ENVIRONMENTAL ASSESSMENT

NONWARHEAD STANDOFF LAND ATTACK MISSILE (SLAM) AND FUTURE MODEL SLAM FIRINGS

24 November 1998

Lead Agency
Department of the Navy
Program Executive Officer (PMA-258)
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Abstract
The following environmental assessment has been prepared in accordance with OPNAV Instruction 5090.1B (1998), Executive Order 12114, and in compliance with Section 102(2)(c) of the National Environmental Policy Act of 1969 and the Council on Environmental Quality Regulations (40 CFR 1500-1508). The proposed action is to conduct firings of nonwarhead SLAM and future model SLAM missiles over the waters of the Naval Air Warfare Center Weapons Division's and Fleet Area Control and Surveillance Facility's Sea Ranges; and over land of the Naval Air Weapons Station (NAWS) China Lake's North and South Ranges using the Trona, California, Controlled Firing Area; and White Sands Missile Range (WSMR) against land targets located on Outlying Landing Field San Nicolas Island (OLF SNI), Naval Auxiliary Landing Field (NALF) San Clemente Island (SCI), and the North Range in California; and on the WSMR in New Mexico. Missiles would be fired for engineering test and evaluation and Fleet training. The missiles would fly preplanned routes. The aircrews would be in constant communication with the missiles and would select the terminal track points via data link after the missile seeker acquires the target. The proposed action would represent a portion of the existing research, development, test and evaluation activities, and training occurring at OLF SNI, NALF SCI, NAWS China Lake, and WSMR.

The main effects of the proposed firings would be due to potential access road and target building pad expansion at SNI and missile impacts. Minor effects would be due to target setup, aircraft and missile noise, jet engine and diesel generator exhausts, and missile recovery activities. These activities would affect air, soil, plants, wildlife, and archaeological resources. No adverse effects are expected from aircraft overflight noise. Preventive measures will exclude the California threatened Island fox from the target buildings on SNI so that no foxes would be harmed. Procedures would be implemented to protect the Desert tortoise at NAWS China Lake. Preventive measures would reduce the risks to users of Trona Gap from possible missile impacts to the insignificant level. Archaeological site CA-SNI-168 (which is eligible for inclusion in the National Register), CA-SNI-169 (which is eligible), and CA-SNI-170 (which is not eligible) are collocated with the SLAM target site on San Nicolas Island. The archaeological value of the resources contained in CA-SNI-168 has been preserved by data recovery, study, and artifact curation in full compliance with the National Historic Preservation Act, Archaeological Resources Protection Act, and Native American Graves Protection and Repatriation Act. The value of site CA-SNI-169 will be similarly preserved before any activities are allowed which might disturb this site. Native American group ceremonial use of Coso Hot Springs would not be disturbed in accordance with the memorandum of understanding. The environmental effects of the proposed action are considered not to be significant: 1) there would be no unmitigated significant cumulative or secondary environmental impacts; 2) the planned tests and training exercises would have no effect on any listed Federal or state endangered or threatened species or significant impact on their critical habitat; 3) the tests and training exercises would not result in any injury of wildlife or harassment of marine mammals; 4) impacts to National Register eligible properties have been and will be mitigated so that there would be no adverse effects; and 5) there is no unresolved controversy concerning the proposed firings. In compliance with the National Environmental Policy Act and consistent with the Council on Environmental Quality Regulations and Executive Order 12114, it has been documented that the proposed action would not result in any significant adverse impact to the human environment. An environmental impact statement is not required.
EXECUTIVE SUMMARY

PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to support the Standoff Land Attack Missile (SLAM) system by conducting testing of all current and future models of the SLAM and providing fleet training in the operational use of the SLAM.

The purpose of test and evaluation firings is to verify that all SLAM technical and operational thresholds have been met. The term “firing” describes a military event where a SLAM is launched, the engine starts and propels the missile, the missile flies a preplanned route, guides and is controlled to a target, and impacts the target. This is distinguished from events where a missile is captive carried on an aircraft wing station but never launched, or is dropped or ejected from an aircraft but the engine is not fired up. Full technical threshold testing of SLAM requires access to both over-water and over-land environments.

The purpose of Fleet training exercise firings is to help ensure that the launch and control crews maintain their proficiency in employing SLAM, and ordnance loading crews maintain their proficiency in loading SLAMs in a carrier environment. Training missions provide the opportunity for the Fleet to expand its knowledge base of SLAM capabilities. Fleet firings serve the additional purpose of verifying that the missile's performance and reliability (in aircraft catapult launches and missile firings) remain at acceptable levels throughout the life cycle of the weapon system.

PROPOSED ACTION

The proposed action is to conduct firings of the SLAM (AGM-84E), SLAM Expanded Response (ER) (AGM-84H), and future models of the SLAM missile from 1998 through 2018. Missiles will fly over parts of Ventura, Kern, Inyo, and San Bernardino Counties in California and over parts of Doña Ana, Lincoln, Otero, Sierra, and Socorro Counties in New Mexico. Missiles flown between the North and South Ranges at NAWS China Lake will use the Trona, California, Controlled Firing Area as a passageway. Missiles will be carried and fired for engineering test and evaluation, and Fleet training. The missiles will fly preplanned routes using a preplanned ingress headings and impact locations. The aircrews will be in constant communication with the missiles and will select the terminal track points via data link after the missile seeker acquires the target. Ground radar operators and flight test engineers will continuously monitor the location and health of every missile that is fired. The use of these target sites is compatible with ongoing range operations and the primary mission of the Naval Air Warfare Center Weapons Division, Point Mugu (NAWCWPNS PM); Space and Naval Warfare Systems Center, San Diego (who manages SCI T&E); NAWS China Lake; and WSMR — to perform test and evaluation, follow-on engineering, and training support for naval weapon systems.

Test and evaluation firings use research, development, test and evaluation (RDT&E) missiles with nonwarhead exercise sections. Fleet training exercises use operationally representative missiles with exercise sections. The actual hardware, software, and launch and control platforms may vary slightly from one test event or training exercise to another. Tests
and training exercises will be conducted on from 2 to 16 operational days per year involving up to 26 missile firings per year. The tests and training exercise firings will be spread among the four ranges according to the requirements of the individual firing. The total program may involve up to 100 T&E missile firings and 300 training exercise firings over its 20 year life (a total of 400). The actual numbers at each range will depend upon future testing and training requirements.

The proposed action includes potential access road and target building pad expansion; target setup; captive carriage of a SLAM to verify infrared (IR) image acquisition prior to a missile launch; missile launch, flight and control; safety aircraft missile chase flights; nonwarhead missile impact; missile recovery; target site clean-up; and required safety and resource protection procedures and mitigation measures.

ALTERNATIVES

Three alternatives were considered for the proposed action: the Preferred Alternative, the Minimum Requirements Alternative, and the No Action Alternative.

Full Requirements (Preferred) Alternative

The preferred alternative is to conduct firings, as required, at all four ranges. As the mission requirements analysis showed (see section 2.3.6) test activities must take place at San Nicolas Island or San Clemente Island, and at NAWS China Lake. WSMR provides the ability to test longer over land flights and missile success against more active countermeasures. San Clemente Island would provide the opportunity to evaluate a second littoral scenario, enhancing the understanding of the missile's capabilities over the single site at SNI. The approximate breakdown of T&E firings by proposed range is: SNI – 25 to 85; SCI – 0 to 20; China Lake – 10 to 50; and WSMR – 5 to 30 (up to 3 per year through 2008). The approximate breakdown of Fleet firings by range is: SNI – 20 to 250; SCI – 0 to 60; and China Lake – 50 to 240.

Minimum Requirements Alternative

Since the Proposed Action is to conduct SLAM testing and training, an alternative to using the four preferred ranges and sites is to use a minimum number of ranges. No single range can satisfy all of the test and training requirements. The minimum number of ranges which can satisfy all of the requirements is two: San Nicolas Island's SLAM target site combined with target sites at NAWS China Lake. The mission requirements analysis shows that ocean environmental tests can be conducted at SNI. The full range of land environmental tests can be conducted at NAWS China Lake. However, desirable longer missile flights over land terrain and more active countermeasures testing would not be possible without the use of WSMR. This alternative is not preferred because it limits the variety of test and training scenarios available and provides less flexibility to meet Navy needs.

No Action Alternative

Under the No Action alternative, T&E firings and Fleet training exercises would not be conducted. The No Action alternative was considered but is not acceptable because it would not provide adequate validation of new missile designs and/or uses, confidence in the missile's performance capabilities, not verify that the missile meets critical test thresholds, nor provide sufficient operational training and deployment readiness.

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION, RESOURCE PROTECTION PROCEDURES, AND MITIGATION MEASURES

Field testing and training exercises are characterized by the occurrence of events as opposed to a continuous activity. Impacts will be restricted to the range and target area—they will not generate pollutants on a continuous basis which might impact local airsheds,
watersheds, or aquifers, nor cause off site impacts such as induced traffic or housing requirements. Environmental analyses of effects on range resources are based on the achievement of a very high degree of missile impact accuracy. Computer simulations are run of each proposed firing as part of its mission planning. The simulations must demonstrate that the probability of missile impact within the target area is greater than 99 percent. Table ES-1 summarizes the environmental effects of the three alternatives.

There are no wetlands within or in the vicinity of any target site. There will be no significant indirect effects. Fuel and manhours are the only nonrenewable resources that will be used by the proposed action. The tests and training exercises will not require the use of nonrenewable resources or energy resources in excessive or disproportionate amounts. Local short term use of these sites will enhance national security and inhibit actions of enemies who might cause severe damage to natural and manmade resources of the United States and will be in accordance with the existing planned uses. Unavoidable adverse environmental effects will consist of the emission of small quantities of air pollutants, generation of noise, and the destruction of a minimal number of common plants in the target site areas.

**Biological Resources Protection Procedures**

Program specific biological resource protection procedures include aircrew briefings prior to each operational day's firings and on-going ground crew briefings; restricted access areas at target sites; and prohibitions against disturbing, harassing, injuring, or feeding any wild plant or animal. Additional procedures at SNI include: physical exclusion of foxes from denning in or under target or storage buildings; adherence to noise abatement procedures; and cleaning of equipment moved to SNI. Island foxes will be physically excluded from the target and storage buildings so that none den in or under the buildings where they might be harmed during a missile impact.

As an environmental safety measure, any missile impact outside of the SNI Area of Potential Effect (APE) or Zone of Disturbance (ZOD) at other target sites will result in an immediate cessation of further firings until the environmental effects and firing procedures can be re-evaluated to prevent a similar target miss. The area of impacts and the need for revising the EA will be re-evaluated. If necessary, a supplement to this EA will then be prepared. Simulation modeling for each firing, aircrew procedures, and flight termination protocol make it highly unlikely that a missile will impact outside of the SNI APE or other ZOD.

The proposed test flights will be rehearsed by captive carrying a SLAM. A captive carry seeker lock-on test will be performed no more than 3 hours before any test to ensure that a satisfactory IR lock-on can be obtained.

An SNI environmental and safety monitoring plan has been established which has four parts: 1) periodic reviews of the missile success rate; and monitoring for 2) wind erosion of soil around the target buildings, 3) biological effects, and 4) archaeological effects. The proposed action is based on the achievement of a very high degree of accuracy in hitting the SLAM target site once the missile is within 10 miles of SNI. A special breeding season monitoring study will be conducted in the next available normal breeding season to assess the effects of aircraft flyovers on migratory birds and marine mammals. This study will include monitoring for effects on Western snowy plovers.

Approval of the Naval Air Station North Island (NAS NI) Natural Resources Office (NRO) will be received prior to the placement of any equipment or instruments outside the boundaries of the MIR on SCI.

NAWS China Lake target sites will be inspected prior to target construction, firings, and recovery actions for the presence of desert tortoises. Any tortoise found will be captured and held until the activity is finished and then returned to the spot where they were collected. Procedures in the Tortoise Management Plant (DON 1992) will be followed.
<table>
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<th>Full Requirements Alternative (Preferred Alternative)</th>
<th>Minimum Requirements Alternative</th>
<th>No Action</th>
</tr>
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<tr>
<td>LAND USE</td>
<td>All activities conducted on active military test ranges consistent with prescribed land use</td>
<td>All activities conducted on active military test ranges consistent with prescribed land use</td>
<td>Current uses would continue</td>
</tr>
<tr>
<td>WATER RESOURCES: Depletion</td>
<td>Very small quantity of water may be used for dust suppression at NAWS China Lake. Not significant</td>
<td>Very small quantity of water may be used for dust suppression at NAWS China Lake. Not significant</td>
<td>No change</td>
</tr>
<tr>
<td>Ocean Water Quality</td>
<td>No discharges of wastewater into any ASBS. An aborted missile could release a very small quantity of JP-10. No detectable harm to marine life.</td>
<td>No discharges of wastewater into any ASBS. An aborted missile could release a very small quantity of JP-10. No detectable harm to marine life.</td>
<td>No change</td>
</tr>
<tr>
<td>Surface Water Quality</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Ground Water Quality</td>
<td>Spilled JP-10 could enter ground water at SNI but would not impact potable human or wildlife water sources. Fuel spilled at any range would be recovered and handled in accordance with standard procedures.</td>
<td>Spilled JP-10 could enter ground water at SNI but would not impact potable human or wildlife water sources. Fuel spilled at any range would be recovered and handled in accordance with standard procedures.</td>
<td>No effects</td>
</tr>
<tr>
<td>AIR QUALITY</td>
<td>Emissions from aircraft, missiles, vehicles, and generators. General conformity determinations not required for SNI or VSMR. SLAM emissions at NALF SCI would be well below de minimis thresholds. JSOW emissions at NAWS China Lake, which are virtually identical to SLAM emissions, were well below de minimis thresholds. SLAM program qualifies for an exemption under 40 CFR 51.853(c)(1) at NALF SCI and NAWS China Lake. Record of Nonapplicability prepared for NALF SCI and NAWS China Lake. Fugitive dust created by vehicles at target sites. No significant impacts.</td>
<td>Emissions from aircraft, missiles, vehicles, and generators. General conformity determinations not required for SNI. JSOW emissions at NAWS China Lake, which are virtually identical to SLAM emissions, were well below de minimis thresholds. SLAM program qualifies for an exemption under 40 CFR 51.853(c)(1). Record of Nonapplicability prepared for NAWS China Lake. Fugitive dust created by vehicles at target sites. No significant impacts.</td>
<td>No effect on existing air quality</td>
</tr>
<tr>
<td>TOPOGRAPHY</td>
<td>Potential change at SNI would be small scale and not significant. No changes to topography at any other sites.</td>
<td>Potential change at SNI would be small scale and not significant. No changes to topography at any other sites.</td>
<td>Local wind will continue to shape dunes on SNI. No effects at other sites.</td>
</tr>
<tr>
<td>SOILS</td>
<td>Missile impact craters will be filled in. Soil erosion control techniques will be used if necessary. No change to soil physical or chemical characteristics. No significant effects.</td>
<td>Missile impact craters will be filled in. Soil erosion control techniques will be used if necessary. No change to soil physical or chemical characteristics. No significant effects.</td>
<td>Sites other than SNI will continue to experience weapon impacts. Current erosive forces continue at all sites.</td>
</tr>
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</table>
### TABLE ES-1. SUMMARY COMPARISON OF ENVIRONMENTAL EFFECTS (Continued).

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<th>Minimum Requirements Alternative</th>
<th>No Action</th>
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<tbody>
<tr>
<td><strong>NOISE</strong></td>
<td>Very short term increases in noise during aircraft flyovers. Noise abatement procedures would be implemented to avoid effects on wildlife at SNI. No change in ambient noise levels.</td>
<td>Very short term increases in noise during aircraft flyovers. Noise abatement procedures would be implemented to avoid effects on wildlife at SNI. No change in ambient noise levels.</td>
<td>No change.</td>
</tr>
<tr>
<td><strong>PLANTS</strong></td>
<td>Potential for some common plants to be destroyed by missile debris. A few native plants grow at SNI site. SCI, NAWS China Lake, and WSMR sites previously disturbed. No significant impact on plants present at any target site.</td>
<td>Potential for some common plants to be destroyed by missile debris. A few native plants grow at SNI site. NAWS China Lake sites previously disturbed. No significant impact on plants present at any target site.</td>
<td>No change. SNI site would be allowed to go fallow. Other sites would continue to be disturbed.</td>
</tr>
<tr>
<td><strong>BIRDS</strong></td>
<td>Missile and aircraft noise and human presence could produce temporary disturbances to the few birds that might be present at all sites. Procedures implemented to avoid adverse effects at SNI. Effects not significant.</td>
<td>Missile and aircraft noise and human presence could produce temporary disturbances to the few birds that might be present at all sites. Procedures implemented to avoid adverse effects at SNI. Effects not significant.</td>
<td>No change</td>
</tr>
<tr>
<td><strong>MARINE MAMMALS</strong></td>
<td>Potential alert reactions from some pinnipeds at SNI. No effects on marine mammals.</td>
<td>Potential alert reactions from some pinnipeds at SNI. No effects on marine mammals.</td>
<td>No change. Continued growth of pinniped populations at SNI and SCI.</td>
</tr>
<tr>
<td><strong>TERRRESTRIAL MAMMALS</strong></td>
<td>Very few mammals present at any target site. Temporary disturbances to mammals possible. Effects not significant.</td>
<td>Very few mammals present at any target site. Temporary disturbances to mammals possible. Effects not significant.</td>
<td>No effects. Effects from other programs would continue.</td>
</tr>
<tr>
<td><strong>ENDANGERED AND THREATENED SPECIES</strong></td>
<td>Resource protection procedures have been established as detailed in the following paragraphs. No taking of any species by injury or death.</td>
<td>Resource protection procedures have been established as detailed in the following paragraphs. No taking of any species by injury or death.</td>
<td>No change to existing conditions.</td>
</tr>
<tr>
<td><strong>MILITARY ACTIVITIES</strong></td>
<td>Continued use of existing target sites. Closure of highways on SNI and SCI and evacuation of facilities at NAWS China Lake on a temporary basis required. SLAM schedules are integrated with other program schedules to minimize disruptions.</td>
<td>Continued use of existing target sites. Closure of highway on SNI and evacuation of facilities at NAWS China Lake on a temporary basis required. SLAM schedules are integrated with other program schedules to minimize disruptions.</td>
<td>Land allowed to go fallow at SNI. Continued use of other target sites. Highway closures and evacuations would continue to be required by other activities.</td>
</tr>
<tr>
<td><strong>FIRE MANAGEMENT</strong></td>
<td>Fire management procedures implemented at SCI and WSMR. Insufficient vegetation to support wildfires at SNI and NAWS China Lake sites.</td>
<td>Insufficient vegetation to support wildfires at SNI and NAWS China Lake sites.</td>
<td>Wildfire risk at SCI and WSMR would continue because of other weapon programs.</td>
</tr>
<tr>
<td>Alternative Component</td>
<td>Full Requirements Alternative (Preferred Alternative)</td>
<td>Minimum Requirements Alternative</td>
<td>No Action</td>
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</tr>
<tr>
<td>INFRASTRUCTURE</td>
<td>Minimal risk that power and telephone lines running along SCI's Ridge Road could be damaged by missile debris.</td>
<td>No effects.</td>
<td>No effects.</td>
</tr>
<tr>
<td>AIRSPACE</td>
<td>No change to airspace restrictions at any range.</td>
<td>No change to airspace restrictions at any range.</td>
<td>No change in airspace restrictions.</td>
</tr>
<tr>
<td>ARCHAEOLOGICAL RESOURCES</td>
<td>Damage to archaeological sites at SNI mitigated to level of no adverse effects (see below). No archaeological or historical resources located at any other target site.</td>
<td>Damage to archaeological sites at SNI mitigated to level of no adverse effects (see below). No archaeological or historical resources located at any other target site.</td>
<td>Natural wind erosion could damage resources at SNI. No effects at other sites.</td>
</tr>
<tr>
<td>CULTURAL RESOURCES</td>
<td>SLAM firings would be conducted in accordance with MOA so that there would be no noise disturbance to Coso Hot Springs ceremonial use by Native American groups.</td>
<td>SLAM firings would be conducted in accordance with MOA so that there would be no noise disturbance to Coso Hot Springs ceremonial use by Native American groups.</td>
<td>No effects</td>
</tr>
<tr>
<td>PUBLIC SAFETY</td>
<td>Range control and target site procedures are designed to make testing safe.</td>
<td>Range control and target site procedures are designed to make testing safe.</td>
<td>No generation of actions which could create a risk.</td>
</tr>
</tbody>
</table>
The WSMR Environmental Office will conduct surveys of the target sites for Northern aplomado falcons two weeks prior to their use. If falcons are present the firing operation will be delayed until they leave. Recovery of any missile which impacts outside of the target area will be coordinated with the WMSR Environmental Office. Recovery operations will be restricted to existing accesses (where possible), any fires will receive rapid response to put them out, and biological surveys will be conducted either prior to or concurrent with entry into areas outside the target sites.

Mitigation measures to protect the SCI mesa grassland from wildfire will consist of maintaining fire breaks around the target site and having a US Forest Service fire fighting helicopter standing by during the fire season. The grassland in the vicinity, within the firebreaks, may be pre-burned both to aid in the location of archaeological sites and to reduce fire fuel.

A fire at the WSMR J-140 target site could spread some distance in the grama grassland. The target sites will be mowed to reduce chance of starting and spreading fire.

Archaeological Resources Protection Procedures and Mitigation Measures

Program specific archaeological resource protection procedures include aircrew briefings prior to each flight and on-going ground crew briefings; restricted access areas at the target sites, restricted access means and routes; reporting new discoveries; and prohibiting collection of artifacts. Archaeological sites near the target sites that require protection have been and would be marked by representatives of the respective range environmental offices. Off-road travel would be minimized and marked areas would be avoided. Missile recovery crews will coordinate their actions with range environmental representatives prior to recovering any missile which impacts outside a target APE or ZOD.

The SLAM target site on SNI is collocated with archaeological site CA-SNI-168. Archaeological site CA-SNI-169 is located just north of the target complex within the APE. Sites CA-SNI-168 and CA-SNI-169 are valuable for the scientific information they contain. Impacts to archaeological site CA-SNI-168 were mitigated by a data recovery program which substantially preserved the value of the site and was performed in accordance with the applicable professional standards and guidelines contained in the Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (48 FR 44734 - 44737). All material collected during data recovery is being retained and stored at the NAWS Point Mugu's environmental facility on SNI in accordance with 36 CFR 79, Curation of Federally Owned and Administered Archeological Collections. The California State Historic Preservation Officer and the national Advisory Council on Historic Preservation concur with the finding of no adverse effects. Potential impacts to CA-SNI-169 will be mitigated by a similar data recovery program before any activities are allowed which might disturb this site.
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</tr>
<tr>
<td>MSL</td>
<td>Mean sea level</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>National Ambient Air Quality Standards</td>
<td></td>
</tr>
<tr>
<td>NAGPRA</td>
<td>Native American Graves Protection and Repatriation Act</td>
<td></td>
</tr>
<tr>
<td>NALF</td>
<td>Naval Auxiliary Landing Field</td>
<td></td>
</tr>
<tr>
<td>NAS</td>
<td>Naval Air Station</td>
<td></td>
</tr>
<tr>
<td>NAVFAC</td>
<td>Naval Facilities Engineering Command</td>
<td></td>
</tr>
<tr>
<td>NAWCWPNS</td>
<td>Naval Air Warfare Center - Weapons Division</td>
<td></td>
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<tr>
<td>NAWS</td>
<td>Naval Air Weapons Station</td>
<td></td>
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<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
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<tr>
<td>NHPA</td>
<td>National Historic Preservation Act</td>
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</tr>
<tr>
<td>NI</td>
<td>North Island</td>
<td></td>
</tr>
<tr>
<td>NM</td>
<td>Nautical mile</td>
<td></td>
</tr>
<tr>
<td>NMFS</td>
<td>National Marine Fisheries Service</td>
<td></td>
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<tr>
<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration</td>
<td></td>
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<tr>
<td>NOS</td>
<td>National Ocean Service</td>
<td></td>
</tr>
<tr>
<td>NOTAMS</td>
<td>Notices to Airmen</td>
<td></td>
</tr>
<tr>
<td>NO₂</td>
<td>Nitrogen dioxide</td>
<td></td>
</tr>
<tr>
<td>NOₓ</td>
<td>Nitrogen oxides</td>
<td></td>
</tr>
<tr>
<td>NRO</td>
<td>Natural Resources Office</td>
<td></td>
</tr>
<tr>
<td>NTC</td>
<td>Navy Test Conductor</td>
<td></td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Definition</td>
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<td>--------------</td>
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</tr>
<tr>
<td>O</td>
<td>Outlying landing field</td>
<td></td>
</tr>
<tr>
<td>OPNAV</td>
<td>Office of the Chief of Naval Operations</td>
<td></td>
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<tr>
<td>O₃</td>
<td>Ozone</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>Pascal</td>
<td></td>
</tr>
<tr>
<td>Pa</td>
<td>Parts per million</td>
<td></td>
</tr>
<tr>
<td>PM</td>
<td>Point Mugu</td>
<td></td>
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<tr>
<td>PMED</td>
<td>Point Mugu Environmental Division</td>
<td></td>
</tr>
<tr>
<td>PM₁₀</td>
<td>Particulate matter less than 10 microns in size</td>
<td></td>
</tr>
<tr>
<td>ppm</td>
<td>Parts per million</td>
<td></td>
</tr>
<tr>
<td>psi</td>
<td>Pounds per square inch</td>
<td></td>
</tr>
<tr>
<td>PST</td>
<td>Pacific Standard Time</td>
<td></td>
</tr>
<tr>
<td>RCC</td>
<td>Range control center</td>
<td></td>
</tr>
<tr>
<td>ROC</td>
<td>Reactive organic compounds</td>
<td></td>
</tr>
<tr>
<td>RONA</td>
<td>Record of non-applicability</td>
<td></td>
</tr>
<tr>
<td>rpm</td>
<td>Revolutions per minute</td>
<td></td>
</tr>
<tr>
<td>RSOP</td>
<td>Range safety operational plan</td>
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</tr>
<tr>
<td>S</td>
<td>State ambient air quality standards</td>
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</tr>
<tr>
<td>SAAQS</td>
<td>South Coast Air Quality Management District</td>
<td></td>
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<tr>
<td>SCAQMD</td>
<td>South Coast Air Basin Management District</td>
<td></td>
</tr>
<tr>
<td>SCAB</td>
<td>Southern California Bight</td>
<td></td>
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<tr>
<td>SCI</td>
<td>San Clemente Island</td>
<td></td>
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<tr>
<td>SCS</td>
<td>Soil Conservation Service</td>
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<tr>
<td>SDAPCD</td>
<td>County of San Diego Air Pollution Control District</td>
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<tr>
<td>SEL</td>
<td>Sound exposure level</td>
<td></td>
</tr>
<tr>
<td>SHOBA</td>
<td>Shore bombardment area</td>
<td></td>
</tr>
<tr>
<td>SHPO</td>
<td>State historic preservation officer</td>
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<tr>
<td>SIP</td>
<td>State implementation plan</td>
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<tr>
<td>SLAM</td>
<td>Standoff Land Attack Missile</td>
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</tr>
<tr>
<td>SLAM ER</td>
<td>Standoff Land Attack Missile Expanded Response</td>
<td></td>
</tr>
<tr>
<td>SNI</td>
<td>San Nicolas Island</td>
<td></td>
</tr>
<tr>
<td>SO₂</td>
<td>Sulfur dioxide</td>
<td></td>
</tr>
<tr>
<td>SWFSC</td>
<td>Southwest Fisheries Science Center</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>Degrees true north</td>
<td></td>
</tr>
<tr>
<td>T&amp;E</td>
<td>Test and evaluation</td>
<td></td>
</tr>
<tr>
<td>TAMPS</td>
<td>Tactical Automated Mission Planning System</td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>Ultra high frequency</td>
<td></td>
</tr>
<tr>
<td>USFWS</td>
<td>United States Fish and Wildlife Service</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Ventura County Air Pollution Control District</td>
<td></td>
</tr>
<tr>
<td>VFR</td>
<td>Visual flight rules</td>
<td></td>
</tr>
<tr>
<td>VHF</td>
<td>Very high frequency</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>White Sands Missile Range</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>Zone of disturbance</td>
<td></td>
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<tr>
<td>ZOD</td>
<td>Zone of disturbance</td>
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</tbody>
</table>
CHAPTER 1

PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

This environmental assessment (EA) evaluates the potential environmental effects of testing of and training with the Standoff Land Attack Missile (SLAM) and its future models at established military test ranges in the southwestern United States. This document presents the purpose of and need for the proposed action, details alternatives to the proposed action, describes the affected environment, and analyzes potential impacts to the environment from the proposed action and alternatives. This document has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code (USC) §§ 4321 et seq. (1994)), the Council on Environmental Quality (CEQ) implementing regulations (40 Code of Federal Regulations (CFR) 1500-1508 (1997)), and Navy guidelines (Chief of Naval Operations Instruction (OPNAVINST) 5090.1B (1998)). The Navy is the lead agency for the decision regarding the proposed testing of and training with SLAM missiles.

SLAM launches may occur up to 200 nautical miles (NM) from the California coast. Therefore, this environmental assessment is also prepared in accordance with Executive Order 12114, Environmental Effects Abroad of Major Federal Actions (EO 12114, 32 CFR 187, reprinted in 10 USC 131), which requires federal agencies to assess environmental impacts when major federal actions may significantly affect the environment of the global commons outside the jurisdiction of any nation. US Navy procedures for applying EO 12114 have interpreted it to pertain to actions occurring beyond the limit of US territorial seas at 12 NM.

1.2 PURPOSE OF THE PROPOSED ACTION

The purpose of the proposed action is to support the SLAM system by conducting testing of all current and future models of the SLAM and providing fleet training in the operational use of the SLAM.

The purpose of test and evaluation firings is to verify that all SLAM technical and operational thresholds have been met. The term "firing" describes a military event where a SLAM is launched, the engine starts and propels the missile, the missile flies a preplanned route, guides and is controlled to a target, and impacts the target. This is distinguished from events where a missile is captive carried on an aircraft wing station but never launched, or is dropped or ejected from an aircraft but the engine is not fired up. Full technical threshold testing of SLAM requires access to both over-water and over-land environments.

The purpose of Fleet training exercise firings is to help ensure that launch and control crews maintain their proficiency in employing SLAM, and the ordnance loading crews maintain their proficiency in loading SLAMs in a carrier environment. Training missions provide the opportunity for the Fleet to expand its knowledge base of SLAM capabilities. Fleet firings serve the additional purpose of verifying that the missile's performance and reliability (in aircraft catapult launches and missile firings) remain at acceptable levels throughout the life cycle of the weapon system.

1.3 NEED FOR THE PROPOSED ACTION

SLAM is one of a very few missiles in the US Navy's arsenal that is capable of being fired from a range beyond that of typical anti-aircraft defenses. Continual development of the SLAM weapon system is needed to maintain the combat effectiveness of the Navy's missile capabilities into the next century. SLAM improvements will provide:

- enhanced launch platform and missile survivability,
• reduced vulnerability to countermeasures,
• increased attack success (both in strike precision and in weapon effectiveness),
• increased operational flexibility to meet current and projected threats,
• improved pilot-aircraft-missile interfaces, and
• maintain compatibility with other weapon systems such as launch and control aircraft.

Fleet firings are needed because the SLAM weapon system is a procedure intensive weapon. Use of the system requires a thorough understanding of its theory of operation and the varied elements that support its functionality. The Fleet needs to fire missiles against wartime representative target sites, requiring both sea and land environments.

Within the range of developmental tests and fleet training firings covered above the specific purpose of and specific need for each launch and the actual hardware, software, and launch and control platforms may vary slightly from one test event or training exercise to another.
CHAPTER 2

PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

Chapter 2 is divided into five parts: 1) introduction, 2) SLAM history and description of the SLAM and typical firing activities, 3) mission requirements, 4) description of the proposed action, and 5) alternatives.

2.2 PROGRAM HISTORY AND DESCRIPTION

2.2.1 History

SLAM was originally developed as an interim short term use missile using off-the-shelf components. Missile Developmental Testing began in December 1988. Operational testing was completed in December 1990 and the missile was introduced into the Fleet in early 1991. The initial production run was increased following successful employment in Operation Desert Storm. Fleet squadrons have conducted training firings which exercise all phases of a SLAM operation since 1992. The SLAM program became a permanent program in 1995 when the Tri-Service Standoff Attack Missile was canceled.

Deficiencies in the SLAM missile were uncovered during Desert Storm, operational test and evaluation, and Fleet experience with SLAM. The McDonnell Douglas Company began development of SLAM Expanded Response (ER) in 1994 to overcome these deficiencies, which have since involved four successful firings.

2.2.2 Missile Description

The SLAM is a medium-range conventional (as opposed to nuclear) standoff weapon (Figure 2-1). It is capable of surgical strikes on fixed targets in day, night, or marginal weather. SLAM and its derivative missiles are specifically designed to attack non-hardened land targets (targets which have not been reinforced to withstand a missile or bomb attack) and ships in port.

In layman’s terms the SLAM missile is a tubular shaped jet aircraft with six or eight wings depending upon the configuration. It is guided by a computerized autopilot system flying a pre-programmed route from its launch point toward its target or a direct route towards a pre-entered location. The autopilot system incorporates continuous receipt of location signals from Global Positioning System (GPS) satellites and inertial guidance. When it predicts that it is close enough to its target, it turns on its television camera for accurate pointing into the target. This pointing is aided by direct communication with a Navy pilot watching the TV image. This camera sees infrared (IR) “light”. SLAM missiles can be launched from one aircraft and controlled by either the same aircraft or by a different aircraft.

SLAM missiles are comprised of three major sections: guidance, exercise, and sustainer; and a fourth minor section: control. The control section consists of a cylindrical shell that goes around the end of the jet engine. This shell contains the four control fins that provide flight control. The joining of the missile sections creates a slick missile to which wings are added. Figure 2-1 illustrates the locations of the missile sections and components of both the baseline SLAM and its immediate successor the SLAM Expanded Response (ER). Table 2-1 gives attributes of the baseline SLAM and SLAM ER. Additional details on the SLAM weapon system are given in Appendix A. For ease of discussion, the term SLAM will imply all current and future models of SLAM unless the text indicates otherwise.
Figure 2-1. SLAM and SLAM ER Missile Sections and Components.
TABLE 2-1. SLAM AND SLAM ER PHYSICAL CHARACTERISTICS.

<table>
<thead>
<tr>
<th></th>
<th>SLAM</th>
<th>SLAM ER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length, cm (in)</td>
<td>445 (175.19)</td>
<td>437 (172.0)</td>
</tr>
<tr>
<td>Diameter, cm (in)</td>
<td>34.3 (13.5)</td>
<td>34.3 (13.5)</td>
</tr>
<tr>
<td>Weight, kg (lb)</td>
<td>620 (1366)</td>
<td>680 (1500)</td>
</tr>
</tbody>
</table>

2.2.2.1 Exercise Section

The missiles used for these firings are configured with an exercise (or practice) section, which replaces the warhead section. The exercise section facilitates tracking the missile during flight, allows retrieval of in flight missile performance data via a telemetry system (which allows for monitoring the health of the missile), and allows the missile to be flight terminated upon command using a flight termination system (FTS). The exercise section contains a single FTS silver-zinc battery. The exercise section contains a 65 pound lead ballast used to give the exercise section the same mass and center of balance as the warhead section. This causes the exercise missiles to fly the same as a live warhead missile.

2.2.2.1.1 Flight Termination System

A FTS must be installed in a missile whenever that missile or any stage of that missile has the ability to violate its impact limit lines (safety footprint). Missile termination occurs when a range command destruct signal is sent or the missile fail-safes. Flight termination occurs when engine fuel is cutoff (causing loss of thrust) and the control fins are turned to fly the missile hard into the ground.

2.2.2.2 Sustainer Section

The sustainer section includes a turbojet engine, a fuel tank with JP-10 fuel, and two silver-zinc batteries. SLAMs are fueled during missile assembly at the factory with 132 pounds (16.9 gallons) of JP-10 and then sealed. The two missile batteries are housed in a single case and are activated just before the missile is launched. The SLAM and SLAM ER use the same engine.

2.2.2.3 SLAM and SLAM ER Hazardous Items

SLAM and SLAM ER employ a number of energy devices which, upon activation or destruction, could result in injury to personnel and/or damage to equipment. These sources of energy release have been termed "hazardous items" and include explosive devices, spring loaded devices, jet fuel, pressure vessels, and radio frequency radiation devices (power density > 0.001 watt/cm²). Pyrotechnical devices provide energy for starting and igniting the engine, SLAM ER wing deployment, probe extension, and battery initiation. The only live pyrotechnical device left in the baseline SLAM just before impact is the FTS fuel cut off device. All SLAM ER missile electro-explosive devices are expended before impact. Once the missile impacts the ground the radiation devices will be nonfunctional. Table A-1 lists the hazardous items that are found in SLAM and SLAM ER missiles.

SLAM and SLAM ER use cadmium plated electrical connectors and small structural fasteners where required by galvanic compatibility constraints and parts availability. The most common use of an US Environmental Protection Agency (EPA) 17 material is the use of chromium in corrosion control coatings (sealing of anodic coating, chromate conversion coating of aluminum for low electrical resistance bonding, and chromated primers used for adhesive bonding and as a paint base). Nickel plating is used in some cases as an alternative to cadmium. (EPA 17 chemicals are items on a list of 17 derived from the most heavily used Toxic Release Inventory reported pollutants. These chemicals are mostly chlorinated solvents and heavy metals. Industry alternatives are still being evaluated for the EPA 17 chemicals, and, until adequate alternatives are identified and the implementing processes developed at MDA, the
existing technology materials will, of necessity, be used.) SLAM ER does not use any Ozone Depleting Substance (ODS) Class I materials.

2.2.3 Typical Firing Activities

Firing activities include setting up the target site's ground to receive the target buildings, setting up the buildings, setting up the instrumentation (both semi-permanent and temporary), firing the missile, recovering the missile pieces, cleaning up the target site itself following both individual impacts and at the end of the program. A typical SLAM firing starts with the planning for that one missile and ends with its performance evaluation. Appendix B contains detailed descriptions of the concept of missile testing (B.1), typical firing events in chronological order (B.2), range control operations (B.3), selected detailed range safety procedures (B.4), and contingency planning (B.5).

2.2.3.1 Target Setup

The Fleet and test communities would like the opportunity to fire missiles at targets which are representative of real targets. These targets include structures representing command and communications buildings, towers, industrial buildings, and storage bunkers. Representative targets are constructed out of ocean going cargo vans. Typical individual van dimensions are 8 feet high by 8 feet wide by 20 feet long. These vans are stacked, arranged, and tied down with steel cables. Several different surface treatments such as stucco or paint might be used to make the vans more closely resemble wartime targets. Thermally significant signatures are created with the placement of electric heaters in selected vans. The electricity comes from portable diesel generators located on-site. Target maintenance may be required after each operational day to restore heaters and present an "undamaged" view to the missiles. Targets will be reconfigured in the existing complexes to satisfy test objectives or optimize target presentation for training. Figure 2-2 shows a sample target layout at SNI.

2.2.3.1.1 Power Requirements

Generators are located at the site to power the electric heaters, cameras and lights for after dark impacts. These generators are located as far away from the planned impact area as possible to reduce the risk of damage. The generators and heaters will be turned on before each scheduled firing so that the buildings will be warm for the missile seeker and to power the visual and communications equipment, and lights (if they are needed). Fuel for the diesel generators will be delivered by fuel trucks as needed.

2.2.3.1.2 Target Site Logistics

Cargo vans are cleaned, painted, and fitted with heaters at the local public works shop. They are then transported by tractor trailer for set up at the target site. Damaged vans will be removed from the target site and temporarily stored near the target site. They will be repaired or cut up. Nonreusable vans will be transported back to the public works shop for disposal; they will be not left in the vicinity of the target sites. Nonreusable vans will be removed within twelve months of their last use as a target.

2.2.3.2 Missile Captive Carriage

The following paragraphs describe the SLAM specific events leading up to and through the pre-firing captive carriage test to verify IR image acquisition. (Additional events that occur with every missile firing on any military range are presented in Appendix B.) SLAM program and range personnel will perform the following activities during a typical firing:

- Develop pre-planned missions. Missile missions will be created and entered into the Tactical Automated Mission Planning System (TAMPS) (Appendix A.2) in conjunction with the SLAM Mission Planning Module (Appendix A.3) or created using the Mission Planning Handbook and entered into the Missile Initialization Unit approximately one week prior to the scheduled test.
Figure 2-2. Sample Target Site Configuration
• Run the pre-planned missions on the NAWCWPNS PM's SLAM/SLAM ER missile simulator to verify each scenario, and predict what should happen during the flight.

• A final face-to-face meeting (within four hours of the operation) will be held between the flight test personnel, most importantly all test engineers and pilots, to go over the operation requirements and procedures, and safety issues.

• Launch platform will carry the missile to designated launch area accompanied by second/backup/chase aircraft.

• Exercise all phases of the weapon system before the live launch with captive carry flights. In simulated flight mode, the weapon controller will interact with the missile (which is being captive carried) in order to rehearse for the actual missile launch and ensure that a satisfactory lock-on can be obtained early in the terminal phase. A captive carry seeker lock-on test will be performed no more than 3 hours before any firing to be sure IR conditions are acceptable. The captive carry aircraft will simulate the missile run in to the target by flying at missile representative speeds and altitudes (typically greater than 500 feet AGL) until it is within one half mile from the target. A second aircraft may preview the target site to verify that no clouds are present when firing on SNI or SCI.

• Verify missile initialization from telemetry, targeting parameters and aircraft timing, and that the range is safe.

2.2.3.3 Missile Launch, Flight, and Control

The missile actions beginning with missile launch up to missile impact are:

• Missile acquires GPS ephemeris data, is launched, and flies first pre-planned phase of flight. Waste gases consist of engine exhausts.

• Missile autonomously flies pre-planned flight profile. The missile flies subsonically, but at more than 400 miles per hour (587 feet per second). The missile will typically fly in to the target at near sea level or ground level elevations. (The midcourse flight path may contain as many as seven way point turns or altitude changes, and can be either over land or water.) The missile chase aircraft will follow the missile to the vicinity of the target site and then climb away.

• Missile transmits seeker video and receives target track commands during terminal phase. The weapon data link transmits the seeker video at the pre-planned distance from the target to the control aircraft via the aircraft's data link pod. The data link pod is a receiver/transmitter device that receives video from the SLAM, and sends command data to the weapon via a radio frequency link to control the missile. The operator examines the seeker video to locate the target, and sends track point update commands to the missile telling it the target track point.

• Missile tracks and guides toward track point. The operator monitors the video and, if required, updates the track point.

• Missile executes pre-planned terminal maneuver prior to impacting the target.

SLAMs will typically be launched at more than 50 nautical miles (NM) from the target depending on scenario requirements. Launch and control aircraft typically fly above 500 feet mean sea level (MSL) on the Sea Range and more than 1500 feet AGL over land ranges. The control aircraft will usually be located so that it can communicate with the missile via a data link pod. Normal test scenarios consist of one aircraft, carrying one SLAM (more than one may be carried) and a data link pod, performing both the launch and control aircraft duties, with a second aircraft, also carrying a SLAM and a data link pod, performing backup launch/control duties. During training exercises the aircraft may carry two missiles. Typical launch and control aircraft are similar to FA-18s and may include aircraft similar to P-3s. For on-range flights,
aircraft may be configured with internal or external C-Band Beacons or Extended Area Test System units for positive tracking.

2.2.3.4 Safety Chase Aircraft Flights

An aircraft will observe missile separation at launch for all air-to-surface missile firings for safety reasons. This aircraft may film the missile as it is launched. Once launched the missile will be chased by either the observer or launching aircraft until the missile gets near the target. The chase aircraft provides an alternate tracking-radar target in the event that the missile radar transponder fails. Figure 2-3 shows a chase aircraft path at SNI.

2.2.3.5 Nonwarhead Missile Impact

Since the targets are empty sheet metal cargo vans, each missile will eventually impact the ground, either through the cargo vans or directly. Deformation of the missile on impact determines the size of the pieces that are to be picked up during the recovery operations and to some extent the ability to collect all of the wires, nuts, and bolts. The degree of missile deformation varies primarily with the velocity of the missile at impact, but other factors also affect deformation, such as: density of the missile and its components; design and strength of the missile and its components; missile size and shape; and orientation and trajectory at impact. SLAM missiles are fragmented and broken into separate scattered contorted pieces. Debris from the target building, missile, and the crater soil scatter into the area around the targets. The actual debris pattern depends upon which target is used, the wind, and the missile trajectory.

Waste gases may include evaporated or burned jet fuel. The majority of the jet fuel in the missile will be used up during its flight leaving less than four (4) gallons at impact. Shorter flight times could leave up to a maximum of seventeen (16.9) gallons.

2.2.3.6 Missile Recovery

SLAM missile recovery procedures consist of checking for fires, turning heaters and generators off, collecting event films and cameras, and cleaning up the missile debris and target site. Cameras placed outside the disturbed target area will be recovered by personnel on foot, or existing roads will be used.

Recovery of missile parts and pieces will begin on the next business day following a firing. All missile pieces will be collected by SLAM program personnel and placed in plywood boxes on flatbed trucks or in the back of a pick-up truck. Vehicle recovery activities will be restricted to existing roads and graded areas. Big pieces may require the assistance of a crane, 4x4, tracked vehicle, or winch to move them from the impact site to a road where they can be picked up and placed on a truck. During recovery of missile parts and pieces, lead ballast pieces will be separated out for lead recovery. Since cadmium and nickel used to plate several parts and chromium used to coat parts comprise a very small total weight, and these parts and pieces are expected to be almost completely recovered, insignificant amounts of EPA 17 materials are expected to be left at the impact sites where they might affect the environment. Should a missile impact the ocean in deep water it will be abandoned in place because recovery operations are dangerous and cost prohibitive. Recovery operations in waters over 150 feet deep require the use of submersible vehicles to both search for and recover the missile. These operations would subject the divers to the usual hazards of deep water activities, and require potentially significant lengths of time at sea.

2.2.3.7 Target Site Clean-up

Non-reusable cargo vans will be moved to the public works shop within 12 months of their last use. These vans will not contain any hazardous substances since the skins of the missiles do not contain any such substances, the missiles will pass through the vans, and all
Figure 2-3. Typical Firing Altitude Profile at SNI.
missile parts and pieces will be recovered from the vans before they are moved. Missile debris will be recovered, demilitarized and disposed of in accordance with DOD Regulation 4160.21-M-1, Appendix 4, and pertinent local directives.

The program office will clean up the target site upon completion of the test and training programs unless an on-going need exists to keep the targets intact. Boxes, cargo vans, cables, tripods, generators, missile debris, etc., will be removed from the site. Surface contours will be modified as required by the local range environmental office (for such things as controlling wind driven soil erosion) upon completion of all test and training firings.

2.2.3.8 Target Site Visual Equipment Setup and Recovery

Testing and performance checking require high-speed missile impact photographic and video records. Camera coverage includes up to two film cameras and one video camera focused on each target structure and one video camera covering the entire target scenario. The photographic and video equipment will be placed around the intended target to obtain the best viewing angle at the safest distance. Cables for camera power and data transmission will be laid down and left in place until the tests and exercises are completed or they are no longer needed. On each operational day:

- Cameras will be placed and loaded with film and pictures taken, and
- Film will be recovered and equipment stored.

The cameras will be controlled from the range operations control room so that the film in them will last long enough to take pictures of all of the day’s missile impacts. The video cameras run the whole time the range is scheduled for SLAM operations. The film cameras will be turned on remotely just in time for the missile impacts and then turned off so that one roll of film can be used for all of the missile impacts on that day.

2.2.4 Firing Management

NAWCWPNS is the principle Navy Research, Development, Test and Evaluation (RDT&E) activity (organization) for air warfare and missile systems within the Naval Air Systems Command (NAVAIR). NAWCWPNS is funded by Congress through NAVAIR to develop new weapon systems and manage existing systems. A large portion of its staff consists of engineers and technicians. NAWCWPNS headquarters is located at China Lake. NAWCWPNS has two field activities which conduct local operations: Point Mugu, and White Sands. NAWS China Lake and NAWS Point Mugu are different Navy organizations from NAWCWPNS. The NAWS organization “owns” the real estate, and is responsible for maintaining the airfield, buildings, roads, radar systems, public works, etc. Naval Air Station (NAS) North Island (NI) in San Diego owns San Clemente Island. Use of the Missile Impact Range (MIR) will be coordinated through the Space and Naval Warfare Systems Center, San Diego.

NAWCWPNS Point Mugu (PM) has been designated as the lead US Navy field activity for SLAM T&E, and the NAWCWPNS PM Harpoon Program Officer has been designated as the Developmental Test Director for SLAM flight testing. SLAM Test and Evaluation Master Plans and the SLAM Integrated Master Test Plans govern the planning, coordination, and execution of all US Navy SLAM and contractor test and evaluation activities throughout the program. The Integrated Master Test Plan contains the test matrix which was developed to meet all the requirements for a comprehensive evaluation program, limited to essential testing, and minimizing redundancy. This approach emphasizes simulation, captive carriage testing on aircraft, and SLAM commonality with Harpoon and any previous SLAM models to minimize the number of missile firings. The captive carriage test program is not covered by this EA since such aircraft and flights are a part of ranges’ ongoing operations.
NAWCWPNS PM serves as the local representative of Fleet units (Navy operational as opposed to management or development units). NAWCWPNS PM schedules range time and supports the conduct of Fleet training exercises.

2.3 MISSION REQUIREMENTS

Selection of the preferred ranges and sites is based on the needs of the proposed test and evaluation, and Fleet training firings; and on range and site requirements that support these needs. Target characteristics do not affect the selection of a range and site for the proposed action.

2.3.1 Test & Evaluation Requirements

Every DoD weapon system is developed to the requirements of an Operational Requirements Document. This document lays out the technical and operational thresholds that must be met to accept the weapon system and desirable objectives that the DoD would like the weapon system to meet. The range and target site combinations selected for the proposed SLAM firings must support testing of criteria in the following areas:

- **Sea environment.** SLAMs require both ocean environments and land environments for full testing and training of the weapon system. These involve testing the seeker’s ability to track a target point.
  - Sea-to-land transition. The seeker’s active range limits the distance that target sites can be inland from the shore line and still serve the purpose of showing water in the field of view for testing and training purposes.
  - Humid environment.
  - Cold water background.

- **Land environment.** Most of the targets that will be attacked by SLAMs will be on land. Therefore, representative wartime target scenarios must be tested using flights where there is no ocean to provide a visual clue to the target’s location.
  - Adaptive terrain following. While adaptive terrain following can be tested over the smooth ocean, full testing requires a significant distance of over land flying including an over-land launch.

- **Space for missile flight and control.** The range’s property and airspace restrictions (including sea range warning areas) must support clearing the necessary missile safety footprint. Since the missile can be fired from distances greater than 50 miles, a large safety footprint is involved. This box or polygon (depending upon missile waypoints and terrain used and flight distance requirements) may be up to 30 miles wide and over 115 miles long. Minimum requirements are a box 8 miles wide and 50 miles long to conduct the shortest flight distance tests.
  - Maximum missile flight range. Maximum ranges can only be tested at sea because of the limited land available for straight flights over military ranges.
    - Low altitude launch (and low altitude over land)
    - High altitude launch
    - Maximum control range
    - Long control range over land

- **Launch envelope.**
  - Near sea level launch
  - Low above ground level (AGL) launch
  - Low AGL over high elevation ground launch
  - High altitude
  - Cold day tests
  - Hot day tests
• **Countermeasures.** Countermeasures testing requires significant distances from commercial traffic so that this traffic is not put at risk from loss of radio or radar signals due to jamming.

• **Target site elevation.** The requirements document specifies that the missile be able to attack targets both at sea level and at a high elevation (above 7000 feet).
  - High elevation site
  - Low elevation site

### 2.3.2 Fleet Training Requirements

Training of Navy aircrews in the use of SLAM requires over-water launches as well as over-land launches. Over-water launches require a target site that is less than 15 miles from a coast. Over-land launches require a target site that is more than 15 miles from a coast. Land environment targets must be reachable via a maximum of one in-air refueling while traveling to the target site from an aircraft carrier and one on the return trip for training purposes. Therefore, the maximum distance that an over-land launched missile’s target can be from the coast is 200 miles. For complete training purposes aircraft must be able to launch from aircraft carriers. To provide for maximum training effectiveness for squadrons assigned to an aircraft carrier both the over-water target(s) and the over-land launched target(s) must be within this same radius from the carrier.

- **Variety of Wartime Representative Targets** — The Fleet needs a variety of target sites that can represent wartime scenarios. Varied topographic settings enable the Fleet pilots to prepare for wartime situations.
- **Ocean Environment.** The selected combination of ranges and target sites must support over-water and over-land firings for Fleet training.
- **Land Environment**
- **Accessibility from Aircraft Carrier** — The Fleet desires to conduct their training missions from the deck of an aircraft carrier. Since FA-18s can only fly approximately 200 miles as a combat radius with in-air refueling, any land range target site must be within this distance from the Pacific Ocean to be usable.

### 2.3.3 Range Requirements

The minimum range requirements for testing SLAM and improved SLAMs are:

- **Provide an operating area that can be surveyed and controlled for aircraft and ships** (as appropriate for inland and sea ranges). Public Safety (Airspace Control and Surveillance) must not be compromised. The test range over which the missile flies should have a minimal amount of non-military aircraft and ship traffic. Range must be able to support hazard footprint boundaries. Missile flight must not unduly expose civilian or military populations to the risk of a missile impact.
- **Provide for missile flight over government controlled land or deep water for security reasons.** This will enable the Navy to either pick up the parts and pieces or prevent others from recovering the parts and pieces.
- **Provide existing target sites that do not contain critical habitat or undisturbed cultural resources.** Existing sites will have adequate resource data to support analyses of impacts and existing procedures and setups for firing event instrumentation.
- **Provide instrumentation to track and record the missile flight through the entire pre-launch and launch profile.** These antennas include C-Band tracking radars, flight termination transmitters, telemetry, and UHF communications. Of particular concern is earth curvature allowances (over-the-horizon) for low-altitude missile profiles, and terrain masking by hills and mountains between the antennas and the missile.
Provide real time SLAM digital telemetry receipt, recording, and display allowing the missile functions (health) to be monitored in the control room and for post flight analysis of the operation.

Provide precise aircraft [launch, control, and chase (and surveillance, where necessary)] and missile tracking. The position and time information will be recorded continuously for post-operation analysis.

- Provide frequency monitoring facilities (to resolve radio frequency interference). Frequency interference control is necessary because of telemetry requirements for missile tracking, monitoring missile guidance and control operations via data link from the exercise section of the missile, and monitoring and control of the missile via the operational missile's data link with the controlling aircraft.
- Provide two dedicated UHF voice communications frequencies. Second frequency provides a back-up for safety purposes.
- Provide weather monitoring and forecasting capabilities. Public safety and firing success depend upon knowing what the weather is and what it will be before and during the firing.
- Provide regular and sufficient clear weather to support the firings.
- Provide support for the proposed launch and control aircraft either on base or very near the base if the base is not within the combat radius of an aircraft carrier. In-air refueling tanker support considerations limit the distance the target site can be from the airfield where the missile is loaded on the aircraft.
- Provide logistics support for target reconfiguration, generators, instrumentation, mission planning equipment, and flight test engineers. Facilities must be closely available to the range/site to support the aircraft flown by the Navy aircrews who launch SLAMs. In some cases the equipment may have to be flown to the range for use and the engineers may have to stay over night to support the firing(s).

2.3.4 Site Requirements

Any selected target site must have suitable topography and be devoid of high value man-made structures within a minimum 500-foot radius from the target. The missile requires a minimal unobstructed (unmasked) line-of-sight distance to successfully acquire and track the target which provides sufficient time for operator control and targeting prior to impact. Terrain elevation and orientation should allow for flexible mission planning and missile flight.

2.3.5 Ranges Considered

Viable ranges and target sites must meet all of the requirements for ranges and sites and at least one of the requirements for a test and evaluation threshold or two of four Fleet training requirements (accessibility to aircraft carriers or a variety of targets, and either an ocean or a land environment). Adequate existing and approved target sites do not exist on the east coast or Gulf of Mexico coast for conducting SLAM firings. Established testing facilities that are currently being used for other programs, and have Navy test organizations that are considered in this EA include: the NAWCWPNS Sea Range, including SNI; the Fleet Area Control and Surveillance Facility (FACSFAC), including SCI; NAWS China Lake North and South Ranges, and White Sands Missile Range (WSMR). (NAWCWPNS has a detachment located at WSMR.) Their locations are shown in Figure 2-4.

Several other west coast military test ranges could be used for SLAM target areas, but the facilities listed below constitute a full spectrum of alternative sites and, for this reason, other potential sites are not considered further in this EA.
2.3.5.1 Outlying Landing Field, San Nicolas Island, California

The NAWCWPNS Sea Range is 36,000 square nautical miles of deep ocean and controlled air space off the coast of southern California (Figure 2-5). The range extends westward to 120° 45' West longitude, 60 nautical miles west of SNI. The range parallels the California coast from approximately Guadalupe, California (north of Vandenberg AFB) to south of San Diego and extends seaward more than 180 miles. NAWCWPNS has a field activity office located at Point Mugu. The SLAM T&E office is a part of the field activity and is within easy flight distance from SNI.

The NAWCWPNS Sea Range is the Department of Defense's largest, most heavily instrumented sea/air range and has the capability of providing the military services with true at-sea and littoral scenarios. The NAWCWPNS PM's primary mission is to perform developmental test and evaluation, developmental support, production support, follow-on engineering, logistics, and training support for naval weapon systems (including missiles), electronic warfare systems, target systems, space vehicles, and related support equipment devices. NAWCWPNS PM also supports military training exercises as a secondary mission. Among NAWCWPNS' capabilities at Sea Range are airspace surveillance and control, radio frequency management (facilities to resolve radio frequency interference), range meteorological services, recovery and logistics boats, vehicles and aircraft, ordnance storage and control, and range clearance. The use of Sea Range airspace is monitored and controlled by PLEAD (a radio call name) Control at Point Mugu. The coordination of airspace directly over the Outlying Landing Field San Nicolas Island (SNI) is the responsibility of Air Operations for SNI. Testing of weapons systems can be carried out with minimal interference to operations and with maximum safety because the island is located west of most interfering civilian activities.

The average height of the inversion base at Point Mugu is 1000 feet. This height corresponds with the cloud base. Cloud cover is a regular feature of the Southern California Bight (SCB). (The area of the eastern North Pacific Ocean that is bounded on the north and east by the southern California coast south of Point Conception, on the west by the Patton Escarpment (an area where the ocean floor dips steeply to the west), and on the south by the United States' border with Mexico is known as the SCB.) Heavy fog forms over the Channel Islands from spring to late summer in calm weather. Summer fog frequently dissipates in the afternoon after solar heating has eliminated the temperature inversion. June and July are the foggiest months.

2.3.5.1.1 Outlying Landing Field (OLF) San Nicolas Island, SLAM Target Site

San Nicolas Island is one of California's Channel Islands, located 65 miles south of Point Mugu and 85 miles southwest off the coast from Los Angeles. The SLAM target site is located on the western end of SNI (Figure 2-6). The SLAM target site is the only weapon impact site on all of SNI. This target site is one of the most complex that the SLAM user will ever attack. The variability of the coastal weather, diversity of the IR background, rigidity of the given attack headings, and the close proximity of the ocean all combine to create a challenging target. The Area of Potential Effect (APE) is set in an area of longitudinal sand dunes which trend northwest to southeast. Very few permanent or valuable structures and minimal terrain masking problems exist, and adequate distances separate the target from personnel and high value range assets. The maximum elevation in the APE is 180 feet. The current target complex is located at the southern end of the APE. The remainder of the APE provides space for new target configurations. Baseline SLAM missile ingress bearings are restricted to 340° T to 360° T. SLAM ER and future model SLAM missile ingress bearings are restricted to 030° T to 330° T.

SNI antennas provide adequate coverage to track a missile out to around 50 nautical miles. SNI antennas provide nearly 360° of unobstructed coverage. SLAM firings would take full advantage of this existing military instrumentation. Due to range safety restrictions, location of the target site and desire for clear air space, all flying activities would occur south and west of SNI.
<table>
<thead>
<tr>
<th>CONTROL AREA (C)</th>
<th>Federal Aviation Administration (FAA) air traffic corridors - Include areas from various levels above the surface to infinity.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WARNING AREA (W)</td>
<td>Air space area under the scheduling authority of NAWS PM or FACS FAC. This area can encompass all (surface to infinity) or any part of the airspace.</td>
</tr>
</tbody>
</table>

Figure 2-5. Sea Range Areas and Boundaries.
Figure 2-6. OLF San Nicolas Island, SLAM Target Site, and Area of Potential Effect.
2.3.5.2 Naval Auxiliary Landing Field, San Clemente Island, California

San Clemente Island is the southern most island of the Channel Islands. It is situated about 75 nautical miles west-northwest of NAS NI, San Diego and about 54 miles south-southwest of Long Beach, California. SCI is owned and operated by the US Navy and is used for military training operations as well as for a variety of research, development, test and evaluation activities. SCI facilities include radars, range communications capabilities, microwave transmission facilities, and meteorological measurement systems. Naval Auxiliary Landing Field (NALF) SCI maintains operational control of island facilities including the airfield and related air space. All military operations within the operational boundaries of the island are coordinated by the FACS FAC. FACS FAC Operating Area boundaries are shown in Figure 2-5. These activities include underwater shock testing, acoustic range testing, launching of surface to air missiles, and use of the Special Warfare Training Area. Other branches of the military also use SCI for training maneuvers and research.

The Missile Impact Range (MIR) target site is an existing site located near the center of SCI. The MIR continues to be used by Tomahawk and the Joint Standoff Weapon System. Since the missiles will be launched more than 50 miles from the target, the missile would be launched over the NAWCWPNS Sea Range, tracked by Point Mugu using SNI radars, and then the telemetry would continue to be received by a P-3 Orion which would relay the telemetry data to SNI or pass it directly to Point Mugu Control/Range Safety (Figure 2-7).

2.3.5.3 Naval Air Weapons Station China Lake, California

Naval Air Weapons Station (NAWS) China Lake is part of the set of Department of Defense assets known as the Major Range and Test Facility Base. NAWS China Lake is about 150 miles north of Los Angeles. It is located within combat radius flight of the NAWCWPNS Sea Range and FACS FAC Operating Area. NAWCWPNS China Lake is a center of excellence for basic research, applied research and development, and developmental engineering. China Lake provides an extensive array of land targets, test facilities, and laboratories.

Surrounding and overlying China Lake is the R-2508 restricted airspace complex covering 20,000 square miles. Test and training exercises are routinely conducted throughout this restricted airspace. The North and South Ranges are located within restricted airspace R-2505 and R-2524. Airspace over the test ranges is restricted for military use from surface to infinity; the surrounding airspace in the R-2508 complex is restricted from 20,000 feet above sea level to infinity.

NAWCWPNS China Lake is located in the upper Mojave Desert of southern California. The geography consists of flat, dry lake beds, large dry washes, alluvial fans, and rugged mountains. Most of the heavily instrumented test areas are located in the large dry lake bed area that covers the southwestern portion of the North Range area. Typical instrumentation includes radar, GPS, Lidar (light/laser radar), and video tracking systems; telemetry receiving; meteorological data gathering systems; fixed and tracking optical cameras; and real-time data-processing, display, and operations control. Low mountain ranges that rise on the north and east sides of the lake bed provide elevated sites for tracking and photographic instrumentation.

The ranges provide excellent flying weather and virtually unlimited visibility in all months (SRS 1996). The land is used exclusively for T&E or as a buffer between sensitive or hazardous tests and the surrounding public lands. The ranges are surrounded mainly by public lands (Bureau of Land Management and National Park Service) with a low population density on those few private areas adjoining the range. NAWS China Lake has a number of existing missile impact target sites.
LEGEND

Target Site
Elevation in Meters

Sources: USGS 1980,
Marriott 1993,
NOS 1991

Figure 2-7. NALF San Clemente Island, Missile Impact Range.
Each proposed target sites has been subject to past weapons-testing activities, previous surface disturbance, and vegetation clearance. The SLAM program would utilize these previously disturbed areas in order to minimize environmental impacts. The proposed target sites include, Airport Lake Range (the Airport Lake Range includes the HABR, HABR Gunbutts, and HABR Tunnel target sites), Charlie SAM Site, Coles Flat, Coso Target Range, FAE Target Site, and Sam’s Town. NAWS China Lake target sites are shown in Figure 2-8.

2.3.5.3.1 Airport Lake Range, HABR, HABR Gunbutts, and HABR Tunnel

Located in the west-central portion of the North Range, the Airport Lake Range supports air-to-ground testing requiring stationary and mobile targets, and live ordnance testing. The Airport Lake Range also includes a portion of the surrounding terrain, including the Coso Basin area and nearby slopes and ridges. The total area of the range is approximately 38 square miles. This range hosts a wide variety of tests involving stationary and mobile targets, and due to its desolate nature and the natural, protected depression of the playa, live ordnance testing. Airport Lake Range has been used for mass detonation tests with large amounts of ordnance (net explosive weights up to 500,000 pounds) expended at a single time.

All of the instrumentation available on the North Range can be utilized at Airport Lake, except for radar tracking below 3,000 feet which is not possible because of shielding from the surrounding elevations. The HABR, HABR Gunbutts, and HABR Tunnel are also located on the Airport Lake Range.

2.3.5.3.2 Charlie SAM Site

Charlie SAM Site is located at the north end of the Charlie (sub-) Range within the southwestern part of the North Range. Charlie Range encompasses approximately 40 square miles. This target area has been used predominantly as an air-to-surface missile test area with some training activity. The target area consists a circle configuration, a radius of 750 ft, with a radar control center and six simulated missile launchers and missiles. Instrumentation support is available at this site.

2.3.5.3.3 Coles Flat

The Coles Flat target is located at 5,800 feet elevation in the northern portion of the North Range test complex. The existing 1,600 foot diameter graded target area is located at the north end of a barren flat. The flat has been used extensively since the 1950’s for aerial bombing. A large target array for test activities is located approximately two miles south of the target site. This site has meteorological data recording equipment and camera stations already in place.

2.3.5.3.4 Coso Target Range

The Coso Target Range is located in the northwest corner of the North Range area. Coso Range is located on a broad mountainous plateau characterized by rough terrain covered with piñon pine, juniper trees, and brush. The range covers an area of approximately 70 square miles and represents a typical wilderness-type combat environment. Coso Range is maintained to ensure removal of expended inert ordnance and to retain the natural appearance of target areas. Average elevation is 6,000 feet, with most simulated targets located at the 7,000 to 8,000 feet levels. Support facilities in Coso Range are limited to voice radio links (FM, VHF, AM, UHF), mobile tracking mounts for optical cameras, and control buildings.

Coso Range is primarily used for development of weapons delivery techniques and tactics, and aircrew training. No live ordnance exercises are conducted on Coso Range. The large variety of conditions and terrain in Coso Range presents pilots with unexpected, realistic conditions that are not duplicated at other aircraft test ranges. Training activities cover detection and acquisition of partially hidden or camouflaged targets, eluding detection during approach, and minimizing exposure to enemy fire during and after attack.
Figure 2-8. NAWS China Lake North Range SLAM Target Sites
Coso Range has a rich variety of realistic targets. Military target types include bridges, radars, tunnels, truck convoys, army tanks, a reveted surface-to-air missile site, and many other targets that are typical of a combat area. Specific targets include a tank park, 120-mm antiaircraft battery (partly concealed), military supply dump, two 260-foot Bailey bridges, and two tunnel entrances.

2.3.5.3.5 FAE Target Center

The FAE target center is located approximately 1.5 miles southeast of Airport Lake. The site has been extensively used for past weapons testing and contains a large earthen berm revetment site at the southeast corner of the target area. From this revetment site, a large graded circle, approximately 6000 ft by 6000 ft, extends to the northwest. An additional graded target area approximately 800 ft by 1000 ft exists north of the circle. It contains several targets. Instrumented tracking equipment has been constructed on the adjacent hill overlooking the impact area.

2.3.5.3.6 Sam’s Town

Sam’s Town is located on the northern edge of the Airport Lake Range. It consists of a graded area 500 ft by 800 ft. It is a configuration of sea vans to simulate an industrial complex. Instrumentation support is available at this site.

2.3.5.4 White Sands Missile Range, New Mexico

White Sands Missile Range (WSMR) is located in south central New Mexico near Las Cruces. WSMR covers approximately 8,288 km² (3,200 mi²). WSMR is the largest, all-overland test range in the United States. The primary mission of WSMR is the operation of a National Range in accordance with direction from the US Army Test and Evaluation Command (TECOM). WSMR is a test facility which possesses unique characteristics required by the US Army, US Navy, USAF, National Aeronautics and Space Administration, and other federal and commercial testing concerns to conduct safe, large-scale experiments on advanced weapons and space flight systems. WSMR’s mission includes the conduct of range instrumentation research and development; development tests of US Army, US Navy, and USAF air-to-air/surface, surface-to-air, and surface-to-surface weapons systems; dispenser and bomb drop programs; gun system testing; target systems; meteorological and upper atmospheric probes; equipment, component, and subsystem programs; high-energy laser programs; and special tasks. WSMR is a huge indoor/outdoor laboratory which is used to test weapon systems, military equipment, components, space systems, and commercial products. Tests vary from simple water purity tests in a lab to huge outdoor explosions which simulate the blast effects of a nuclear explosion. For these purposes, it includes an extensive complex of ranges, launch sites, impact and target areas, instrumentation, buildings, equipment and personnel. The range provides internal and external data during testing by telemetry, radar, laser tracking, interferometer, optical, and other sensing systems. In addition, WSMR is used for troop training, and a variety of recreational activities. The US Army is the executive management agent for the facility, but both the US Air Force and US Navy are afforded special status at the installation through the creation of service deputies (WSMR 1996).

The WSMR area is characterized by alternating north-south aligned depressions and uplifted structural blocks. Sunshine is abundant throughout the year (ASI 1994). WSMR target sites are shown in Figure 2-9.

Seven SLAM firings have been conducted between 1989 and 1994 at two sites at WSMR: TS-513 and J-140.
Figure 2-9 White Sands Missile Range Target Sites.
2.3.5.4.1 J-140

This site and TS-513 are both located at the northern end of WSMR in southeastern Socorro County, New Mexico. J-140 is located in the Tularosa Basin. The basin is approximately 120 miles long and averages 35 miles in width with elevations ranging from 3,900 to 4,300 feet above mean sea level (MSL). J-140 is located on the upper bajada on the east side of the Mockingbird Mountains. The area surrounding J-140 is relatively steep, and has one arroyo on the north side. J-140 is located on a foot slope grama grassland that is found on gently undulating to gently rolling soils that occur as broad areas on old alluvial fans. The J-140 site has been graveled and is relatively flat (ASI 1994).

2.3.5.4.2 TS-513

TS-513 lies in Stallion Basin within the Jornada del Muerto, a broad valley defined by the Oscura, San Andres and Organ Mountains on the east and the Fra Christobal Range and Sierra Caballo on the west. This basin measures 120 miles long and from 15 to 30 miles in width. Elevations in the basin range from 4,700 to 5,100 feet above MSL. The area surrounding TS-513 is relatively flat, consisting of small, vegetated sand dunes or hummocks. The TS-513 site has been graded flat but not graveled (ASI 1994).

2.3.6 Range Comparison

Four ranges were compared based on their ability to fulfill current and future model SLAM missile threshold testing and training objectives using the above requirements. The technical characteristics of the target sites on SNI and SCI, and at NAWS China Lake and WSMR were described above. The results of the comparison process are provided in Table 2-2. All ranges and sites meet the range and site requirements identified in Sections 2.3.3 and 2.3.4.

2.4 PROPOSED ACTION

The proposed action is to conduct over-water and over-land firings of nonwarhead SLAM and future model SLAMs against land targets for test and evaluation and training purposes. Test and evaluation firings would use RDT&E missiles with exercise sections. Fleet training exercises would use operationally representative missiles with exercise sections.

The proposed action includes: potential access road and target building pad expansion; target setup; captive carriage of a SLAM to verify IR image acquisition prior to a missile launch; missile launch, flight and control; safety aircraft missile chase flights; nonwarhead missile impact; missile recovery; target site clean-up; and required resource protection procedures and mitigation measures.

In addition, the US Navy may test the feasibility of integrating the SLAM weapon system into other existing and new launch platforms for use in new mission roles on existing platforms and in the current and new roles on new platforms. While new platforms may be tested, the firing profiles and environmental effects are expected to be the same.

SLAM and future model SLAM exercise missiles will be fired to support both T&E and Fleet training needs. Other needs may also arise at a later date. The following paragraphs provide current estimates of quantities of missiles to be fired during the life of the program. The T&E missile firings are exclusive from the training missile firings and vice versa.
### TABLE 2-2. COMPARISON MATRIX OF TECHNICAL ACCEPTABILITY OF FIRING RANGES.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Test Location:</th>
<th>SNI: SLAM</th>
<th>SCI: MIR</th>
<th>NAWS China Lake</th>
<th>WSMR</th>
</tr>
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<tbody>
<tr>
<td><strong>Test and Evaluation Requirements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sea environment</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Sea-to-land transition</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Humid environment</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Cold water background</td>
<td>Yes</td>
<td>Yes</td>
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</tr>
<tr>
<td>Land environment</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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</tr>
<tr>
<td>Adaptive terrain following</td>
<td>No</td>
<td>No</td>
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<td><strong>Space for missile flight and control range</strong></td>
<td></td>
<td></td>
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<tr>
<td>Maximum missile flight range</td>
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<td>Long control range over land</td>
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<td>No</td>
<td>Yes</td>
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<td><strong>Launch envelope</strong></td>
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<td>Near sea level launch</td>
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<td>Yes</td>
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<tr>
<td>Low Above Ground Level (AGL) launch</td>
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<td>Yes</td>
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<tr>
<td>Low AGL launch over high elevation ground</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
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#### 2.4.1 Test And Evaluation Firings

Test and evaluation programs are cyclic in nature, passing through a well defined course of events leading to eventual implementation of the proposed new design. This cyclic nature involves engineering and laboratory design efforts which are then followed by free flight...
tests. Thus, the number of flight tests in any one year can vary greatly depending upon the number of programs being managed and the stages of each of these programs. A total of 0 to 10 missile launches per year is expected to support T&E with a total of approximately 100 launches over the next 20 years. SLAM and its future model weapon systems are expected to have a life cycle which lasts at least until 2018.

2.4.2 Fleet Training Exercise Firings

The total Fleet training exercise missiles launched per year will range from 8 to 16. Current Fleet budgetary constraints limit the number of exercise firings to 16. Below this the number of exercises is dependent upon the number of carrier battle groups which deploy in a year and the respective number of fighter and attack squadrons deploying on them. Squadrons are selected to conduct SLAM training firings on a rotating basis based upon the nearness of their deployment dates. Carrier group deployments are subject to national requirements and can not be fully predicted.

Each operational exercise day will see from two to five missile firings. Two is the minimum number of missile firings which are economical considering the cost of range time. Five is the maximum number of missiles which can be fired in one day. The SLAM program presently expects to have two to six fleet training exercises per year to cover the 8 to 16 firings. The total number of firings over the 20 year life of the program is expected to be approximately 300. Fleet training exercise firings are conducted in the same manner as test and evaluation firings. Fleet training exercises will use the same target sites as SLAM T&E activities. Fleet training exercises will be conducted until the SLAM and future model SLAMs are retired from operational use.

2.5 ALTERNATIVES

Three alternatives were considered for the proposed action: the Preferred Alternative, the Minimum Requirements Alternative, and the No Action Alternative.

2.5.1 Full Requirements (Preferred) Alternative

The preferred alternative is to conduct firings at all four ranges. As the mission requirements analysis showed, test activities must take place at San Nicolas Island or San Clemente Island, and at NAWS China Lake. WSMR provides the ability to test longer over land flights and missile success against more active countermeasures. San Clemente Island would provide the opportunity to evaluate a second littoral scenario, enhancing the understanding of the missile's capabilities over the single site at SNI. The approximate breakdown of T&E firings by proposed range is: SNI - 25 to 85; SCI - 0 to 20; China Lake - 10 to 50; and WSMR - 5 to 30 (up to 3 per year through 2008); for a total of 100. The approximate breakdown of Fleet firings by range is: SNI - 20 to 250; SCI - 0 to 60; and China Lake - 50 to 240; for a total of 300.

2.5.2 Minimum Requirements Alternative

Since the Proposed Action is to conduct SLAM testing and training, an alternative to using the four preferred ranges and sites is to use a minimum number of ranges. No single range can satisfy all of the test and training requirements. Nor can a single missile be used to test all of the missile's capabilities. The minimum number of ranges which can satisfy all of the requirements is two: San Nicolas Island's SLAM target site combined with target sites at NAWS China Lake. The mission requirements analysis shows that ocean environmental tests can be conducted at SNI. The full range of land environmental tests can be conducted at NAWS China Lake. However, desirable longer missile flights over land terrain and more active countermeasures testing would not be possible without the use of WSMR. This alternative is not preferred because it limits the variety of test and training scenarios available and provides less flexibility to meet Navy needs. The approximate breakdown of T&E firings by proposed range would be: SNI - 25 to 85; and China Lake - 15 to 75; for a total of 100. The approximate
breakdown of Fleet firings by range would be: SNI – 20 to 250; and China Lake – 50 to 280; for a total of 300.

2.5.3 No Action Alternative

Under the No Action alternative, T&E firings and Fleet training exercises would not be conducted. This alternative would result in inadequate validation of the missile design and would adversely impact different aspects of operational training and deployment readiness. Flight testing is necessary to verify that critical system technical and operational performance thresholds have been achieved. There would be no assurance that the missiles' designs would function successfully or that squadrons could successfully employ SLAMs in a future conflict, putting aircrews, aircraft, and other friendly forces at significant risk of destruction or damage without the proposed firings. In the absence of T&E firings and training exercises, this alternative would cause no environmental impacts to the islands', the ocean's or the land ranges' natural resources.
CHAPTER 3

AFFECTED ENVIRONMENT

Chapter 3 is divided into four subsections dealing with each of the different ranges: OLF San Nicolas Island, NALF San Clemente Island, NAWS China Lake, and WSMR. Each subsection starts with the physical resources, followed by the biological resources, archaeological resources, and the military related features.

The existing environment discussion is limited to those resources affected by the firing related activities. The areas of interest consist of: the target sites, the areas used by instrumentation personnel in setting up the visual equipment, the land under the flight path of the missiles and target acquisition and chase aircraft, and the area around the targets which receive missile and target debris from missile strikes.

3.1 OUTLYING LANDING FIELD SAN NICOLAS ISLAND

SNI is the outermost island of the California Channel Islands. It lies about 60 miles south-southwest of Point Mugu and approximately 75 miles southwest of Los Angeles (see Figure 2-5). SNI has the second largest pinniped rookery in the SCB; a year round presence of pups, and major sea bird breeding and roosting sites, including the world’s largest Brandt’s cormorant colony. SNI is the home of many unique species including endangered and threatened species. All native habitats found on SNI are extremely fragile. Only a small area at the western end of SNI will be affected by missile impacts. The following resource categories will not be discussed because they are not present or are unlikely to be affected by the proposed action:

- Geology. Geological resources are too deep to be affected by missile impacts.
- Wetlands. There are no wetlands in the vicinity of the SLAM target site.
- Invertebrates. Insect populations are believed to be low due to the sparseness of vegetation and lack of tidal marshes or fresh surface water resources.
- Amphibians. There are no amphibians on the island.
- Reptiles. Island reptiles (lizards) [except the Island night lizard (a California State threatened species)] are plentiful and will not be affected. The Island night lizard does not prefer sand dune habitat but rocky areas covered with prickly pear cactus.
- Terrestrial mammals. There is very little suitable habitat for terrestrial mammals at the target site. The Island fox (a California State threatened species) is discussed separately.
- Socioeconomic resources. There are no socioeconomic activities at the target site.
- Historical resources. While numerous shipwrecks surround the shorelines, most are within one half mile of the shore. None of these wrecks or other cultural resources in the ocean will be impacted, since the missiles are predicted to hit the island, or in a worst case, impact the water more than 3 miles from shore. (Flight termination procedures call for termination to wait until the missile has flown 3 miles beyond the island.) One Chinese abalone collectors’ site is located on the coast south of the target site approximately 0.75 mile away.
- Transportation. The only transportation facility at the target site is Jackson Highway. The highway, at this location, is used by island police patrols, for occasional Environmental Division activities, by SLAM target personnel, by Building 807 launch complex personnel (Figure 2-6), and by a few others.
• Infrastructure. The SLAM target site is self-supporting from a utilities standpoint. Generators are located on site to provide power for cameras and heaters and other equipment. Gas, electric, sewer and water facilities are not present.
• Visual Resources. There will be no change to current uses of the target site.

3.1.1 SLAM Target Site History

The SLAM T&E target site was established in the spring of 1989. The precise location was selected in consultation with the Point Mugu Environmental Division. Logistics played a major role in selecting the target site. The site had to be accessible to flatbed semitrailers and heavy duty cranes with space for them to set up the target buildings. Target masking and impacts on island infrastructure were also considered. Three target buildings were set up initially to allow for scenario flexibility (size and augmentation). Target site access roads and building pads were expanded in the fall of 1996 to the configuration shown in Figure 2-2 to accommodate SLAM ER testing. There are now five target buildings plus the “generator” masking building.

3.1.2 Water Resources

Coastal Water Research Project and California State Mussel Watch studies suggest that the nearshore environment around SNI is probably very clean. The waters surrounding SNI have been designated by the California State Water Resources Control Board as an Area of Special Biological Significance (ASBS).

The SLAM target site is in a sand dune area. No perennial streams, wetlands or lakes are present in the vicinity of the SLAM target site. Any ground water present is expected to be near the bottom of the sand dunes. The site is approximately 2 miles from the watersheds of springs and wells used for potable water.

3.1.3 Air Quality

The weather on SNI, as a whole, is cold and windy. The average wind speed during the year is about 16 miles per hour, and can reach 35 to 55 mph (SCS 1985) (Figure 3-1). The prevailing northwest winds often sweep around both shores and over the summit of the island. SNI is 60 miles from the mainland and far upwind of mainland pollutant sources. As Appendix C.3 explains, air pollutants may occasionally be trapped in the inversion layer and carried out to SNI by the Catalina Eddy.

Pursuant to the Federal Clean Air Act (CAA), the EPA has identified National Ambient Air Quality Standards (NAAQSs) to protect public health and welfare. NAAQS have been set for the following pollutants: total suspended particulate (particulate matter less than 10 microns [PM_{10}]), carbon monoxide (CO), oxides of nitrogen (NOx), ozone (O_3), sulfur dioxide (SO_2), and lead (Pb). These pollutants are called criteria pollutants because the standards satisfy criteria specified in the CAA (Appendix C.1). The EPA has classified air basins (i.e., distinct geographic regions) as either attainment or non-attainment for each criteria pollutant, based on whether or not the NAAQS have been achieved. Air basins that have not received sufficient analysis for certain criteria air pollutants are designated as “unclassified” for those pollutants and are treated as being in attainment.

The California ARB is the state agency responsible for regulating mobile source (vehicle) emissions and overseeing the activities of local air pollution control districts (APCDs). In addition, California ARB has established State Ambient Air Quality Standards (SAAQSs) (Appendix C.1). Under the California Clean Air Act (which was patterned after the Federal CAA), areas have been designated as attainment, non-attainment, or unclassified with respect to SAAQSs.
Figure 3-1a. Wind Stream Line Chart for July 1200-1800 PST.

Figure 3-1b. Annual Wind Rose for SNI. (45 years of data).

Figure 3-1c. Wind Rose for SCI (1980-84). (Frequency of wind and direction).

Figure 3-1. SCB Wind Streamlines and Roses.
SNI is part of Ventura County which is in nonattainment for the federal and state ozone standards and the state particulate matter standard. SNI's air quality is unclassifiable/attainment in accordance with a letter from the EPA (EPA 1998, provided as Appendix C.7) with respect to the (NAAQSs, Appendix C.1).

The Ventura County Air Pollution Control District (VCAPCD) has issued a Permit to Operate portable tactical equipment test and/or tactical maneuver operation diesel engines for tactical military equipment as part of an overall permit covering generators used by the Navy on SNI. The annual hours of operation for the tactical equipment shall not exceed 554,500 brake horsepower - hours per year as a group. The permit allows the equivalent of about 80 days of operation of 2 generators operating 8 hours a day each.

3.1.3.1 SLAM Firing Conditions

During the fall and winter, the best SLAM window is in the afternoon, usually 1200-1500 local time, or even after sunset. Spring and summer months are the most difficult in which to operate. Early summer clearing usually occurs in the mid-afternoon, if at all, and only for a brief period. This provides little time for target solar heating and conduct of the mission. Usable SLAM windows grow larger later in the year. Unpredictable mid-day clearing usually starts to occur by July, providing some workable foggy days.

SLAM operations against the target on SNI must be carefully scheduled around prevailing weather conditions and for the best solar loading. An IR video camera will be set up south of Jackson Highway approximately under the missile’s projected flight path overlooking the target site to provide FTEs with an early view of the IR scene. The pre-launch IR target acquisition aircraft will fly around the island once after performing its simulated run to check for the presence of clouds which might affect the IR view. Launches will be delayed until there are no clouds.

3.1.4 Topography

The western end of SNI is a wide shelf covered with longitudinal sand dunes which trend northwest to southeast. The APE is located in this sand dune area. The elevations within the vicinity of the APE range from approximately 80 feet to 180 feet MSL.

3.1.5 Soils

The western part of the island is mostly covered by eolian (wind blown) sand dunes. The SNI soil map categorized the soil in the APE as Dune Land. This soil unit consists of hummocky and sloping to moderately steep sandy areas made up of mostly quartzitic sand-sized particles that have been shifted by the wind. Dune Land consists of very deep calcareous sands. The sand in places has cemented cross-bedding layers of caliche chunks, or sheets that occur at variable depths. Pebbles and cobbles occur in some beach areas. Also included are small areas of Rock outcrop, and along the beach areas, steep and very steep stony cliffs (SCS 1985). Active dune sand is composed of generally unvegetated deposits of loose, well sorted sand. The extent and thickness of these deposits change as sand grains are transported by wind. The sand dune’s large extent and high permeability make it a significant medium for groundwater recharge. However, its high permeability means that it does not store water efficiently (PMED 1996).

3.1.5.1 Missile Crater Morphology

When a missile hits the ground it pushes soil and rock up forming a crater. Secondary impact craters are formed by missile debris and blocks of ground material which are thrown out of the crater provided the ground surface is weak enough to be deformed by them (Moore 1976). Craters in nearly cohesionless materials such as sand have continuous rims,
best developed in the lateral and down-trajectory directions and tend to be conical. Sand can also slump back into the crater and cover parts of the missile (Moore 1976).

3.1.6 Noise

The western end of SNI below the mesa is dominated by sounds produced by the physical environment and the resident wildlife. While bird calls are heard at the target site, elephant seal and sea lion vocalizations are almost continuous and much more noticeable. Man-made sounds at the target site are short-term and intermittent. These sounds consist of road traffic (trucks and vans), and infrequent aircraft over flights. Diesel generator noise levels are provided in Appendix D.2. The nearest human receptors are military personnel working in the various facilities on top of the mesa. The nearest civilians are persons on official business on SNI.

Noise levels at the target site should be similar to those at Point Bennett at San Miguel Island which were studied by Awbrey (1980) since Point Bennett is located similarly to Vizcaino Point. Awbrey’s lowest flat weighted 10 minute average sound level was 54.3 dB. Minima of 60 to 65 dB were much more common. High winds produced 10 minute averages exceeding 100 dB and sometimes his recording meter triggering level had to be set at 120 dB to avoid excessive recording and the resultant quick depletion of the recording paper supply. The quietest times were mid-afternoons when the winds were lowest in late March to mid-April. Noise generated by the surf, wind, animal vocalizations, passing boats, and over-flying aircraft (including helicopters) frequently exceeded 80 dB.

The only noise receptors of concern at the SLAM target site are occasional birds and foxes. Marine mammals, which are present at the coast about 1/5 mile away, are also of concern since they are protected by the Marine Mammal Protection Act. Since birds and marine mammals are known to respond to noises, especially noises associated with a visual cue, the NAWS Point Mugu Environmental Division conducted a study of the effects of FA-18C/D aircraft overflights on migratory birds and marine mammals at SNI on 5 November 1997. This study provided the first concurrent measurement of FA-18 noise levels and animal observations combined with known aircraft power settings and altitudes. The FA-18 aircraft was carrying a SLAM and data link pod and flew representative missile target approach routes which are used to verify missile seeker performance before each operational day’s firings. Flights were started at 2000 feet MSL and were flown at two power settings [Thrust for Level Flight (TLF) and idle]. TLF flights were flown at 300 KCAS and idle at 500 KCAS. Flights were successively lowered to 1500 feet, 1000 feet, 750 feet, and 500 feet. The field personnel were in constant two-way communication with the aircrew and could call off the tests if any disturbance to the animals was seen. The observers noted that the noise level was very sensitive to the location of the sensors relative to the aircraft overflight path. The noise level appeared to be much quieter as little as 300 feet away. Sounds varied from almost background level at 2000 feet AGL and 300 KCAS (knots calibrated air speed) to a maximum root mean square (rms) of 108 dB at 500 feet AGL and 500 KCAS. The rms pressure level represents the average sound level during the interval in which 90 percent of the aircraft sound energy is received. For each altitude, the rms pressure levels for the 500 KCAS overflights tended to be slightly higher than the levels for the 300 KCAS overflights. No clear dependence on aircraft altitude was evident during these tests. The longest overflight was only audible for 14 seconds (Greene 1998). Some additional FA-18 aircraft noise levels are provided in Appendix D.3.

3.1.6.1 Noise Impacts on Wildlife

Adverse effects of noise on a wildlife species include an adverse reaction such as stampeding, preventing a necessary reaction, causing a change in the hearing ability, or causing physical damage to the species.

To elicit an adverse reaction, a noise would have to be both above the hearing threshold of the species and be recognized as representative of a threat to the animal. A noise can also be so loud that normal hearing to communicate with a pup or others of the same species, find prey, or avoid predators is prevented.
A noise may elicit a startle response from the animal where it picks up its head, listens, and looks around. If the animal does not recognize the noise source or considers the source a threat, it may move away from the source. The particular response depends upon the learning ability of the animal, its life stage, ecological niche (whether hearing is used to avoid predators, communicate, or find food), current phase of its reproductive cycle, and population density. Major vertebrates can learn to ignore loud noises; horses and sea lions have been trained to ignore explosion noises (Gales 1982, Fletcher and Busnel 1978).

Jehl and Cooper (1980) reported that when jets flew over marine mammals on San Miguel Island more than 1,000 feet AGL they produced no effect. Jets flying below 1,000 feet usually produced some effect (usually some movement). They concluded that jet overflights were only a minor source of disturbance. This study did not report any noises of sufficient loudness to cause communication problems, interfere with normal predator or prey relations, cause a change in hearing ability, or cause any physical damage to the hearing organs.

The NAWS Point Mugu Environmental Division conducted a study of the effects of FA-18C/D aircraft overflights on migratory birds and marine mammals at SNI. Animals were observed by field personnel and through video. Effects on the animals were seen at Twin Beaches, directly south of the target site. The maximum effect on the mammals was that a few sat up momentarily, but none made any movement toward the water. Cormorants and pelicans did not respond, even when the aircraft flew directly over them. These animals were not breeding or nesting, and their responses to the same sounds during such activities may be different. Responses to a low altitude (e.g., 500 feet AGL) overflight might be different if the animals had not previously been exposed to a series of progressively lower and louder overflights with progressively shorter durations and more rapid onsets of sound (Greene 1998).

3.1.7 Plants

SNI has the lowest diversity of native plants of any of the eight Channel Islands. Presumably, this is due to the isolation and relative lack of ecological diversity on SNI as compared to the other islands. The majority of SNI is covered by low-lying vegetation consisting primarily of annual herbs. Ice plant (Mesembryanthemum crystallinum and M. nudiflorum) has spread over large areas. Except for the northwestern end, morning glory (Calystegia macrostegia ssp. macrostegia) is widespread over the island. Lupine (Lupinus albifrons) is a ubiquitous and dominant perennial. Other species found at the target site include Dune malacothrix (Malacothrix incana), Silver lotus (Lotus argophyllus), Coastal goldenbush (Isocoma meziesii), Sand/Beach evening primrose (Camissonia cheiranthifolia), Verbena (Abronia umbellata), Locoweed (Astragalus traskiae), Sticky sand verbena, Beach pancake (Abronia maritima), and Sea rocket (Cakile maritima) (an introduced species).

Two plant species are listed as endangered or threatened by the State of California: San Nicolas Island buckwheat (Eriogonum grande var. timorum) (state endangered) and Trask’s milk vetch (Astragalus traskiae) (state threatened). The Beach spectaclepod and Broom rape are under strong consideration for listing as either endangered or threatened species. The Beach spectaclepod is present on the western end of SNI. The buckwheat is found on the eastern end of SNI. Most of these plant species are endemic only to the Channel Islands.

At the coast north of the Rock Crusher site, in the cove just south of this site, and all along the northern coast from Vizcaino Point east past Thousand Springs are narrow bands of sparse Sand Dune/Coastal Strand. The remainder of the APE is covered with a mixture of Sand Dune/Coastal Strand and Lupinus communities.

3.1.8 Birds

A wide variety of resident and migrant shore and pelagic birds inhabit the coastal areas of SNI throughout the year. Of these, five species are of concern with respect to the proposed action. SNI supports large breeding colonies of Brandt’s cormorants and Western gulls on the western end of the island. A large colony of California brown pelicans flies back and forth along the southwestern coast. Several pairs of Western snowy plovers are breeding on the
island, especially along the northern coast near Red Eye Beach and Thousand Springs. Critical habitats on SNI have been proposed for the plover, but none are located beneath a missile flight path. The American peregrine falcon is an occasional visitor. Black oystercatchers and several species of terns are also present. Bird colonies are shown in Figure 3-2.

3.1.8.1 Brandt's Cormorant (*Phalacrocorax penicillatus*)

The Brandt's cormorant breeding population spreads along the Pacific coast of North America from Washington south to Baja California, and is centered in California (Hunt, Pitman, and Jones 1980; Carter et al. 1992). This bird is strictly a coastal marine inhabitant, rarely wandering away from littoral areas (Hunt et al. 1981). They nest on seven of the eight Channel Islands (Hunt, Pitman, and Jones 1980), invariably on the north side of the larger islands and in other locations exposed to northwesterly winds which normally prevail during the breeding season (Hunt et al. 1981).

These cormorants feed in large flocks, often in the company of other sea birds. With respect to population levels, the Brandt's cormorant is the most abundant cormorant in the SCB. The fall immigration can increase the resident population by about 50 to 100 percent (Bonnell et al. 1980). When warmer waters prevail, the quantity of food declines, breeding populations become smaller and reproductive success declines (Sowls et al. 1980). The local population at an island can also change as birds switch between colony sites (Carter et al. 1992).

Carter et al. (1992) reported several colonies of breeding Brandt's cormorants on SNI including the following: Vizcaino Point East (200 nesting pairs), and Cormorant Rock Area (100 pairs). Brandt's cormorant reproductive activities begin in May with courtship and egg laying. Incubation and chick fledging take place through the end of August (Hunt et al. 1981). Brandt's cormorants are extremely sensitive to disturbance while they are nesting. Repeated disturbances could have disastrous effects on a cormorant colony. At first sight of observers, practically every cormorant may leave the colony. This would expose any eggs to predation by Western gulls (Hunt, Pitman, and Jones 1980). Actual responses of the cormorants to the proposed aircraft flyovers would be monitored with video equipment during a special study to determine the minimum altitude at which the birds respond and during critical nesting and breeding seasons until safe flight procedures can be established. By monitoring for a response the biologists would be able to communicate directly with the pilots via radio and instruct them not to fly any lower, preventing any detrimental effects.

Cormorants move onto and off the island in a diurnal pattern. At San Miguel Island, cormorants left the island between 0700 and 0900 most mornings (although a few remained on the roost until after 1000) and did not begin returning until about 1500 (Bowles and Stewart 1980).

3.1.8.2 Western Gull (*Larus occidentalis*)

The Western gull breeds all along the Pacific coast from British Columbia to Baja California. Bird surveys in 1989 to 1991 found very large increases in the population of Western gulls at SNI. Increases at Vizcaino Point South, Cormorant Rock, and the Elephant Seal Beach area may reflect increased local prey resources. Western gulls are also present at Thousand Springs Area, Light Point West, and Dutch Harbor (Carter et al. 1992). Gull nest success has been very poor for the last five years.

Western gulls nest on the ground in solitary pairs, small colonies, and in very large colonies containing thousands of birds (Carter et al. 1992). All of the large gull colonies were found to be associated with vegetation. The Vizcaino Point colony is characterized by gullies and sand dunes partially stabilized by low lying vegetation (Hunt et al. 1981). The nesting location of Western gulls on the western end of SNI is shown in Figure 3-2. The yearly reproductive activities of the Western gull begin as early as January with territory establishment. Egg laying begins in April and chick fledging can reach into August (Hunt et al. 1981). Some gulls are present on their nest sites throughout the year (Schreiber and Schreiber 1980).
Figure 3-2. Sea Birds and Marine Mammals of SNI.
Western gulls prefer to forage close to their colonies. The Western gull may be the only sea bird nesting in the SCB which is benefiting from human civilization (garbage and offal) (Hunt, Pitman, and Jones 1980).

3.1.9 Marine Mammals

The resources of the SCB are shared by 30 species of cetaceans (whales, porpoises, and dolphins), six species of pinnipeds (seals and sea lions), and one species of fissiped (sea otter). Only three or four whale species reside in the SCB year round — most only pass through during annual migrations (Jensen and Eagle 1993). Marine mammal migration routes are shown in Figure 3-3.

SNI supports the second largest breeding population of the Northern elephant seals and large numbers of California sea lions, and is second only to San Miguel Island in numbers and diversity of pinniped populations in California. Pacific harbor seals are also present in significant numbers. All three of these species of pinnipeds have breeding populations on SNI. Guadalupe fur seals (Arctocephalus townsendi) [which had been sighted on SNI in the summer months from June through September (Stewart and Yochem 1984)] and Steller sea lions (Eumetopias jubatus) have not been sighted in recent years. The Guadalupe fur seal is a federally listed threatened species.

3.1.9.1 California Sea Lion (Zalophus californianus)

California sea lions are present throughout the year. The number of sea lions at SNI during the breeding season has increased since 1990 and was at an all time high of 32,909 during the 1994 season (Lowry 1995).

California sea lions breed in the summer from May through July. They are most abundant in late June to early July during the height of their breeding season. In the fall, many individuals migrate north from California to British Columbia. Total numbers drop sharply in the autumn and reach an annual low in early winter when the sea lions disperse to open ocean waters to feed (Bonnell et al. 1980).

California sea lions are distributed along a six kilometer stretch of the southern shoreline, including the beaches between Cormorant Rock and Rock Crusher (351 in 1994) and between the Rock Crusher and Vizcaino Point (3,669 in 1994) (Figure 3-2) (Lowry 1995).

Bowles and Stewart (1980) recorded the daily behavior patterns of sea lions on San Miguel Island as part of the Air Force's sonic boom study. As air temperature rose, sea lions began moving seaward. If the temperature jumped sharply, the exodus was very rapid. As the beach cooled, sea lions trekked one-quarter mile inland into the arroyos. Animals usually disappeared from the surfline areas overnight (Bowles and Stewart 1980).

California sea lions can produce very loud sounds. Sea lions on public display at Sea World in San Diego produced peaks having A-weighted sound exposure levels of 100-109 dB at 1 meter. Nine 1 minute average A-weighted sound levels ranged from 79.4 to 95.4 dB (average = 89.1) for about 20 animals between 1 and 10 meters from the microphone (Awbrey 1980).

California sea lion mothers normally only suckle their own pups. Consequently, they and their pups must learn to recognize each other's voices from among the hundreds of other females and pups which may be present at a colony. This is accomplished by spending several minutes exchanging vocal (and other) signals at birth and periodically for several days afterward. After being separated and reunited by voice, final identification of the pup is confirmed olfactorily by the mother (Chappell 1980).
Figure 3-3. Marine Mammal Migration Routes.
3.1.9.2 Northern Elephant Seal (*Mirounga angustirostris*)

The present breeding range of the Northern elephant seal extends from Baja California to Point Reyes. More than half of the 1991 population of 130,000 was associated with the Channel Islands. SNI is the second largest Northern elephant seal rookery and hauling out ground in the SCB, accounting for 5 to 15 percent of the total on-land population throughout the year.

The number of Northern elephant seal pups born increased at more than 14 percent per year from 1911 to 1982; the population was doubling every five years (USFWS 1987). The National Marine Fisheries Service (NMFS) Southwest Fisheries Science Center (SWFSC) also counted pups, adults, and juveniles at SNI beginning in the 1988 breeding season to document their distribution and derive minimum population estimates. The number of elephant seals at SNI during the breeding season increased from 1988 to 1993’s count of 10,662. [The last year of complete census data including adults given in Lowry (1995) was 1993.]

Northern elephant seals pup and breed along the entire southern shoreline and at two beaches on the northern shoreline near Vizcaino Point including Red Eye Beach. Northern elephant seals were counted on the beaches between the Cormorant Rock and Rock Crusher (1528 in 1993), between the Rock Crusher and Vizcaino Point (35 in 1993), and on Red Eye Beach (102 in 1993). The NAWS Point Mugu Environmental Division has been tracking the population which had been increasing until this year's El Niño.

Adult males arrive in December and January. Breeding females arrive from December through mid-February. Females give birth about seven days after coming ashore and remain suckling their pups an average of 27 additional days before breeding and returning to sea. Elephant seal mothers normally only suckle their own pups (Chappell 1980). Adult elephant seals leave southern California island rookeries in February and early March to forage and replenish body reserves that were depleted during the intensive (up to three months) breeding season fasts (DeLong and Stewart 1991). Females remain at sea for around 66 days and males for around 120 days before returning to the islands to molt (Stewart and DeLong 1994). Elephant seals are most abundant on land in late January and February, but peak occupancy generally occurs in April and May during the molt of females and juvenile males. The minimum population on SNI occurs in the summer and early autumn during the molt of adult males.

Elephant seals are one of the hardest pinnipeds to disturb. No serious disturbance was ever recorded among Northern elephant seals (Bowies and Stewart 1980).

3.1.9.3 Pacific Harbor Seal (*Phoca vitulina*)

Pacific harbor seals are found and forage in shallow waters along the coast line from Mexico to the Aleutians. Harbor seals begin to increase in number on land in late February when females arrive and begin giving birth. Pacific harbor seals are in greatest abundance on the Channel Islands in late May to early June when the adults and juveniles are molting. In the autumn, breeding populations disperse to sea (Bonnell et al. 1980, USFWS 1987, Stewart et al. 1993, Stewart and Yochem 1994). The populations on the islands are lowest in the winter when they are about 15 percent of the spring/summer molt population (Stewart and Yochem 1994). The peak population on SNI is currently about 1200, 500 on the north side and 700 on the south side mostly east of Dutch Harbor. Seals are found scattered all along the coast.

Pacific harbor seal pups are born from late February through late April, and they are most abundant in early April. Harbor pup seals can swim at birth and regularly accompany their mothers to sea. Most pups are weaned in three to four weeks — by mid-May. Mating occurs from late April through August (Bonnell et al. 1980, USFWS 1987, Stewart et al. 1993, Stewart and Yochem 1994).
The breeding and hauling ground at SNI is located in a cove on the north side of the island. Pacific harbor seals usually haul out and give birth at another seven sites on the southwestern side of the island and occasionally use 13 other sites seasonally (USFWS 1987).

Harbor seals haul out shortly after sunrise, numbers peaking noon to midafternoon, then decline from late afternoon to dusk (Bowles and Stewart 1980, Stewart and Yochem 1994).

Harbor seals are extraordinarily shy, and disturbances at beaches where young seals are present are likely to cause separation of mothers and pups, and the subsequent starvation and death of pups (USFWS 1987).

Complete audiograms have been obtained for the harbor seal, both above water and submerged. The harbor seal is 20-30 dB less sensitive than humans. The pinniped's low auditory sensitivity makes it likely that it can withstand substantially more intense sounds without hearing loss than can humans (Chappell 1980).

### 3.1.10 Endangered and Threatened Species

Table E.1-1 in the appendix identifies the endangered and threatened sea turtles and marine mammals [current as of 20 August 1994 (50 CFR 17.11)]. None of the turtles lay eggs on any California coast.

Table 3-1 lists the endangered and threatened plant, reptile, bird, and terrestrial mammal species that are present on SNI. The following list of endangered and threatened species was taken from a letter from the US Fish and Wildlife Service (USFWS) to NAWS PM in 1994 (Branfield 1994). Plant status on SNI is from Junak (1992). The only known sensitive species in the APE is the Island fox. Brandt's cormorants roost at night, after the usual firing time, under one flight path near Cormorant Beach (Figure 3-2). California brown pelican roosting sites are found under missile flight paths south of the target site and at a few places along the northern shore. Western snowy plovers use Red Eye Beach for nesting (see Figures 3-2 and 3-4). A very few plovers might be found occasionally on the southern beaches.

The Peregrine falcon and brown pelican are present at SNI. The Island night lizard, Western snowy plover, Peregrine falcon, and brown pelican are the only federally listed species on SNI. Candidate and state listed plants on SNI are Trask's milk vetch (state threatened), SNI box thorn, Ashy phacelia, Short-lobed broomrape, and the SNI buckwheat (state endangered) (USFWS 1987, CALDFG Jun 1993). In general, Island night lizards are not found in the dune areas of SNI's western end. The latest estimated Island night lizard population size is 17,000.

#### 3.1.10.1 California Brown Pelican (*Pelecanus occidentalis californicus*)

The last successful nesting of California brown pelicans on SNI was recorded in 1959 (Baldridge 1973 in PNL 1993). By the end of the 1970s, brown pelicans were roosting at SNI seasonally in late summer and fall; and peak populations were reported to number about 1000 birds (Briggs et al. 1981 referenced in USFWS 1987). Brown pelicans would be expected to feed in waters adjacent to their roosting areas (Hunt et al. 1981) which occur near the Rock Crusher site (Figure 2-6). They are visual feeders and plunge into the water to catch anchovies. Daily movements include flights between their primary day roost on Vizcaino Point and their nighttime roost at Cormorant Rock (NAVFAC 1995).

The brown pelican is still listed as an endangered species; however, the species is being reviewed for either delisting or downlisting to threatened.

#### 3.1.10.2 Western Snowy Plover (*Charadrius alexandrinus*)

The Pacific coast population of the Western snowy plover breeds primarily on coastal beaches from the State of Washington to Baja California, Mexico, with the majority of breeding birds found in California. A total of 20 breeding areas currently occur in coastal
California with one of eight principal sites located on SNI (58 FR 12864). Eleven sites on SNI were proposed as critical habitat areas for plover nesting (60 FR 11768). The three sites at the western end of SNI are shown in Figure 3-4.

While plover sitings have been recorded on only a few of SNI's beaches, their presence on SNI is increasing.

TABLE 3-1. ENDANGERED AND THREATENED SPECIES ON SNI.

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>Endangered/Threatened Status</th>
<th>Status on SNI</th>
</tr>
</thead>
<tbody>
<tr>
<td><em><strong>PLANTS</strong></em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Astragalus traskiae</td>
<td>Trask's milk vetch/locoweed</td>
<td>ST (Rare)</td>
<td>Endemic to SNI and Santa Barbara Island (SBI). Common &amp; widespread; slopes and stabilized dunes at lower elevations around periphery of SNI</td>
</tr>
<tr>
<td>Dithyrea maritima</td>
<td>Beach spectacle pod</td>
<td>ST</td>
<td>Common but localized including ridge east of Vizcaino Point, sandy slopes east of Rock Crusher, and near Cormorant Rock</td>
</tr>
<tr>
<td>Eriogonum grande var. timorum</td>
<td>San Nicolas Island buckwheat</td>
<td>SE</td>
<td>Endemic to SNI. Common on slopes of southeastern escarpment and adjacent coastal flats, from east side of Twin Rivers drainage to the sand spit</td>
</tr>
<tr>
<td><em><strong>REPTILES</strong></em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xantusia riversiana</td>
<td>Island night lizard</td>
<td>FT</td>
<td>Found on SNI, SCI, and SBI. Pop. est. 14,800</td>
</tr>
<tr>
<td><em><strong>BIRDS</strong></em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charadrius alexandrinus nivosus</td>
<td>Western snowy plover</td>
<td>FT</td>
<td>Eleven nest areas on SNI beaches. Occasionally found on other beaches.</td>
</tr>
<tr>
<td>Falco peregrinus anatum</td>
<td>American peregrine falcon</td>
<td>FE, SE</td>
<td>Occasionally over winter near shore at west end of SNI</td>
</tr>
<tr>
<td>Pelecanus occidentalis californicus</td>
<td>California brown pelican</td>
<td>FE, SE</td>
<td>Roosts seasonally, but does not nest on SNI</td>
</tr>
<tr>
<td><em><strong>MAMMALS</strong></em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhydra lutris nereis</td>
<td>Southern sea otter</td>
<td>FT</td>
<td>Less than 20 individuals around SNI, none elsewhere in SCB</td>
</tr>
<tr>
<td><em>Urocyon littoralis dickey</em></td>
<td>San Nicolas Island fox</td>
<td>ST</td>
<td>Found island wide</td>
</tr>
</tbody>
</table>

Federal: Federally listed endangered
FT: Federally listed threatened
SE: State listed endangered
ST: State listed threatened (Smith 1995).

The breeding season of the coastal population extends from mid March through mid September. Nest initiation and egg laying occurs from mid March through mid July. Incubation averages 27 days. Fledging (reaching flying age) requires an average of 31 days. Broods rarely remain in the nesting territory until fledging (58 FR 12864). Each pair can have up to three clutches per year but they usually have only one or two.

Snowy plovers forage on invertebrates (crustaceans and macrophytes) in the wet sand and among surf-cast kelp within the intertidal zone; in dry, sandy areas above the high tide; on salt pans; spoil sites; and along the edges of salt marshes and salt ponds (58 FR 12864).
Figure 3-4. Locations of Endangered and Threatened Species on the Western End of SNI.
Poor reproductive success, resulting from human disturbance, predation, and inclement weather, combined with permanent or long-term loss of nesting habitat due to encroachment of introduced European beach grass and urban development has led to a decline in active nesting colonies, as well as overall decline in the breeding and wintering population of the Western snowy plover along the Pacific coast of the United States (58 FR 12864). Hunt et al. (1981) blame the Island fox for keeping the plover population at a token level.

3.1.10.3 American Peregrine Falcon (*Falco peregrinus anatum*)

Peregrine falcons are occasionally present on SNI, but no nests have been reported.

3.1.10.4 Southern Sea Otter (*Enhydra lutris nereis*)

In California, Southern sea otters are primarily associated with tidal habitats. Kelp beds are used as habitual rafting sites for groups of otters as well as for individuals (Riedman 1987).

Starting in 1987, 139 otters were reintroduced to SNI, but the island's population has remained at approximately 15 adults. Several of these sea otters are living off the coast of SNI between the Rock Crusher and Vizcaino Point (see Figure 3-4).

3.1.10.5 Island Fox (*Urocyon littoralis*)

The Island fox is listed as a state “threatened” species (CALDFG Jul 1993).

Island fox populations are distributed over most of the area of the islands on which they occur, though abundance varies by habitat type. On SNI, the Island fox is found in all habitats, particularly near Tule Creek and along the southwest coast, but densities are highest in the lupine scrub and grasslands of the mesa. Recent surveys indicated the presence of foxes in the northwest section of SNI and field investigations within the last decade indicate fox densities in this area to be from 16 to 27 foxes per square kilometer. The Island fox maintains a healthy population of about 500 (PMED 1996) on SNI. The fox feeds on seeds and fruits, marine and terrestrial birds (including nestlings and young), carrion, garbage, and rodents (USFWS 1984).

Foxes seek refuge in and (by burrowing) under structures, such as the target containers, from the wind, heat, and other environmental factors.

3.1.11 Military Activities

The western end of SNI comprises the range operations area. T&E activities in this area are dispersed due to the specific siting requirements for the different tests and activities. With the exception of Jackson Highway, the access roads, target building pads, targets, and impact crater area, the SLAM site is mostly vacant and generally remains in its natural state of barren sandy expanses.

Of the 200 personnel on the island, approximately 120 are directly supporting test activities on the island. These people are stationed across the upper mesa. During SLAM test and training events all personnel will be kept at least two and one half miles from the target site. On the average, 25 nonpermanent personnel visit the island daily during the work week.

3.1.12 Airspace

The airspace needed for the operations covers SNI and extends radially north, west, and south of SNI in the Sea Range. The launch and control aircraft fly out to the launch point area and may run race track routes before launching the SLAMs. Then the chase aircraft will fly in formation with the missile along the missile flight path to SNI.
Most of the Sea Range is covered by FAA Warning Areas 60, 289, and 532, which cover the airspace from the surface to unlimited height. Affected airspace and sea surface areas are cleared of contacts before a SLAM operation.

3.1.13 Archaeological Resources

3.1.13.1 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) requires the head of any Federal agency having jurisdiction over a proposed Federal action in any State, prior to approval of the expenditure of any Federal funds, to take into account the effects of the action on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. A proponent of an action must identify any resources which may be affected by their proposed action. The January 1996 report (Rosenthal and Padon 1996) concluded that the collocated archaeological site CA-SNI-168 was eligible for inclusion. An index study has been completed which determined that site CA-SNI-169 is also eligible (Rosenthal and Jertberg 1998).

Section 110 of the NHPA requires Federal agencies to locate and inventory all cultural properties which appear to be qualified for inclusion in the National Register of Historic Places. In compliance with this section, NAWS PM has prepared and continues to update an inventory of the archaeological sites on SNI. CA-SNI-168 and -169 are the first two SNI sites to be evaluated for eligibility for inclusion in the National Register. Curation of collected ecofacts and artifacts from ongoing site investigations takes place on SNI in the environmental facility in compliance with the Archaeological Resources Protection Act and Native American Graves Protection and Repatriation Act.

A draft Historic and Archaeological Resources Protection Plan has been prepared and is being implemented for NAWS Point Mugu. A field research station has been established on SNI.

3.1.13.2 Nicoleño Occupation

Archaeologists, today, are trying to discover how the Nicoleños at SNI survived and adapted to their natural and socioeconomic environment. They are estimated to have occupied SNI at least 8000 years ago. More than 530 archaeological sites have been found on SNI. These sites include kitchen middens (prehistoric trash accumulations), food processing sites, stone quarry sites, burial sites, petroglyph sites, and village areas. Historical sites of early Chinese abalone collectors (circa 1860s-1910s), seal and otter hunters (circa 1820s), and early sheep ranching operations (1857-1943) also remain.

3.1.13.3 Archaeological Sites Within The Area Of Potential Effect

The initial SLAM target site is collocated with archaeological site CA-SNI-168. Because of the impacts to the resources of this archaeological site, the Navy contracted with Petra Resources, Inc., an archaeological services company, to conduct a field survey and a sampling program of the target site and the immediately surrounding area. These studies involved a preliminary site investigation; surveying and mapping the site; and a subsurface testing program. The following paragraphs summarize the results of these studies. (The final report describing the findings of the test program, surveying and mapping, and site investigation is available for review at the NAWS PM Environmental Division office.)

To assure that all impacts were assessed, Petra Resources surveyed an area extending 1/2 mile out from the initial target building area to the north in the direction of missile flights. This survey covered the three nearest known archaeological sites: CA-SNI-169, 170, and -171; and located each site's midden deposits. A data recovery effort is under contract and is expected to be completed at CA-SNI-169 before any missiles impact this site. Site CA-SNI-171 lies outside the APE.
Figure 3-5 shows the archaeological sites within and around the APE (other sites on the end of the island are omitted to protect the knowledge of their locations). The scientific archaeological value has been substantially recovered from CA-SNI-168 and will be substantially recovered from CA-SNI-169 before any impacts to the site are permitted. These are the only two sites within the APE boundary that contain resources of sufficient scientific value for study. Most of the archaeological sites are probably eligible for listing on the National Register based on the scientific information they contain. Human remains have been recovered from a few of the sites on the western end of SNI. The temporal affiliation of these burials is unknown.

3.1.13.4 CA-SNI-168 Site Study Results

CA-SNI-168 is a large, 255,000 meter square, heavily eroded, shell and lithic scatter. Wind rows of ubiquitous land snail shells, buried land snail shell strata, and empty shells intermixed with archaeological deposits exist throughout the site (Rosenthal and Padon 1996). The data recovery program indicates that CA-SNI-168 is a camp site where final tool manufacture, food processing, and general domestic production and maintenance activities were occurring throughout the year (Rosenthal et al. 1997). Study details appear in Appendix F.1.

CA-SNI-169 is a dispersed midden area which consists of at least three deflating midden remnants. CA-SNI-169 is contemporary with CA-SNI-168 and is probably part of the extensive CA-SNI-168 camp which spread and moved across the landscape over the centuries (Rosenthal et al. 1997).

CA-SNI-170 is a large midden area which has been heavily impacted by wind and water erosion and past military activities. Even though there are widely dispersed surface stone artifacts and shellfish, little intact midden remains (Rosenthal et al. 1997).

3.1.13.5 Evaluation of Significance

Petra's review of the test investigation results indicate that CA-SNI-168 contains important scientific data of considerable antiquity. The site possesses a configuration of artifacts and faunal remains that make it possible to answer important research questions about maritime subsistence strategies, inter-island exchange, past environments, and the evolution of ritual and ornamental traditions. The resources, because of their scientific importance, qualify under Criterion "d" because they "have yielded, or may be likely to yield, information important to prehistory or history" [36 CFR 60.4 (d)] for listing as a National Register eligible property (Rosenthal and Padon 1996). This site is only eligible for the prehistory information which it contains.

CA-SNI-169 appears to have scientific value and may be potentially eligible for listing in the National Register. Its early dates of 3370 BP and 3260 BP, and varied tool assemblage, suggest it contains valuable scientific information concerning San Nicolas' Middle Phase occupation (Rosenthal et al. 1997).

CA-SNI-170 has few remaining resources and appears to lack both integrity and scientific research value (Rosenthal et al. 1997).

3.1.13.6 Data Recovery Findings

Petra Resources retrieved a representative sample of the archaeological deposits at site CA-SNI-168. Data was collected until redundancy was reached. These artifacts and ecofacts are being curated in NAWS Point Mugu's environmental facility on SNI in accordance with 36 CFR 79, Curation of Federally Owned and Administered Archaeological Collections. Since CA-SNI-168 is only eligible for its data potential, and that data potential has been realized, there will be no adverse effect from use of this area as the target site for SLAMs.
Figure 3-5. Archaeological Resources near the SLAM Target Site.
Some cultural materials still exist within the boundaries of CA-SNI-168 and -169. Due to the nature of shifting sand dunes on this area of the island, it is possible that additional deposits containing data not collected in the data recovery program may become exposed through time. As such, the NAWS Point Mugu archaeologist will monitor this area and will assess the research potential of any newly exposed deposits.

3.1.13.7 CA-SNI-171 Survey and Index Unit Results

CA-SNI-171 is a large archaeological site which has extensive, widely dispersed stone artifacts and intact midden. It has considerable faunal and artifactual diversity, structural remains, and burials. Rosenthal et al. (1997) conclude that this site is eligible for listing on the National Register. This site is located outside of the APE. No further surveys or data recovery is currently planned.

3.1.14 Public Safety

Access to SNI by the public has been and will continue to be restricted according to access restrictions prescribed by the Department of the Navy. Access to the target site is limited to those on official business. The proposed site has a relatively low potential for safety or environmental hazards. The proposed site does not have any known contamination from hazardous materials. All personnel will be cleared from the site before any missile strikes will be permitted. Military aircraft do overfly the site. The risk from military aircraft will not be significant.

Safety will be paramount during the conduct of these operations and will not be compromised to obtain test or training objectives. It is the policy of the Commander, NAWCWPNS Point Mugu that every reasonable precaution will be followed in all flight operations to prevent injury to personnel, or damage to property, including the environment. All NAWCWPNS flight operations are conducted in accordance with the Sea Range Safety Handbook. These procedures apply to both the Sea Range with the SLAM target site on SNI and the Sea Range with the target site on SCI. The following steps will be taken to prevent injury to military and civilian personnel including members of the public and to avoid damage to property and the environment (Appendix B.4 provides detailed descriptions of selected steps):

- A basic principle of NAWCWPNS range safety is that no missile should violate the boundaries of its predetermined hazard area. Hazard areas are oriented to minimize the risk to personnel and property. Figure 3-6 shows a typical flight path route surrounded by the safety footprint (interior polygon) (see Appendix B.4.1). The safety footprint would only be violated in emergency conditions or in the event of a severe malfunction.

- Since SLAM missiles are, and its future models will be, capable of violating their safety footprint, a flight termination system (FTS) is required. Firings using a FTS require a Missile Flight Safety Officer to initiate flight termination. The Missile Flight Safety Officer monitors the flight in real time. He will initiate flight termination if there is a high probability that flight safety criteria (safety footprint) will be violated. If the missile is terminated, it will impact the earth's surface within the missile hazard area boundary (exterior polygon) (see Appendix B.4.2). The footprints and boundaries are actually drawn on the radar screens by computers in the control room so that the missile location can be tracked against them throughout its free flight.

- In order to cover the operational procedures and safety criteria of the missile launch and flight under these conditions, a Range Safety Operational Plan is prepared (see Appendix B.4.3).

- The range user provides the range with a list of the potentially hazardous materials, items, or test conditions for planning purposes (see Appendix B.4.4).
Figure 3-6. Example SLAM Safety Footprint and Hazard Area Boundary.
• Advance notice is given to the public that a certain area of the range will be closed for the test or training operation. Closures of the Sea Range will be coordinated with the US Coast Guard and the Federal Aviation Administration. The public will be notified of the closures in a Broadcast Notices to Mariners and/or weekly LOCAL NOTICES TO MARINERS (NOTMs) article and through weekly LOCAL NOTICES TO AIRMEN (NOTAMS).

• The flight test and training personnel, including all test engineers and pilots, have a final face-to-face meeting within four hours of the test mission to go over the test requirements and procedures, and safety issues.

• Aircraft and land search radar will be used to detect and identify all vessels on the range in the hazardous area. These vessels must clear the hazardous area before the test or training operation can proceed (safe range).

• Before the launch and control aircraft take off, all missile systems, including the FTS and telemetry, will be checked to verify that they are working correctly. The NAWCWPNS PM Missile Flight Safety Officer has the responsibility for ensuring that SLAM missiles are not launched until the FTS, all safety TM channels, and all communication channels specified for range safety are functioning properly.

• Air and surface traffic is controlled by Air Intercept Controllers and is monitored during all test and training operations in real time in the control room. The Navy Test Conductor has responsibility for proper and safe conduct of test and training operations.

• Visual meteorological conditions must be met before launch. These conditions are: five nautical mile visibility for the chase aircraft, cloud bottoms above the missile's search altitude, and no clouds visible near the western end of SNI.

3.1.14.1 Surveillance

The proposed missile firings create hazardous operations areas in the Sea Range. These areas are identified in the Range Safety Operational Plan (Appendix B.4.3). (Local Notices to Mariners and to Airmen provide advance notice to the public that portions of the Sea Range will be closed in the near future.) Since SLAM is capable of seeking out a surface target, 100 percent of all surface ships must be detected and moved out of the hazardous operations area before the firing operation can proceed (creating a safe range condition). Nonparticipant aircraft must also be kept out.

The Surveillance Aircraft Controller, located in the Range Surveillance Center at Point Mugu, will be responsible for the positive control (including altitude assignments) of the surveillance aircraft used for detection and identification of nonparticipant ships and boats in support of missile flight safety on the Sea Range and the aircraft involved in range operations. This position will be operationally responsible to the PLEAD Control controller for the proper utilization of airspace. The surveillance aircrews perform a visual and radar search of the areas within and adjacent to the hazard pattern starting two hours before the range will be needed for the hazardous operations. Typically, aircraft with surface search radar capabilities and VHF/FM are used. Data from these radars are collected, correlated, and displayed in the Range Surveillance Center and each Tracking and Control Room at PM.

All over-water areas of the Sea Range are listed on the navigation charts as "Warning Areas." There is no requirement for ships entering the area to receive clearance from the Navy to do so. Consequently, the range area to be used for a firing must be cleared before each firing operation. Nonparticipant ships vary from a very small pleasure or fishing boat to the largest merchant or naval ship. The merchant ship population is generally evenly distributed throughout the year; however, fishing boats are most numerous from June through November. Some small fishing boats are continuously present on the Sea Range.

Clearing the hazardous areas is accomplished via radio communications between PLEAD Control, the clearing aircraft, and surface ships in the hazardous areas. If required, the
ship will be asked to assume a specified course and to clear the hazardous area (See Section 3.1.12, Airspace).

3.1.14.1.1 Surveillance Aircraft

Surveillance aircraft will be used to clear the range area inside the SLAM’s hazard area boundary (Figure 3-6). This boundary will be modified to account for possible overflights. P-3 aircraft performing range clearance operations typically fly at 500 feet above MSL.

3.1.14.1.2 Surveillance Radar

The surveillance radars and display systems on SNI are used to detect and track all aircraft and surface vessels in or approaching the 36,000 square miles of the Sea Range. This surveillance ensures that all hazardous operations are conducted in a safe manner. The surveillance radars track to ranges of up to 200 miles and have an accuracy of one or two miles. They provide a complete picture of all of the participants and non-participants in the Sea Range.

3.2 NAVAL AUXILIARY LANDING FIELD SAN CLEMENTE ISLAND

This section describes the natural and cultural features of SCI. San Clemente Island is the southernmost of the Channel Islands and lies within the FACSFAC Operating Area, located 36 NM from the mainland. The island is administered by the Commanding Officer at NAS North Island. The NAS North Island Natural Resources Office is responsible for managing the natural and cultural resources of SCI. Island locations are given in Figure 2-7.

SCI has an area about 56 square miles or about 35,540 acres. The island stretches northwest to southeast for about 21 miles, 4 miles at its widest part and 1 1/2 miles wide near the north end. The northeastern slopes, facing the California coast, plunge sharply into the ocean in very steep to extremely steep cliffs. The southwest side is more irregular and has gentler slopes. Throughout the entire area, but more prominently in the southern half, the island is dissected by deep V-shaped canyons reaching depths of more than 500 feet. These canyons drop sharply into the sea (SCS unpub). Some of the endangered plants occur on the very stony and very steep cliffs of the island’s canyons. These canyons also serve as shelter for other plants and wildlife, such as the unique Island fox. The island’s maximum elevation of 1,965 feet occurs at Mount Thirst.

The MIR target site is located on top of the island with excellent visibility to all sides. The land slopes gently downward from the east and north to the west and south.

Geographic isolation of islands is conducive to the evolution of unique life forms. The flora and fauna of SCI exemplify this attribute of island biology. The flora include 14 species or subspecies of plants found nowhere else in the world. An additional 29 plants occur only on this island and one or more of the other Channel Islands. The fauna includes three subspecies of birds endemic to the island and two others which are indigenous to the Channel Islands; the Island night lizard and the Island fox are listed as threatened species.

Sheep ranching was conducted on SCI from 1877 to 1934. Feral goat herds, pigs, and cats also roamed the island. These animals overgrazed the island and affected all of its inhabitants including threatening many of these unique life forms. The effects included the destruction of cover and essential breeding habitat for several bird species. The last of these animals were removed in 1991. The island is now recovering.

The following resource groups will not be discussed in depth since the number of their resources are very small in the area that is predicted to be affected by the proposed action or no effects are expected:

- Water Resources. There are no permanent surface or ground water resources in the vicinity of the MIR. Only a few puddles might appear after a spring time storm. Coastal Water Research Project and California State Mussel Watch studies suggest
that the nearshore environment around SCI is probably very clean. While the waters surrounding SCI have been designated by the California State Water Resources Control Board as an ASBS, the absence of any permanent stream which could carry pollutants into the ocean or even the presence of any discharges which might pollute the water indicate that there will be no impact on ocean water quality.

- Geological Resources. While a missile could penetrate into the bedrock at the MIR, its small size will not cause any significant change to the characteristics of the bedrock such as fractures, landslides or deformations.

- Topography. There are no plans to modify the topography of the MIR to support the configuration or reconfiguration of the targets or the target setting on SCI.

- Invertebrates. The general absence of suitable habitat for invertebrates around the targets indicates that few invertebrates should be affected by the proposed tests. There will be no widespread release of chemicals which might impact the insects of the island. The loss of some vegetation from a wildfire due to a missile landing in vegetation could result in the loss of some individual insects, but the next season's re-population would replace those directly lost. Fluctuations in population levels would probably make it impossible to determine the exact level of effects on insects or other invertebrates.

- Reptiles. Two lizard species are present: the Island night lizard and the common Side-blotched lizard (Uta stansburiana). The Side-blotched lizard is commonly found in other habitats on the island but not in the MIR. The threatened night lizard is discussed below in Section 3.2.7.6.

- Terrestrial mammals. The mammalian fauna of SCI is depauperate. The minimal habitat at the target site is unlikely to support more than a minimal population of mice. The threatened Island fox is discussed separately (Section 3.2.7.10).

- Socioeconomic resources. There are no social activities at the target site or on SCI that would be affected by the proposed action. Economic effects would consist of moneys spent for firing support activities on the island including potential room and board for transient firing personnel. These activities are insignificant.

- Historic resources. Historic resources exist on SCI, but are not located in areas which will be affected by the proposed action.

- There are no known concentrations of hazardous substances which might present an environmental health concern in the vicinity of the MIR. The site is regularly inspected by the explosive ordnance disposal teams after each military test event. Consequently, hazardous items are picked up shortly after they are deposited and few, if any, should be left.

### 3.2.1 Air Quality

The fire management study (Beauchamp and Radtke 1989) presented data from a wind power feasibility study on the local direction of winds on SCI. Of interest to this EA are the data for Mount Thirst, the highest and most exposed point on the island. At Mount Thirst, the prevailing winds blow from the north to the west 78 percent of the time, averaging 15.5 kmh (9.7 mph), and showing a diurnal variation of 6.6 kmh (4.1 mph). The strongest winds of 19.2 kmh (12.0 mph) were measured between 1800 - 2000 hours, gradually declining to a low of 12.6 kmh (7.9 mph) between 0800 - 1000 hours. Gale force winds are common in winter at the higher regions of SCI, but are infrequent at the lower elevations. Average wind speeds year round are under ten knots, predominantly from the northwest. The seas around the island are generally calm, with rough water conditions occurring only 11 percent of the time. Appendix C.3 provides more details on the meteorology of the SCB.

SCI is part of Los Angeles County. While the Channel Islands are listed as unclassifiable/attainment for all criteria air pollutants (40 CFR 81.305), the California Air Resources Board considers SCI to be a part of the South Coast Air Basin (SCAB). The SCAB is
listed as nonattainment (extreme) for ozone, nonattainment for nitrogran oxide, and nonattainment (serious) for PM$_{10}$ and carbon monoxide. All portable generators used to power firing event equipment and instruments are supplied by the Engine Equipment Company. This company has obtained individual operating permits for each generator it places on SCI including all the generators that would be used to cover SLAM firing events.

3.2.2 Soils

The loss of vegetative cover due to sheep ranching and feral animals has resulted in extensive erosion on many parts of the island. In many areas, the consolidated volcanic parent material is all that remains on the island's surface. This major alteration precludes recovery of vegetation to the condition of pre-European times in these areas (Beauchamp and Radtke 1989).

Soils in the MIR were formed in fine alluvium derived mainly from mixed rock sources. These clay soils have rooting depths ranging from 20 to 60 inches (SCS unpub).

3.2.3 Noise

The island is generally dominated by the sound produced by physical components of the environment – wind and surf. The periodically loudest areas are the north end of the island around the NALF and nearby demolition ranges and the south end around the Shore Bombardment Area (SHOBRA). In the former area, frequent aircraft operations produce peak sound intensity levels commonly 70 to 100 dBA on the ground and periodic explosions that may be heard thousands of feet away. In the latter area, the firing of naval guns and detonation of impacting ordnance produce explosions that may be heard many miles away sometimes even on the mainland coast; on occasion assault support aircraft add to the noise (Chambers 1981).

3.2.4 Plants

San Clemente Island's existing vegetative cover primarily consists of introduced annual grasses and some native perennial grasslands on the plateau areas, abundant indigenous cactus on the terrace faces, scattered woodlands and shrublands in the canyons and on the eastern escarpment, and maritime desert scrub on the lower terraces. A few different plant community types exist between the coast and the target site including the land around the target site. These can be lumped into four categories: disturbed land, Stipa grassland, Maritime desert scrub, and coastal habitats.

The area around the MIR consists of native and non-native grasslands. Native grasslands are determined by the degree of dominance of native grasses and herbivorous animals, and are considered sensitive by the California Department of Fish and Game (Holland 1986) and others. Native grassland generally consists of perennial bunchgrasses with both annual and perennial forbs, such as needlegrasses (Nassella sp.) and introduced annuals (Bromus sp., Avena sp.). Non-native grassland is comprised of annual grasses sometimes associated with annual, native forbs. Species common to this type of habitat on San Clemente Island include ripgut brome (Bromus diandrus), foxtail chess (Bromus madritensis spp. rubens), soft chess (Bromus hordaceus), phalaris (Phalaris minor), annual beard grass (Polygogon monspeliensis), and wild oats (Avena fatua).

For the most part, the MIR has been highly disturbed due to a long history of military operations and weapons testing, including soil disturbance due to plowing and furrowing, leaving sparse reemergent vegetation. The firebreak road near the MIR consists of a swath approximately 6 feet wide and 0.6 mile long that is cleared of vegetation annually (US Navy 1996b). An additional firebreak road was constructed as part of the Joint Stand-Off Weapon program and would continue to be maintained as part of the SLAM program (Figure 3-7).
Figure 3-7. Missile Impact Range, Sea Birds and Marine Mammals at SCI.
3.2.5 Birds

The island supports about 240 species of birds although most are just visitors during periods of migration. Approximately 30 marine associated and terrestrial species breed or have bred on SCI. Horned larks and Western meadowlarks are especially abundant in the extensive grassland habitats. The remainder of the species are mainly migrants or visitors to the island. The relatively undisturbed beaches and rocky shoreline provide excellent foraging and resting habitat for many migrating and visiting waterbirds (Jorganson and Ferguson 1984, and Beauchamp and Radtke 1987). The target area does not contain any known or preferred habitat of the endangered or threatened bird species present on the island, is highly disturbed, and provides little cover or foraging habitat.

Sixty-one species of marine birds have been observed during three systematic bird surveys of SCI [see Chambers (1981) for list]. Of these species, bald eagle, Osprey, and peregrine falcon no longer occur on the island. The majority of the bird activity takes place on the seaward, southwestern coast of the island. The largest single congregation of birds is at Bird Rock in Northwest Harbor. Western gulls, Brandt's cormorants, brown pelicans, Royal terns, Elegant terns, and a variety of small shore birds roost on Bird Rock. Roosting occurs on all the large offshore rocks, which, with the exception of White Rock, are on the seaward coast of the island. Most marine bird species breed on the offshore rocks or the steep cliffs along the shoreline of the island. Western gulls breed at Bird Rock, Seal Cove, Mail Point, and north of Wilson Cove. Seal Cove is the only known breeding site on SCI for Black oyster catchers. Seal Cove and China Pont both offer good breeding habitat for Xantus' murrelets, but nesting has not been documented since 1968 (Chambers 1981). Carter et al. (1992) conducted extensive sea bird nesting colony studies from 1989 to 1991. Sea bird colonies found by Carter et al. are shown in Figure 3-7. Western snowy plovers have been seen on the island (threatened species).

3.2.5.1 Brandt's Cormorant *(Phalacrocorax penicillatus)*

Historical Brandt's cormorant nesting sites were found at Ship Rock, Bird Rock (2), and Castle Rock (Carter et al. 1992). Brandt's cormorant ecology was described in Section 3.1.8.1.

3.2.5.2 Western Gull *(Larus occidentalis)*

Western gulls are present at Castle Rock, Bird Rock, Northwest Harbor to Wilson Cove, China Point Island, Lost Point South, Mail Point South, and the Seal Cove area (Carter et al. 1992). Western gull ecology was described in Section 3.1.8.2.

3.2.6 Marine Mammals

California sea lions are the most abundant marine mammal species occurring on SCI. Pacific harbor seals and Northern elephant seals also frequently haul out on the island. The distribution of pinnipeds on SCI tends to be localized in small isolated sections of the coast on the western side of the island (Figure 3-7). The sea lion population ranges from about 1,800 animals during the summer to less than 1,000 during the fall. The majority of this population occurs between Seal Cove and Lost Point. Within this area there are two main rookeries and two hauling out grounds. The sea lion population shifts between these sites during the year with a definite preference for the rookeries during the summer. Northern elephant seals, California sea lions, Pacific harbor seals and an occasional sea otter are also found at SCI. Gray whales migrate along the island's coast.

Wandering Southern sea otters (a Federal and California threatened species, see Section 3.1.10.4) have occurred off the island; unsubstantiated reports of these animals have been made as far south as Baja California, the southern end of their historical range. The
current range for sea otter populations is only as far south as Pismo Beach with the exception of the otters at SNI.

### 3.2.6.1 Gray Whale

Most of the eastern Pacific population of Gray whales (about 11,000 of the 18,000) migrates through the SCB in winter and spring (Bonnell and Dailey 1993). The southbound migration occurs from November to early February. The return migration occurs in two waves. In April and May, a large cross section of the population passes through the bight. In early June, a smaller population, primarily lactating females with their young, migrates through the area. This latter group requires more nutrition and is likely to graze in the kelp beds of the bight (Leatherwood et al. 1987). The major migratory routes are thought to lie between several hundred yards offshore and the Channel Islands; few whales have been sighted seaward of the Channel Islands. The gray whale is known to migrate close to shore along the western side of SCI (Figure 3-3). The Gray whale was recently taken off the endangered species list.

### 3.2.7 Endangered and Threatened Species

Due to SCI’s size and isolation, it is the most biologically distinctive coastal island owned by the United States. Due to the numerous organisms found only on the island and to the extensive damage by introduced grazing animals to its ecological system, 44 plants and animals have been proposed for federal or state protection. Nine wildlife and four plant species are listed by the Federal government as threatened or endangered. Table 3-2 shows the 13 special status species known to occur or potentially occurring on SCI, including one reptile, six birds, two marine mammals, and four plants. The USFWS has issued two Biological Opinions for SCI concerning the management and protection of the Island night lizard, and controlling the incidental take of protected species as a result of training activities that could potentially cause wildfires. NMFS has documented the presence of the Guadalupe fur seal on San Clemente Island during 1991 (NMFS 1997), but it has not been sighted since, so there is no discussion for this species. Preferred habitats of these species, where applicable, are shown in Figures 3-8 and 3-9. There are no known nesting sites of the American Peregrine falcon on San Clemente Island. The MIR does not support habitat for the California brown pelican. (The California brown pelican was discussed in Section 3.1.10.1.)

In addition, two plant species proposed for listing as endangered by the Federal government (Santa Cruz Island rock cress [*Sibara filifolia*] and San Clemente Island woodland star [*Lithophragma maximum]*) occur on the island. The rock cress is known only to occur at the southeastern tip of the island, the woodland star is currently known only from a few canyons on the eastern portion of the island (US Navy 1996c). Due to the lack of potential habitat for the rock cress and the woodland star on or near the MIR, or within the overland missile flight path, no further discussion of these species is included herein.

In accordance with the Endangered Species Act (ESA), other federal legislation, and DoD regulations, NAS NI is coordinating research and implementing management programs to conserve endangered and threatened species and habitat critical to their continued existence. The distribution and abundance of all listed and many candidate species have been monitored in an ongoing effort since 1977. Status surveys are used to evaluate population changes and the effectiveness of recovery programs (NRO 1992).

### 3.2.7.1 San Clemente Island Indian Paintbrush (*Castilleja grisea*)

The paintbrush has been found in almost every large canyon on the east and west sides of the island. It occasionally occurs on cliffs in canyons and on the eastern escarpments of San Clemente Island, and is uncommon in the western canyons in the southern half of the island. Along the eastern escarpment, the Indian paintbrush occurs on rock faces almost down to the beach. In addition to cliffs, sandy flats, and gully edges, substrates include loose rocky soil. Its current distribution strongly suggests that it occurred over a much larger range in the past. Potential habitat for this species includes all non-sand dune and non-grassland areas,
### TABLE 3-2. ENDANGERED AND THREATENED SPECIES ON SCI. 
(Ferguson et al. ND, KTA+U 1993, and Murphy 1995, US Navy 1994b)

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>Federal Status on SCI</th>
<th>Status on SCI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENDANGERED AND THREATENED SPECIES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PLANTS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Castilleja grisea Dunkle</td>
<td>Dunkle San Clemente Island Indian paintbrush</td>
<td>E</td>
<td>SCI endemic. Prefers western coast of SCI.</td>
</tr>
<tr>
<td>Delphinium variegatum ssp. kinkiense (D. kinkiense Munz)</td>
<td>San Clemente Island larkspur</td>
<td>E</td>
<td>SCI endemic. No occurrences within the MIR.</td>
</tr>
<tr>
<td>Lotus dendroideus ssp. traskiae = (L. scoparius ssp. f.)</td>
<td>San Clemente Island broom/ Trask's island lotus</td>
<td>E</td>
<td>SCI endemic. Occurs at Eel Point.</td>
</tr>
<tr>
<td>Malacothamnus clementinus</td>
<td>San Clemente Island bushmallow</td>
<td>E</td>
<td>SCI endemic. No occurrence within the MIR.</td>
</tr>
<tr>
<td><strong>REPTILES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xantusia riversiana Cope</td>
<td>Island night lizard</td>
<td>T</td>
<td>Principally associated with all of the <em>Lycium</em> and prickly pear phases of maritime succulent scrub. Occurs throughout the island.</td>
</tr>
<tr>
<td><strong>BIRDS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lanius ludovicianus meamsi Ridgway</td>
<td>San Clemente Island loggerhead shrike</td>
<td>E</td>
<td>Low potential at MIR; prefers disturbed habitat on steep eastern escarpments</td>
</tr>
<tr>
<td>Amphispiza belli clementeae Ridgway</td>
<td>San Clemente Island sage sparrow</td>
<td>T</td>
<td>Occurs on north and central west coast of SCI.</td>
</tr>
<tr>
<td>Charadrius alexandrinus nivosus</td>
<td>Western snowy plover</td>
<td>T</td>
<td>No potential to occur at MIR due to lack of suitable nesting habitat.</td>
</tr>
<tr>
<td>Pelecanus occidentalis californicus</td>
<td>California brown pelican</td>
<td>E</td>
<td>Likely forages along the strand habitat. Unlikely to nest due to degraded nature of nesting habitat.</td>
</tr>
<tr>
<td>Falco peregrinus anatum</td>
<td>American peregrine falcon</td>
<td>E</td>
<td>No potential to occur at MIR due to lack of suitable nesting or foraging habitat</td>
</tr>
<tr>
<td>Haliaeetus leucocephalus</td>
<td>Bald eagle</td>
<td>T</td>
<td>Low potential to occur due to lack of suitable large bodies of fresh water, i.e., lakes or rivers.</td>
</tr>
<tr>
<td>MAMMALS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arctocephalus townsendi</td>
<td>Guadalupe fur seal</td>
<td>T</td>
<td>Low potential along the shore; last recorded on SCI in 1991</td>
</tr>
<tr>
<td>Enhydra lutris nereis</td>
<td>Southern sea otter</td>
<td>T</td>
<td>Low potential to occur in the kelp beds off of the eastern shore.</td>
</tr>
<tr>
<td><strong>PROPOSED FOR LISTING</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithophragma maximum</td>
<td>San Clemente Island woodland star</td>
<td>PE</td>
<td>SCI endemic, &lt; 20 sites. Known from the eastern side of SCI. No occurrence within the MIR.</td>
</tr>
<tr>
<td>Sibara filifolia</td>
<td>Santa Cruz Island rock cress</td>
<td>PE</td>
<td>SCI endemic. Known primarily from the southern portion of SCI. No occurrence within the MIR.</td>
</tr>
</tbody>
</table>
Figure 3-8. Central SCI Potential Habitat and Locations of Endangered Plants.
Figure 3-9. Central SCI Potential Habitat of the SCI Sage Sparrow.
particularly those at the southern end of the island without significant development. Because it is likely to be parasitic, there may be a specific host dependency to be considered as well. The population of this species probably exceeds several thousand individuals (NRO 1992). Potential habitat is shown in Figure 3-8. The nearest paintbrush colony is located approximately 0.75 miles away from the MIR.

### 3.2.7.2 San Clemente Island Larkspur (*Delphinium kinkiense*)

The San Clemente-Island larkspur is a white-flowered larkspur usually associated with moist sites found on the eastern slopes of the high plateau grasslands, especially on northern and central island sections. Approximately 40 separate populations of San Clemente Island larkspur are known to occur on the island, all on mesic grassland sites (US Navy 1996c). Field observation following fire suggests that this species is adapted to fire during its dormant period. The eastern slope grassland habitat where these colonies occur is considered potential habitat for this species (see Figure 3-8). Four distinct locations of the San Clemente Island larkspur exist approximately 0.75 mile northeast of the target area. Due to substantial prior disturbance, the plant is not likely to colonize the MIR site.

### 3.2.7.3 San Clemente Island Broom (*Lotus dendroideus* spp. *traskiae*)

Ten colonies (totaling less than 1,000 plants) were located in 1985. The largest concentration of this species occurs in the vicinity of Wilson Cove. Six additional colonies were discovered between 1989-1990 (NRO 1992). Each colony is generally associated with rocky areas. Goats were the primary cause for the reduction of this taxon; however, disturbance associated with military construction and maintenance activities have eliminated some individuals. Potential habitat for this taxon includes most of the island. Cultivation of the *Lotus* in various soils and plantings on SCI at a variety of elevations and exposures suggest that this plant is rather broad in its habitat requirements (see Figure 3-8).

### 3.2.7.4 San Clemente Island Bushmallow (*Malacothamnus clementinus*)

This plant is known from several locations on the island where it occurs on low benches and canyon sides, including Lemon Tank, China, Horse Beach, Box, and Middle Ranch canyons, and on two plateaus. The total population consists of about 100 individual plants containing thousands of stems. The ease of resprouting from underground parts suggest that the species may be adapted to fire like most other species of *Malacothamnus*. However, too frequent fires might eliminate the plants in isolated sites. Potential habitat for this species may be considered to be those non-grassland and non-dune portions of the island where no substantial disturbance is likely to take place (see Figure 3-8). This designation assumes that the species is capable of persisting in these habitats if planted. It appears to tolerate a wide range of soils.

### 3.2.7.5 Trask's Island Lotus (*Lotus dendroideus* ssp. *traskiae*)

This San Clemente Island endemic ranges from the bluffs at Pyramid Head, to the mouths of some western canyons near boulders, to the long-standing population at Wilson Cove where 100 to 200 plants occur (US Navy 1996c). Ten colonies of this species, totaling less than 10,000 plants, were located in 1985, generally associated with rocky areas. Six additional colonies were discovered in 1989-1990. From all indications, it is expanding its range in habitats that vary from prickly pear patches to rocky grassland. The closest occurrence of this species relative to the MIR is approximately 0.75 mile to the east. Potential habitat for this species is scattered throughout the island (US Navy 1996c). It tends to be most common around the edges of maritime sage scrub and near rocky outcrops in grassy areas. The habitat is noted as grassy coves on dry and sometimes rocky slopes (US Navy 1994b).
3.2.7.6 Island Night Lizard (*Xantusia riversiana*)

The island night lizard has a robust and widely distributed population on San Clemente Island. Densities of 800 to 1300 individuals per hectare were found in areas of preferred habitat (NRO 1992). Lizard abundance varies drastically both between habitats and over the geographic range of a given habitat type. Upland regions lacking rock outcrops or scattered boulders, such as the flat grassland northwest of the mid-island, probably did not support large night lizard populations even where covered with shrubs. Only marginal habitat for this species exists at the MIR, and no island night lizards have been observed in this area. The closest location is approximately one mile from the target area (US Navy 1996b), on the lower terraces of San Clemente Island and on the plateaus near Lemon Tank and Tota Canyon, approximately 1.5 miles southeast of the MIR. Efforts are under way to delist this species.

3.2.7.7 San Clemente Island Loggerhead Shrike (*Lanius ludovicianus mearnsi*)

The SCI loggerhead shrike is one of nine recognized subspecies. This subspecies inhabits only SCI. In 1982 the population size was estimated to be 18 to 30 individuals. Intensive surveys conducted between 1987 and 1991 documented the decline in nesting activity of this species. Because of this critical situation, a captive rearing program was initiated during the breeding season of 1991 (NRO 1992). Basic habitat requirements for the loggerhead shrike include an adequate supply of invertebrate and small vertebrate prey, open foraging areas, a selection of elevated perches, and sufficient roosting and nesting cover. Much of SCI satisfied these conditions at one time. Recent observations show that shrike distribution is generally restricted primarily to the higher and eastern sections of the island. In the fall and winter months, solitary shrikes typically occupy the island's uppermost mesas. Whereas shrikes commonly disperse throughout the upper mesas during the fall and winter, they apparently utilize only the island canyons for nesting activities. Wintering shrikes have occurred near the old airport, approximately 0.8 mile northwest of the MIR (Everett and Koehler 1994). In 1983 shrike breeding seemed to be confined to a zone from the China Point area, northward no farther than Burns' or Stone Canyons, approximately midway on the eastern side of the island. A historical breeding site was located in Nanny Canyon, approximately 0.75 mile east of the MIR. Shrikes have nested in February, but the prime nesting period is March and April. While the area in proximity to the MIR only offers marginal habitat for the loggerhead shrike and no shrikes have been observed in this area, they could occasionally fly over the MIR.

3.2.7.8 San Clemente Island Sage Sparrow (*Amphispiza belli clementeae*)

The sage sparrow is nonmigratory. Mainland sage sparrows typically inhabit a moderately dense, xerophytic scrub community. The only vegetation association on SCI that resembles mainland sage sparrow habitat is the *Lycium* phase of the Maritime Desert Scrub community. It occurs as a distinct vegetative unit in only four discontinuous locations. The largest area is a narrow coastal belt along the western marine terrace (West Shore Zone). This zone occupies approximately 5 km² of coastal terrace extending north from Eel Point. A second, intermediate zone is located approximately 4 km south of the West Shore Zone in the vicinity south of Seal Cove. A third region, fundamentally different from the first two, is located at the extreme north end of the island (North Head). Finally, a largely unexplored site is situated at the island's extreme south end, in proximity to Pyramid Cove. The SCI sage sparrow, apparently responding to a restricted vegetative distribution, rarely occurs more than 100 to 130 feet (30 to 40 m) above sea level. A population census of this species was made each year between 1980 and 1988. Post breeding census results (adults and juveniles combined) have varied from 38 to 363 individuals during this eight year period. On the basis of a study conducted between 1987 and 1989, the population appears to be steadily increasing (NRO 1992). Essential habitat, as indicated in the Channel Islands Recovery Plan, is presented in Figure 3-9. The closest suitable habitat to the MIR is approximately 1.2 miles to the west. No sparrows are expected to occur at the MIR due to the absence of suitable habitat.
3.2.7.9 Western Snowy Plover (*Charadrius alexandrinus nivosus*)

Western snowy plovers have been sighted along the sandy beaches of the island, which include West Cove, China Cove, Horse Beach Cove, and Pyramid Cove. To date, none have been observed in Northwest Harbor. The status of the population is not known, since records of the bird have been sporadic and mostly from the last several years. A juvenile was recorded from West Cove in 1991, indicating that some nesting has occurred.

3.2.7.10 Island Fox (*Urocyon lltoralis*)

Although the Island fox maintains a healthy population on SCI, it is still considered to be in jeopardy. Because of the lack of cover, the Island fox is not expected to be present in the target area.

3.2.8 Military Activities

At present, approximately 550 personnel, belonging to NALF SCI and tenants from numerous Department of Defense agencies operate on the island daily, supporting all facets of Department of Defense operations and research (Sexton and Lammers ND). Approximately 10 to 15 personnel work south of the MIR; 3 to 5 at the Station Stone southwest of the MIR, and another 7 to 10 personnel supporting the SHOBA activities.

3.2.9 Fire Management

Fire management of the vegetated areas of the island is a concern to the NAS NI Natural Resources Office as a fire could destroy habitat of species of concern.

Wildland fire hazard can be considered a function of two factors: rate of spread and resistance to control. The rate of spread is controlled by wind (weather), topography, and physical fuel characteristics. Wind and topography can both increase the rate of spread of fire by increasing the heat transfer from the fire to the fuel. As fuels downwind and upslope from a fire are quickly heated by hot gases and radiant energy released by the fire, the fuels are rapidly dried out and heated to the ignition point. Physical fuel characteristics affecting the rate of spread are the fuel moisture content, the amount of fine fuels present, and the porosity of the fuel bed. Fuel moisture is the key to fire resistance. Fuel moisture is high in living vegetation and very low in dead vegetation. Small diameter fuels <0.64 cm (<0.25 in) such as grasses are not only easily dried out and heated to ignition temperatures, but also provide better fuel and air mixture for combustion, thereby promoting a high rate of spread (Beauchamp and Radtke 1989).

Fire spread can be considered as a series of ignitions wherein heat from a fire raises successive strips of fuel to the ignition temperature. Ignition occurs in four phases: 1) the firebrand coming in contact with the dead fuel; 2) the moisture in the fuel being driven off; 3) the temperature being raised to the point of pyrolysis (about 199°C or 290°F to 249°C or 480°F); and 4) ignition when the fuel and heat generated gases are heated to about 321°C (610°F) (Beauchamp and Radtke 1989).

The fuel load is increasing as the island recovers from the overgrazing caused by goats. The island is essentially covered by an annual/perennial grassland mixture and maritime desert scrub vegetation separated into three different phases depending on the predominance of box-thorn, coastal prickly pear, and cholla. Annual grasses and herbs occur in all phases. This fuel type has a high rate of spread due to its large amount of fine, dead fuels consisting of grasses and herbs, but has a low resistance to control (wildfires can be easily controlled) (Beauchamp and Radtke 1989).

Four fire fighters are located at Fire Station 10 at Wilson Cove. Fire Station 10 has a 500 and 750 gallon pumper available to fight wildland fires. Seven additional fire fighters are located at the airfield station (Station 11). Fire Station 11 has four crash trucks which are not designed for off-road use. A prescribed burn program was carried out for several years
beginning in 1984 and is now restricted to case by case review. The SCI Fire Department does not respond to wildland fires in the more remote areas of the island unless they threaten to become large scale fires, or unless it is requested to do so by SHOBA personnel, and the fire can be contained by an existing road system (Beauchamp and Radtke 1989).

### 3.2.9.1 Stipa Grassland Fuel Type

Perennial grassland fuels normally do not become a fire hazard until after the annual grasses have dried or cured. This fuel type can become flammable. The high porosity of the air-fuel mixture makes the grassland a highly flammable fuel type that can maintain a high rate of spread but has a quick burnout period; is difficult to reignite, but burns with low heat intensity; and is generally easy to control. Since much of the island's vegetation is grassland, fire scars are normally obliterated within a few seasons by new growth. Figure 6 of the fire management study shows that the target area was burned over in 1985 (Beauchamp and Radtke 1989).

### 3.2.9.2 Maritime Desert Scrub Fuel Type

Because of its large component of annual grass flash fuels and its occasional component of semi-woody shrubs, this fuel type can approximate the perennial grass fuel type in flammability, rate of spread, and ease of control. The rugged topography, abundance of rocks, and sparse grass cover associated with sites containing this fuel type, as well as the maritime terraces dissected by deep canyons may act as localized fire barriers whose effectiveness will be determined by the location of the fire start and the prevailing winds (Beauchamp and Radtke 1989).

### 3.2.10 Infrastructure

The main electric and telephone lines for the south end of the island pass right by the MIR.

### 3.2.11 Archaeological Resources

Chronometric data from Eel Point have shown that SCI was aboriginally occupied by maritime-adapted groups beginning nearly 10,000 years ago. During the late prehistoric period, the island was occupied by island Gabrieleno peoples, who had departed or died out by 1815, leaving little ethnographic record. However, the island's prehistoric occupants did leave a rich archaeological legacy. Most of the resources remaining from the Gabrieleno occupation of the island include house pits, rock shelters, and flaking stations. Over 3,500 prehistoric archeological sites have been recorded on SCI. Recently, a probabilistic (15 percent) sampling survey and site testing project was completed, which resulted in an estimate of 7,500 archaeological sites for the island as a whole (Yatsko and Raab ND). Twenty historical sites are also present.

Generally, the highest densities of archaeological sites are found on the marine terraces along the western slope of SCI. Nearly all areas of the Coastal Terrace (CT) and Upland Marine Terraces (UMT) terrains studied to date have yielded site densities in the range of 100 to 300 sites per square kilometer (Yatsko Nov 1994). Figure 3-10 shows the extent of these marine terraces to the west of the MIR target site. This figure also shows the boundaries of two archaeological site location studies near Eel Point which yielded 92 and 22 sites, respectively.

Archaeological sites on the marine terraces are typically very discrete cultural loci, with well defined surface material scatters and midden boundaries. They are generally smaller (10-15 meter diameter) and less complex than those in the vicinity of the MIR target area. These small shell midden sites have a wide variability in densities of marine shell, occurring as discrete, sometimes slightly mounded shallow (30-50 cm) deposits in level to moderately sloping terrain, or in rock shelters. These midden loci are usually surrounded or overlapped by
Figure 3-10. Central SCI Archaeological Resources.
scatters of flaked lithics, artifacts and/or unmodified/fire-altered rock. Larger sites most often seem comprised of multiple, overlapping, smaller midden loci, very likely representing temporally separated prehistoric occupations (Yatsko Nov 1994).

A reconnaissance survey within the fire breaks of the MIR target site was conducted in 1994. Nothing of consequence was found or flagged for avoidance within the disturbed area boundaries shown in Figure 3-10. While the density of sites around the MIR is lower than on the marine terraces, numerous archaeological sites do exist just outside the disturbed area boundary. One site is located approximately 750 feet north of the MIR. This prehistoric occupation site is located adjacent to the access road to the camera pad northeast of the MIR and is considered eligible to the NRHP. Test excavations determined that no subsurface components of the site are located where the access road bisects a portion of the site (US Navy 1996).

Small (less than 15 meter diameter) shell midden sites are the dominant cultural features on the island, accounting for perhaps 95 percent of the total loci. Because small low-density sites are found throughout the island's terrains, variability in their patterning, composition and chronology are important to understanding the prehistoric human ecology of SCI. If it is assumed that the aboriginal use of the island involved seasonal mobility between these small sites across the island's different resource zones, then the largest portion of prehistoric behavior took place at such sites. Investigation of these small sites is important to the scientific objectives of reconstructing SCI's prehistoric human ecology. No archaeological sites along the shore line near Eel Point or in the MIR target site area have been formally evaluated for eligibility to the National Register of Historic Places. Provisionally, however, any of these sites with a substantial degree of integrity are currently considered to possess characteristics which recommend them to the National Register. As such, sites are considered eligible until individually evaluated and subject to the procedures required for compliance with Section 106 of the NHPA.

3.3 NAVAL AIR WEAPONS STATION CHINA LAKE

The proposed firing operations would be conducted over the China Lake ranges using the R-2508 restricted airspace complex against existing targets located on the north range. Each proposed target location has been subject to past weapons-testing activities, previous surface disturbance, and vegetation clearance. The proposed target sites include, Airport Lake (including HABR, HABR Gunbutts, HABR Tunnel), Charlie SAM site, Coles Flat, Coso Military Target Range, FAE, and Sam's Town.

The following resource groups will not be discussed in depth since the number of their resources are very small in the area that is predicted to be affected by the proposed action or no effects are expected:

- Geological Resources. The proposed activities will not affect geological resources.
- Wetlands. There are no typical wetlands in the vicinity of any proposed SLAM target site.
- Topography. There are no plans to modify the topography of any target site to support the configuration or reconfiguration of targets on NAWS China Lake ranges.
- Fish. Four species are found in springs and seeps on the ranges but none are found in the vicinity of any target site.
- Amphibians. The two native species are usually confined to permanent water sources. Proposed target sites do not have permanent surface waters.
- Military activities. Other military activities occur on the ranges. These other activities will not be unusually affected by the proposed action.
- Infrastructure. Utility lines are unlikely to be affected by missile impacts. Infrastructure is sufficient to meet the needs of the proposed action.
• Socioeconomic resources. There are no socioeconomic activities at the target site and very minimal indirect activities that will result from the proposed action.

• Transportation. All activities will occur within restricted airspace. There will be no frequent or continuous change in any transportation facility use.

• Cultural resources. No traditional cultural properties have been identified within or near the target sites.

• Natural resources. No natural resources recovery activities within the military ranges or under the Controlled Firing Area. The proposed firings may require the temporary evacuation of the geothermal power plant located in the northwest corner of the North Range, in accordance with a standing MOA.

• Environmental health. Environmental health concerns are not an issue.

• Visual resources. No change to current uses of target sites.

3.3.1 Land Use

NAWS China Lake is within the R-2508 Airspace Complex, approximately 150 miles northeast of Los Angeles in the Upper Mojave Desert of California. The R-2508 Airspace Complex includes all of the airspace and associated land presently managed by the three military activities in the Upper Mojave Desert region—NAWCWPNS China Lake, Edwards Air Force Base, and the Fort Irwin National Training Center. The R-2508 Airspace Complex is approximately 140 NM long and 105 NM wide and covers approximately 19,600 square miles, 3,170 square miles of which is military land. The remaining 16,430 square miles within R-2508 is mostly rural and includes privately owned land and land managed by the Bureau of Land Management (BLM).

NAWS China Lake covers approximately 1,700 square miles and consists of the China Lake Complex (North Range Complex) and the Randsburg Wash/Mojave B Complex (South Range Complex). The north and south complexes are divided into ranges. The ranges within the North Range Complex are George, Coso, Baker, Charlie, and Airport Lake. The South Range Complex consists of the Randsburg Wash, Mojave B North, Mojave B South, and Superior Valley ranges.

The North Range Complex includes China Lake operational facilities, such as Command Headquarters, laboratories, and the Mainsite of China Lake. The North Range supports a variety of test, evaluation, and training activities, such as air-to-air, air-to-surface, surface-to-surface, gun range, parachute testing, and munitions and ordnance tests. The Range Control Center (RCC) and Armitage Airfield are on the southern edge of the North Range.

The principal facility in the South Range Complex is the Electronic Combat Range in the Randsburg Wash area. The complex supports such operations as electronic combat, air-to-surface tactical and combat training, and ground tests.

Non-military land beneath the R-2508 Airspace Complex is used for agriculture, grazing, oil production, recreation, and wildlife conservation. The portion of the R-2508 that would be used for SLAM test flights is mostly rural, but does include a number of small and medium communities, such as Keeler, Olancha, Trona, Inyokern, Ridgecrest, Tehachapi, Randsburg, Johannesburg, and Red Mountain. Other land uses include airports at Inyokern, Trona, California City, Mojave, and Tehachapi. Standardized flight restrictions exist for these areas.

Sensitive resource areas within the SLAM flight test area of the R-2508 Airspace Complex include portions of the Dome Land Wilderness Area and Death Valley National Park and other wilderness areas. Additional sensitive land uses throughout the area include residences, paved roads, and other commercial and recreational sites.
There are four Native American reservations below the R-2508 Airspace Complex, but all are 10 miles or more outside the area of R-2508 where SLAM flight tests would be conducted. Major roadway routes under the R-2508 Airspace Complex include US Highway 395 and California state highways 14, 58, 135, 178, and 190. R-2508 airspace boundaries are shown in Figure 3-11.

The SLAM flight tests would impact in the North Range. The SLAM target areas within the North Range Complex include:

- Airport Lake Range
- Charlie Range Sam Site
- Coles Flat
- FAE Target Center
- Sam's Town

Each of these target areas are established and have been used previously for similar activities. The targets are within a defined zone of disturbance (ZOD) that would be large enough to completely contain debris from any SLAM variant. These ZODs are generally maintained by grading on a regular basis. The locations of the North Range Complex target areas are shown on Figure 2-8. A more detailed description of each target area follows.

3.3.1.1 Airport Lake Range

Located in the west-central portion of the North Range, the Airport Lake Range supports air-to-ground testing requiring stationary and mobile targets, and, due to its desolate nature and the natural, protected depression of the playa, live ordnance testing. The Airport Lake Range also includes a portion of the surrounding terrain, including the Coso Basin area and nearby slopes and ridges. The total area of the range is approximately 38 square miles and includes an hourglass-shaped dry lake bed about 4 NM long (Airport Lake). Existing roads cross and circle the range. The playa consists of well compacted clay, which provides an excellent impact area for testing.

The Airport Lake target has various structures and items placed on the lakebed, including a convoy of military trucks, an 80-foot long boat, and an 80- by 40-foot assemblage of seavans. The area around each of these targets has been disturbed by testing and training activities and is regularly graded.

All of the Instrumentation available on the North Range can be utilized at Airport Lake, except for radar tracking below 3,000 feet which is not possible because of shielding from the surrounding elevations. The HABR, HABR Gunbutts, and HABR Tunnel are also located on the Airport Lake Range.

3.3.1.2 Charlie SAM Site

The Charlie Range encompasses approximately 40 square miles. The Charlie SAM Site target area has been used predominantly as an air-to-surface missile test area. The target area consists a circle configuration, with a radius of 750 feet, a radar control center, and six simulated missile launchers and missiles. Instrumentation support is available at this site.

3.3.1.3 Coles Flat

The Coles Flat target is located 5,800 ft MSL in the northern portion of the North Range test complex. The target area is a relatively flat, graded area of approximately 1,600 square feet located at the north end of a barren flat, and is accessible by maintained dirt roads. The flat has been used extensively since the 1950's for aerial bombing. Historically, this has been used for aerial bombing, as a Tomahawk impact area, and for Joint Standoff Weapon (JSOW) operational evaluation. The JSOW operational test and evaluation program conducted an EA for this target site (US Navy 1996) and a finding of no significant impact (FONSI) was issued. This site has meteorological data recording equipment and camera stations already in place.
3.3.1.4  Coso Military Target Range

The Coso Military Target Range is located in the northwest portion of the North Range area. The range provides a realistic tactical military environment for test and evaluation activities and for aircrew training. The large variety of conditions and terrain in Coso Range presents pilots with unexpected, realistic conditions that are not duplicated at other aircraft test ranges. Coso Range is maintained to ensure removal of expended inert ordnance and to retain the natural appearance of target areas.

Coso Range is located on a broad mountainous plateau in the northwest corner of the North Range. The range covers an area of approximately 70 square miles and represents a typical wilderness-type combat environment. Average elevation is 6,000 feet, with most simulated Targets located at the 7,000 to 8,000 foot levels. Coso Range is primarily used for development of weapons delivery techniques and tactics, and aircrew training. Aircrew training activities cover detection and acquisition of partially hidden or camouflaged Targets, eluding detection during approach, and minimizing exposure to enemy fire during and after attack. No live ordnance exercises are conducted on Coso Range.

Support facilities are very limited within the Coso Military Target Range, but the range features a realistic tactical military environment with a wide variety of target types. The target site is limited to voice radio links (FM, VHF, AM, UHF), mobile tracking mounts for optical cameras, and control buildings. Coso Range has a rich variety of realistic targets. Military target types include bridges, radars, tunnels, truck convoys, army tanks, a reveted surface-to-air missile site, and many other Targets that are typical of a combat area. Specific targets include a tank park, 120-mm antiaircraft battery (partly concealed), military supply dump, two 260-foot Bailey bridges, and two tunnel entrances.

3.3.1.5  FAE Target Center

The FAE target center is located in the northern portion of the George Range, approximately 1.5 miles southeast of Airport Lake. The site has been used extensively in the past for test and evaluation of air-to-air, air-to-surface, and surface-to-air guided missiles. The target area contains a large earthen berm site at its southeast corner, a large graded area approximately 6000 ft by 6000 ft., and an additional graded target area approximately 800 ft by 1000 ft generally used for bomblet impact scoring. The site contains several targets. Instrumented tracking equipment has been constructed on the adjacent hill overlooking the impact area.

3.3.1.6  Sam's Town

Sam's Town is located on the northern edge of the Airport Lake Range. It consists of a graded area 500 ft by 800 ft. The Sam's Town target is a recently designed and constructed target that simulates an industrial complex. It was specifically designed as a target for the Tomahawk Land Attack Missile. The complex is situated in a graded area that can be approached from either side by a maintained dirt road. Instrumentation support is available at this site.

3.3.2  Water Resources

The land ranges of NAWS China Lake lie partially within the counties of Kern, Inyo, and San Bernardino. China Lake itself is a playa lake on the floor of Indian Wells Valley. The mountainous area at the northern end of the North Range Complex belongs to the Coso and Argus mountain ranges. Surface water and ground water from most of the region within the North Range Complex drains toward China Lake. Several other playa lakes are also present in the Indian Wells Valley, including Airport Lake at the north end of the valley.

Although arid, the North Range Complex contains at least 77 springs. The springs have low yields, but generally good quality, reflecting the relatively short residence time of the
water underground before it discharges to the surface along geologic contacts. Most of the springs in the North Range Complex occur in the Coso and Argus Ranges at elevations of about 6,000 feet. Seeps, ponds, or other wetland areas in the north range include the G-1 Seep, Lark Seep wetlands, and the Coso Hot Springs, an active spring of non-potable mineral waters. Most of the runoff from rainfall and snowmelt quickly evaporates, but some runoff recharges the ground water system to greater depths or continues to flow toward the basins beneath the alluvial fans where it is protected from evaporation.

Ground water quality is largely a function of elevation. Ground water quality in the basin areas is extremely poor because the minerals that dissolve in the water as it flows through rocks and sediments toward the basin are concentrated by evaporation. Concentrations of total dissolved solids (TDS) are typically well over the drinking water standard of 1,000 ppm. The salts are not removed from the basins because the basins have no outlet to the sea. The playa lakes occasionally flood, but soon dry out again, leaving a residue of salt on the ground surface. Water quality at higher elevations, within alluvial fans, varies. The Indian Wells Valley is bounded on the east by the Sierra Nevada. This is a seismically active geologic boundary. As a result of the underlying geology, the western edge of the North Range Complex is a geothermal area, containing hot springs. Ground water quality associated with these springs is poor with TDS levels over 1,000 ppm.

### 3.3.3 Air Quality

The climate of the China Lake area is typical of the upper Mojave Desert, with a predominance of fair weather and clear skies. Temperatures in the summer months exceed 100° Fahrenheit (F), with the highest maximum temperatures occurring in July and August. The temperatures in the winter months average about 60° F, with the coldest day recorded at 0° F. Temperatures at the proposed target areas are consistent with the general China Lake area. Due to its higher elevation, temperatures at the Coles Flat target area are expected to be slightly lower than at the FAE, Sam site, and Airport Lake target areas.

Prevailing winds in the area are generally from the southwest, and the area can experience relatively high winds. Average wind speeds of 15 miles per hour (mph) occur approximately 40 days a year. Peak gusts in excess of 40 mph have been recorded an average of 35 days per year. Average hourly wind speed is usually highest during the spring (i.e., March to May). On occasion, north winds coming from Owens Lake (which is located approximately 50 miles north of Ridgecrest) create severe dust storms that affect Ridgecrest and NAWS China Lake.

Local topography is a controlling climatic factor. While precipitation west of the Sierra crest ranges from 20 to 55 inches, average annual precipitation as measured and recorded since 1946 in the Ridgecrest/China Lake area (which is east of the Sierra Nevada) is 4.5 inches. Over the last 15 years, the annual precipitation trend has been measured at six inches per year. Approximately every three years, the Ridgecrest/China Lake area receives 2 to 5 inches of snow. At higher elevations in the China Lake ranges, annual precipitation is 9 to 12 inches, some of which is snow.

Precipitation at the proposed target areas is consistent with the general China Lake area. Due to its higher elevation, precipitation (including snow) at the Coles Flat target area is expected to be slightly higher than at the FAE, SAM site, and Airport Lake target areas.

#### 3.3.3.1 Regulatory Framework

The proposed target areas are located within Inyo County. The EPA has designated Inyo County as unclassified for all criteria pollutants except PM_{10}, for which the county has been classified as non-attainment. PM_{10} non-attainment areas are divided into "serious" and "moderate" categories. Inyo County is currently designated as a serious non-attainment area for PM_{10}. Inyo County is considered unclassified for the SAAQSs for all criteria pollutants except PM_{10}; the County is designated as non-attainment for PM_{10} (CARB 1992).
The Great Basin Unified Air Pollution Control District (GBUAPCD) is responsible for local regulation of air quality through the issuance of permits for proposed actions. Whether or not a particular action requires permitting depends on the size and volume of pollutants emitted. Some types of equipment or sources are exempted from permitting requirements. These excluded categories include:

- Motor vehicles and self-propelled construction equipment
- Aircraft engines mounted on aircraft
- Equipment used to prepare edible materials
- Residential/commercial laundry equipment (excluding dry cleaning)
- Tanks used for transporting materials.

In addition to the emissions from the equipment types listed above, fugitive emission sources are exempted from permitting requirements. Fugitive emissions are emissions that are not generated by a point source as a particular stack or piece of equipment. Examples include:

- Solvent vapors from the hand cleaning of aircraft or motor vehicle parts
- Paint solvent vapors from spray cans or brush applied paint, varnish, lacquer, thinner, or stripping compounds
- Dust from various sources, including unpaved roads, desert areas, and ammunition tests
- Solvent, acid, caustic, or other vapors from evaporation or percolation ponds.

### 3.3.3.2 Air Quality

In general, air quality in the vicinity of the NAWS China Lake is excellent due to the low population in the region and the diffuse and minimal number of man-made emission sources. This is particularly true for the proposed target areas, which are located well within the boundaries of NAWS China Lake, and are far removed from population centers and man-made emission sources.

Although the air quality in the project region is generally excellent, air quality can be impaired during periods when winds blow airborne particulate matter (i.e., dust) from the Owens Lake region towards Ridgecrest and NAWS China Lake. Due to its desiccated state, Owens Lake is a primary emitter of dust in the region when strong winds blow. Air quality at NAWS China Lake is affected when a dust storm is occurring at the dry Owens Lake, and prevalent winds are from the north. Dust storms that significantly affect air quality at China Lake occur relatively infrequently, but most of these events occur during the spring months.

In addition to excellent air quality, the China Lake region generally enjoys a high level of visibility and long distances of visual range. High visibility and long visual ranges are necessary for weapons and flight testing and other military operations at China Lake. Prior to the mid 1970s, no analytical data were assembled that quantitatively measured visibility or the sources of its degradation. Since that time, measurements have consisted of visual observations made at the weather station at Armitage Airfield, where a log is kept. Each hour an observer notes whether or not various landmarks of known distances are visible. Based on these observations, the approximate visibility range is recorded. Visibility in the region is generally high, except when dust storms are occurring at Owens Lake.

### 3.3.4 Soils

The Airport Lake test site is located at about 2,300 feet mean sea level (MSL). Airport Lake is located at the bottom of a prehistoric dry lake bed. Airport Lake is normally a dry lake bed; however, during certain times of the year it may receive enough rain for most of the lake to be covered with approximately one foot of water. Unusual rains in the spring of 1998 covered the lake to a depth greater than three feet. Basin floor soils such as those found in and
around Airport Lake are severely saline-sodic affected and void of vegetation. Soil textures in these areas are extremely variable, ranging from sand to clay; however, clay soils are more extensive (Gould 1995).

The Charlie SAM site, which is located about one mile north of the FAE site, is located at approximately 2,500 feet MSL. The location has a gentle slope, draining to the southwest. The soil substrates at the SAM site are highly disturbed and consist of aeolian deposited sandy loam. Part of the area has soils that have been weakly cemented by silica and/or carbonates (caliche).

The Cole's Flat test site is located on a mountain valley alluvial fan terrace system. Similar to other areas on mountain valley alluvial fan terraces in the northern portion of the base, soils at Cole's Flat are expected to have sandy surfaces with sandy or loamy subsoils containing moderately compacted granitic alluvial material (Gould 1995; Stoner 1994).

Coso Target Range is characterized by rough, mountainous terrain covered with piñon pine, juniper trees, and brush. Soil surveys have not been conducted within the Coso Military Target Range.

The FAE target site is located at about 2,300 feet MSL. The topography is flat and the location is sandy, with loosely uncompacted alluvium and wind-blown soils. The soil substrates at the FAE site are highly disturbed and consist of aeolian deposited sandy loam. Part of the area has soils that have been weakly cemented by silica and/or carbonates (caliche).

The Sam's Town test site is located at about 2,300 feet MSL. The topography consists of uncompacted alluvium and wind-blown soils.

3.3.5 Noise

Since noise levels decrease as the distance from the noise source increases, the affected region of influence for noise issues is more limited than for other resources. For discrete noise sources, the region of influence is up to one-half mile from the noise source. (Noise terminology is discussed in Appendix D.4.) Each of the target areas is located well inside the boundaries of the NAWS, with the nearest target site location in relation to the Station boundary being the Charlie SAM Site. The Charlie SAM Site is located over seven miles east of the Station's western boundary.

Recorded ambient noise levels in the project vicinity are relatively low in those areas that are not influenced by traffic or other man-made noise sources. In the Coso Range, average ambient noise levels measured over a 24-hour period generally range between 26 and 46 dBA, Leq (Rockwell International 1980; Consultants in Engineering Acoustics 1988).

Existing noise levels at NAWS China Lake are generated by both airborne and ground-based noise sources. Airborne noise sources are military aircraft operations, which involve the operation of aircraft engines and occasionally result in sonic booms. These sources cause elevated noise levels for brief periods throughout the project region (County of Inyo 1982; Rockwell International 1980). Ground-based sources include Navy vehicles using area roadways (including U.S. 395) and detonated explosive devices. Other noise sources in the project vicinity include natural sources such as wind and rain (Rockwell International 1980).

Military aircraft flyovers associated with NAWS China Lake are identified by the Inyo County Noise Element as having the most significant noise impact on County residents. Residents have indicated that the nighttime military air exercises have the greatest noise impact. Field measurements indicate that low jet flyovers (1,500 to 2,000 feet above the ground surface) generated noise levels of 92 dBA for about 25 seconds. The downrange rumble of jet aircraft was measured at 83 dBA, which lasted for about 90 seconds. Based on these readings, it was estimated that very low flyovers (less than 500 feet above ground surface) create noise levels over 100 dBA, which on an impulse basis (as would be the case with overflights) do not
caused damage to the human ear, but can be uncomfortable and upsetting (County of Inyo 1982).

Noise measurements taken as part of several studies indicate that overflying military aircraft have varying influences on the ambient noise level. Measurements taken in the Coso Basin vicinity indicate similar noise peaks from overflying aircraft associated with NAWS China Lake. These noise peaks were reported to occur only rarely and, therefore, increased the ambient noise level by only 3 to 6 dBA when averaged over a 24-hour period (Rockwell International 1980). In contrast, the Inyo County Noise Element indicated increases in the ambient noise level at Lone Pine of 10 to 12 dBA when military jets flew over the town (County of Inyo 1982). The difference in effect on the ambient noise level could be due, in part, to the changes in elevation that the military jets fly. Field observations indicate that these jets tend to fly lower over Owens Lake (near Lone Pine) and higher over the Coso Basin area.

Due to the dispersed nature of vehicle use at China Lake (and in the vicinity of the proposed target areas in particular), vehicle usage does not generate significant noise levels in the project vicinity. Estimated noise peaks generated by detonations of explosives at China Lake generally do not raise ambient noise levels above 60 dBA in populated areas (County of Inyo 1982). There would be no detonation of explosives under the proposed full requirements or minimum requirements alternatives.

Due to regional topography, winds in the project vicinity can be strong and highly variable. Wind noise is usually greatest in the spring when wind speeds reach their maximum. High winds can generate peak noise levels of 80 to 85 dBA (Rockwell International 1980).

### 3.3.6 Plants

NAWS China Lake lies within the transition zone between the Great Basin and the Mojave Desert regions. All of the designated target areas at China Lake are established targets that are within a defined Zone of Disturbance (ZOD). These ZOD areas have been disturbed by previous activity and regular maintenance to the extent that no biological resources remain intact. Since the ZOD areas are highly disturbed areas typically devoid of vegetation, minimal habitat and foraging opportunities exist for wildlife species. It is unlikely that any special status species would be found within a ZOD area.

California is botanically divided into three floristic provinces: California Floristic, Great Basin, and Desert (Hickman 1993). All three provinces are found on the northern half of the North Range Complex. The southern half of the North Range Complex supports the Desert Floristic Province. The vegetation at China Lake is also influenced by the presence of numerous springs and seeps in the region, as well as by the wide range of elevational changes ranging from 2,160 feet above MSL on the China Lake Playa, to over 8,839 feet above MSL on Maturango Peak.

There are 18 different plant communities at China Lake, of which all 18 are found on the North Range Complex (Table 3-3). Transition zones occur between many of the different plant communities. The plant communities vary from the almost barren playas, alkali sink, saltbush scrub, and creosote bush scrub at lower elevations, to sagebrush scrub and pinyon woodland found in the Coso and Argus Ranges. Mojave mixed scrub is the most common plant community type, followed by creosote bush scrub. Desert riparian areas are found scattered throughout the north ranges in association with springs and seeps.

Approximately 800 different species, subspecies, and varieties of vascular plants exist on the different ranges. Most of these plants are representative of the Desert and Great Basin provinces, but a small component is more typically found in the Sierra Nevada. Plant communities within the North Range Complex are influenced from Great Basin elements. The vegetation is largely characterized by desert scrub habitat. The North Range Complex contains sand dune areas, creosote clonal rings, extensive desert riparian areas, large tracts of pristine habitat, and the Lark Seep lagoon with its related channel system. The plant communities in the northern Coso-Argus Mountain region of this area show the southwestern limit of the Great
Basin influence in the lower elevational distribution of sagebrush, bitterbrush (*Purshia tridentata* var. *glandulosa*), rabbitbrush (*Chrysothamnus* spp.), and Mormon tea (*Ephedra viridis*).

Airport Lake is void of vegetation. Vegetation at Charlie SAM site is moderate, consisting primarily of creosote and some desert scrub. Cole's Flat vegetation is sparse, with a few scattered Joshua trees in the vicinity of the target. Joshua tree density increases on the flat to the south. The Coso Target Range area is characterized by rough, mountainous terrain covered with piñon pine, juniper trees, and brush. FAE Target Center vegetation is sparse, and is primarily desert scrub and creosote. Sam's Town vegetation is also sparse, and is primarily grass when there is enough water.

### 3.3.7 Wildlife

Because of the region's varied topography and diversified habitats, wildlife at China Lake is rich and varied. This section provides an overview, not an exhaustive account of wildlife resources in the area. Because of the relative scarcity of water in the desert, riparian areas and water sources, even temporary seeps and ponds, tend to concentrate wildlife species creating an oasis effect. Generally, these areas show the highest wildlife diversity for a given region and represent a valuable resource for wildlife. Appendix CL-2 provides a comprehensive listing of the biological resources at China Lake.

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<tr>
<th>TABLE 3-3. PLANT COMMUNITIES FOUND AT NAWS CHINA LAKE.</th>
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Notes:  
MSL = Mean Sea Level  
NA = Information not available  

Within all floristic provinces, there are a wide variety of wildlife types. Many species are wide-ranging, while others are highly restricted to microhabitats within a particular plant community. Many of the more mobile species, especially larger mammals and birds may utilize a variety of plant communities, even within a single day. Less mobile species, especially some
invertebrates, reptiles, amphibians, and small mammals may live out their entire life cycle within a single plant community or even within a few square meters of habitat.

### 3.3.7.1 Invertebrates

Among the most diverse species at China Lake, yet the least studied, are the invertebrates. Characteristic invertebrates of desert scrub habitats include a variety of grasshoppers, crickets, beetles, ants, wasps, butterflies and moths, scorpions, and spiders. A large number of invertebrates exist within the ephemeral playas and clay pans. While these habitats support many smaller invertebrates, the most obvious are the larger brachiopods, including several species of fairy shrimp (*Brachinecta* spp.), some tadpole shrimp (*Lepidurus emmonsi*), and potentially, clam shrimp (*Eocyzicus digueti*). Through support of independent research efforts over the last 10 years, NAWS China Lake has begun to develop a list of invertebrate species found on its ranges and in association with the sand dune system and associated sand field plant communities. Many of these may represent endemic species. Some of the more obvious species include harvester ants (*Pogonomyrmex* spp.), termites (Order: Isoptera), creosote bush grasshoppers (*Boettettix argenteus*), desert clicker grasshoppers (*Ligurotettix coquillettii*), broad-necked darkling beetles (*Coe/ocnemis californicus*), tiger beetles (*Cincindela* spp.), tarantula hawks (*Hemipepsis* spp.), and desert tarantulas (*Aphonopelma palipes*).

### 3.3.7.2 Reptiles

Some of the most conspicuous wildlife species at China Lake are the reptiles. Thirty-one species of reptiles have been identified at China Lake. Common lizards include the side-blotched lizard, zebra-tailed lizard (*Cal/isaurus draconoides*), western whiptail (*Crotaphytus collaris*), Gilbert's skink (*Eumeces gilberti*), and the desert iguana (*Dipsosaurus dorsalis*). Common snakes include the gopher snake (*Pituophis melanoleucus*), red racer (*Masticophis flagellum*), sidewinder (*Crotalus cerastes*), and the Mojave rattlesnake (*C. scutulatus*). Less common species include the desert tortoise, chuckwalla (*Sauromalus obesus*), and Panamint alligator lizard (*Gerrhonotus panamintina*). Two snapping turtles (*Chelydra serpentina*) have been found in the Lark Seep channels as an introduced exotic species.

### 3.3.7.3 Birds

Probably the most well documented category of wildlife species occurring at China Lake are its native and transient bird populations. To date, 310 different bird species, including four introduced species, have been identified. The Audubon Society conducts an annual Christmas Count on the North Range Complex. The following discussion of birds found at China Lake target sites are arranged by habitat types, including: desert scrub, alkali sink, scrub woodland, and disturbed.

The more common species found within the desert scrub habitat include: turkey vulture (*Cathartes aura*), Northern harrier, red-tailed hawk, golden eagle (*Aquila chrysaetos*), American kestrel, prairie falcon (*F. mexicanus*), lesser nighthawk (*Chordeiles acutipennis*), Northern flicker (*Colaptes auratus*), Say's phoebe (*Sayornis saya*), Western kingbird (*Tyrannus verticalis*), homed lark, common raven, black-throated sparrow (*Amphispiza bilineata*), sage sparrow (*A. Bellii*), and savannah sparrow (*Passerella sandwichensis*).

Alkali sink habitat includes the alkali sink scrub, saltbush scrub, and vernal playa plant communities. Most of the species listed here are migratory and are usually only found in the alkali sink habitat when standing water is present, usually during the winter. Many of the smaller waterfowl species, such as ducks, are occasionally found in the pond habitat described below. The more common species associated with the alkali sink habitat include the American white pelican (*Pelecanus erythrorhynchos*), snow goose (*Chen caerulescens*), Canada goose (*Branta canadensis*), green-winged teal (*Anas crecca*), mallard (*A. platyrhynchos*), Northern pintail (*Anus acuta*), cinnamon teal (*A. cyanoptera*), Northern shoveler (*A. clypeata*), gadwall (*A. shovelera sandwichensis*).
strepera), American widgeon (Aythya americana), bufflehead (Bucephala albeola), ruddy duck (Oxyura jamaicensis), spotted sandpiper (Actitis macularia), western sandpiper (Calidris mauri), least sandpiper (C. minutilla), long-billed dowitcher (Limnodromus scolopaceus), Wilson's phalarope (Phalaropus tricolor), red-necked phalarope (P. lobatus), ring-billed gull (Larus delawarensis), California gull (L. californicus), black tern (Chlidonias niger), and cliff swallow (Hirundo pyrrhonota).

Scrub woodland habitat type includes those plant communities that are generally found above 5,000 feet MSL, such as the Joshua tree woodland, Great Basin mixed scrub, pinyon woodland, and desert transition scrub. In addition, to the many species found in the desert scrub habitat, the following species are fairly common: Anna’s hummingbird (Calypte anna), mountain chickadee (Parus gambeli), black-headed grosbeak (Pheucticus melanocephalus), and savannah sparrow.

Non-native vegetation found on the golf course and in the residential and developed station area represents the disturbed habitat type. This habitat also includes lands disturbed as a result of grazing or development activity. Common species which are associated with this habitat type include killdeer (Charadrius vociferus), rock dove (domestic pigeon) (Columba livia), mourning dove, Anna’s hummingbird, northern flicker, western kingbird, barn swallow, American robin (Turdus migratorius), loggerhead shrike, European starling (Sturnus vulgaris), yellow-rumped warbler, white-crowned sparrow, dark-eyed junco, western meadowlark, Brewer’s blackbird, great-tailed grackle (Quiscalus mexicanus), brown-headed cowbird (Molothrus ater), house finch, and house sparrow.

3.3.7.4 Mammals

The ranges at China Lake support over 80 mammal species. Many, like the several species of kangaroo rat (Dipodomys sp.), live in even the driest portions of the desert, deriving all of the water they need from the seeds they eat. Through much of the desert, Merriam’s kangaroo rat (D. merriami) is the most abundant small mammal, although the Panamint kangaroo rat (D. panamintinus), and, especially in saltbush communities, the Great Basin kangaroo rat (D. microps) are also common. Other common small mammals include the pocket mouse (Perognathus spp.), deer mouse (Peromyscus maniculatus), canyon mouse (P. crinitus), cactus mouse (P. eremicus), brush mouse (P. boylii), the pinyon mouse (P. truei), various vole species (Microtus spp.), Mohave ground squirrel (Spermophilus mohavensis), Argus Mountain Kangaroo Rat (Dipodomys panamintinus argusensis), Botta pocket gopher (Thomomys bottae), and the carnivorous grasshopper mouse (Onychomys torridus). More abundant in somewhat more mesic (wetter) areas are western harvest mouse (Reithrodontomys megalotis), the gray shrew (Notiosorex crawfordi), and desert woodrat (Neotoma lepida). Other common mammals in the desert include the ubiquitous black-tailed jackrabbit (Lepus californicus), the gray shrew (Notiosorex crawfordi), and desert woodrat (Neotoma lepida). Other common mammals in the desert include the ubiquitous black-tailed jackrabbit (Lepus californicus), the gray shrew (Notiosorex crawfordi), and desert woodrat (Neotoma lepida). Other common mammals in the desert include the ubiquitous black-tailed jackrabbit (Lepus californicus), the gray shrew (Notiosorex crawfordi), and desert woodrat (Neotoma lepida). Other common mammals in the desert include the ubiquitous black-tailed jackrabbit (Lepus californicus), the gray shrew (Notiosorex crawfordi), and desert woodrat (Neotoma lepida). Other common mammals in the desert include the ubiquitous black-tailed jackrabbit (Lepus californicus), the gray shrew (Notiosorex crawfordi), and desert woodrat (Neotoma lepida).
In addition, larger mammals include Nelson's bighorn sheep (*Ovis canadensis nelson*), the feral burro (*Equus asinus*), the feral horse (*Equus caballus*), (both introduced species) and the mule deer (*Odocoileus hemionus*).

### 3.3.8 Special Status Species

Tables of sensitive plant and wildlife species known or suspected to exist at China Lake are included in Appendix CL-3.

Although there are currently no known Federal listed threatened or endangered plant species on NAWS China Lake lands, there are a number of unique plant species which have been classified as sensitive species. Plant species that are considered to be sensitive include: those that are listed or are being considered for listing by the State of California, US BLM, US Forest Service (USFS), or California Native Plant Society; those with limited range (endemic); those of questionable or unclear taxonomic status; species of scientific interest; those exhibiting unique or rare features (e.g., creosote clones or Joshua spikes); those occurring in a known valuable habitat (e.g., riparian areas, or sand dunes); or those species which exist in a protected habitat (e.g., wetlands, riparian areas, playas).

Two plant species that are proposed for Federal listing are likely to be found at China Lake. Land mountain milk-vetch is a Federally proposed endangered species that has been identified approximately four miles south of NAWS China Lake in Superior Valley. Potential habitat at China Lake is in Superior Valley on the south ranges. Shining milk-vetch (*Astragalus lentiginosus var. micans*) is a Federally proposed threatened species that may be found at China Lake. This species is taxonomically similar to freckled milk-vetch (*Astragalus lentiginosus var. variabilis*), which does occur at the Station. It is possible that, after genetic testing, these varieties may be considered the same.

There are currently three wildlife species which are residents at China Lake, that are Federally listed as endangered or threatened by the USFWS. These are the Mohave tui chub (*Gila bicolor mohavensis*), desert tortoise (*Gopherus agassizi*), and the Inyo California towhee (*Pipilo crissalis eremophilus*). Wildlife species that are considered sensitive according to the NAWCWPNS China Lake Natural Resources Management Plan (US Navy 1997), include those: that are being considered for listing as endangered or threatened; listed as a species of concern by the BLM, USFS, California Department of Fish and Game (CDFG), or National Audubon Society; with limited range or that are endemic to a particular area; of questionable or unclear taxonomic status; species of scientific interest (e.g., butterflies); exhibiting unique or rare features; found in a known valuable habitat (e.g., riparian areas, or sand dunes); or species found in a protected habitat (e.g., wetlands, riparian areas, playas).

In addition to the three resident wildlife species listed above, the North Range Complex also has potential occurrences of three other Federally listed endangered or threatened migrant species: the Western snowy plover, the American peregrine falcon, and the Least Bell's vireo (*Vireo bellii pusillus*).

There are no known Federally listed endangered or threatened invertebrate species at China Lake; however, several sensitive species have been identified. The Mohave tui chub is a Federally listed endangered fish species found at China Lake. The distribution of the Mohave tui chub at China Lake does not occur near any of the proposed SLAM target sites. It is restricted to the south-central portion of the North Range Complex, near G-1 seep and Lark seep lagoons. The Inyo brown towhee was determined to be a threatened species by the USFWS on August 3, 1987, and critical habitat was designated. This subspecies is now recognized as the Inyo California towhee. The Inyo California towhee is the only Federal listed bird species that is a resident at NAWS China Lake. Territories are centered around desert riparian vegetation, but range possibly up to 0.5 mile into the adjacent upland plant communities. The towhee habitat areas at China Lake occur in the northeast upper third of the North Range Complex. All known habitats and the critical management areas are outside of the proposed SLAM target site vicinities. There are no Federally endangered or threatened amphibians or mammal species known to exist at NAWS China Lake.
3.3.8.1 Desert Tortoise (Gopherus agassizii)

The only reptile with Federal status is the desert tortoise. The Mojave population (west of the Colorado River) of the desert tortoise was listed as endangered under the emergency listing provisions of the Endangered Species Act by the USFWS in August 1989. The species was determined to be threatened by the State of California in June 1989, and USFWS upgraded the status of the desert tortoise to threatened in April 1990. A Recovery Plan was finalized in 1994. Critical Habitat was designated in 1995. At China Lake, tortoises are found in creosote bush scrub, saltbush scrub, and Joshua tree woodland communities. They are found at elevations ranging from 1,000 feet above MSL to 4,000 feet above MSL. The highest density tortoise habitat tends to be on gently sloping bajadas, in creosote bush scrub with sandy-loam to pebbly soils. Tortoise habitat is shown in Figure 3-12.

A survey of both the north and south ranges was conducted in 1990 and 1991. Approximately 355 of China Lake’s 1,712 square miles (20.7%) were determined to be potential desert tortoise habitat. Only 17 percent (60 square miles) of the 355 square miles was estimated to have tortoise densities approaching 20 or more per square mile. On the North Range Complex, 136 square miles of potential habitat were identified, but only two areas totaling 7 square miles (5.1%) were estimated to have densities approaching 20 tortoises per square mile: an area 3 miles east of Airport Lake and another near the town of Inyokern.

In 1992, NAWS China Lake initiated formal consultation with the USFWS to create a programmatic Biological Opinion (BO) which would allow China Lake limited authority to construct facilities and conduct military operations in tortoise habitat without project-by-project consultation with the USFWS. Under this programmatic BO, which was signed on December 3, 1992, and reissued in 1995, a Desert Tortoise Habitat Management Area encompassing approximately 200,000 acres was created and an annual report would be submitted for projects covered under the BO. Projects over 50 acres outside and projects over 2.5 acres inside the Desert Tortoise Habitat Management Area require notification to USFWS. USFWS will then direct China Lake to request formal consultation or allow the project to continue with only documentation. Surveys must be conducted for all projects within potential desert tortoise habitat as recommended by USFWS. Results of survey efforts and effectiveness of take or avoidance measures are provided to the USFWS for all projects on an annual basis.

Four of the North Range Complex target sites are considered to be desert tortoise habitat. The Coso Military Target Range and the target site at Coles Flat are both located outside of the habitat areas. None of the sites are in the USFWS designated critical habitat area. Also, the target sites have been used for years and are thus already disturbed areas. They are all graded, and could not support the species.

3.3.9 Airspace

There are two categories of airspace or airspace areas: regulatory and non-regulatory. Within these two categories, there are controlled, uncontrolled, special use, and other airspace types. The categories and types of airspace are dictated by: 1) the complexity or density of aircraft movements; 2) the nature of operations conducted within the airspace; 3) the level of safety required; and 4) the national and public interest. Restricted Areas are regulatory special use airspace and are depicted on aeronautical charts. Military Operations Areas and Controlled Firing Areas are nonregulatory special use airspace. MOAs are charted while CFAs are not.

Airspace designations throughout the United States are controlled by the FAA and are applicable to all pilots. No changes in the FAA airspace designations for these areas are proposed as part of this action. The R-2508 Airspace Complex is designated by the FAA as special use airspace. The Complex consists of three types of airspace—restricted areas, military operating areas (MOAs), and air traffic control authorized airspace (ATCAA). Restricted
Figure 3-12. NAWS China Lake Desert Tortoise Habitat Areas
Airspace is controlled from the ground to an unlimited altitude, with the exception of R-2508, which extends from approximately 20,000 feet above MSL to an unlimited altitude. MOAs extend from 200 feet AGL to 18,000 feet above MSL. ATCAA airspace extends from 18,000 feet above MSL to 60,000 feet above MSL, except when R-2508 is active, in which case it extends only to 20,000 feet above MSL.

Typical military flight activities in the R-2508 Airspace Complex include aircraft testing, research and development, operational weapons testing and evaluation, student training, air combat maneuvering, and proficiency testing. The complex can support in excess of 350 aircraft sorties on any normal day. A sortie is a take-off and landing and can include more than one aircraft and up to 12 ordnance deliveries.

General aviation aircraft may fly unrestricted in accordance with regulations governing visual flight, called visual flight rules (VFR), within the MOAs of the R-2508 Airspace Complex. Other civilian flight activities within MOAs of the R-2508 Airspace Complex include hang-gliding, parachuting, and flying ultralight aircraft and sailplanes. Firefighting helicopters and airplanes occasionally operate within the R-2508 Airspace Complex, primarily in the western portion. Firefighting administrative support aircraft normally fly 1,500 feet AGL and below. Actual firefighting and related support aircraft normally are conducted within a temporary flight restriction NOTAM area, an area for which a temporary altitude restriction has been imposed. Aircraft operations to and from staging bases may occur outside the areas covered by the NOTAM.

3.3.9.1 Trona, California, Controlled Firing Area

The evolution of weapons and weapons systems requiring long standoff distances have previously been accommodated through tests contained within restricted airspace, which included transition between R-2505 and R-2524 by operating above 20,000 MSL in R-2508. Also, use of the corridor below 20000 feet MSL was permitted for those systems which operated as a remotely piloted vehicle (RPV) in accordance with established coordination procedures. However, the continued development of new and improved weapons which cannot be operated as an RPV and the requirement to develop realistic tactical scenarios which require airspace below 20000 feet MSL, necessitated the development of the Controlled Firing Area to support non-controlled systems at lower altitudes.

The Trona, California, Controlled Firing Area (CFA) would be used by SLAM missiles transiting from launch areas within R-2524 to target areas within R-2505 while using the R-2508 Restricted airspace. Its vertical dimensions are 3000 feet above ground level (AGL) to flight level (FL) 200 [20000 feet mean sea level (MSL)]. The CFA would also be used by High Speed Anti-Radiation Missiles, Advanced Medium Range Air-to-Air Missiles, Joint Standoff Weapons, and potentially other free flight weapon systems. The Letter of Authorization to operate the CFA places several restrictions on its activation. There is no requirement to issue a Notice to Airmen (NOTAM); however, the local airports at Inyokern and Trona must be notified at least 24 hours in advance. The High Desert TRACON office located at Edwards AFB is the controlling agency and NAWCWPNS China Lake is the using agency. The Trona CFA may be activated for no more than two hour time blocks and only between the hours of 7 am and 5 pm Monday through Friday. A maximum of two blocks may be used during any given day. The CFA is expected to be activated an average of 36 times per year.

3.3.10 Cultural Resources

This section describes the cultural resources that may be found within the APEs at each of the proposed SLAM target sites at NAWS China Lake. Cultural resources include prehistoric and historic archaeological sites; historic objects, structures, buildings, sites, and districts; and sites which have cultural/traditional significance to Native American or other groups.
Each of the proposed SLAM target sites at China Lake have a long history of use and disturbance. Zones of Disturbance have been delineated at the target sites. Intact cultural deposits are unlikely to occur within these areas. A records search was conducted by the China Lake EPO which determined that there are no known or listed National Register eligible sites on or immediately adjacent to any of the proposed SLAM target sites at China Lake.

Traditional cultural properties are sites, locations, or features that are eligible for inclusion on the National Register of Historic Places because of their association with cultural practices or beliefs of a living community that (a) are rooted in that community's historic and (b) are important in maintaining the continuing cultural identity of the community. No traditional cultural properties have been identified within or immediately adjacent to the proposed target areas at China Lake.

3.3.10.1 Prehistoric Resources

Prehistoric resources are physical properties resulting from human activities that predate written records and are generally identified as archaeological sites. Examples of prehistoric resources include village sites, temporary camps, quarry locations, lithic scatters, roasting ovens/pits and scatters of fire-affected rock, milling features, petroglyphs and pictographs, rock shelters, wind breaks, hunting blinds, and rock alignments or rock rings.

Because most of NAWS China Lake has not been surveyed for cultural resources, sensitivity maps have been developed for predicting the relative density of prehistoric resources in unsurveyed areas. The prehistoric sensitivity for each of the China Lake target areas is shown in Table 3-4.

3.3.10.2 Historic Resources

Historic resources consist of physical properties, structures, or built items resulting from human activities that post-date written records. Historic resources consist of archaeological remains and architectural structures. Historic archaeological site types can include townsites, homesteads, agricultural or ranching features, mining-related features, railroad-related sites or features, refuse concentrations, and features or artifacts associated with early military use of the land. Historic architectural resources can include houses; cabins; barns; local structures, such as churches, post offices, and meeting halls; and early military structures, such as hangars, test facilities and associated structures, administration buildings, barracks, officers’ quarters, warehouses, and guardhouses.

Because most of NAWS China Lake has not been surveyed for cultural resources, sensitivity maps have been developed for predicting the relative density of historic resources in unsurveyed areas. The historic sensitivity for each of the China Lake target areas is shown in Table 3-4.

TABLE 3-4. PREHISTORIC AND HISTORIC SENSITIVITY FOR TARGET SITES AT NAWS CHINA LAKE.

<table>
<thead>
<tr>
<th>TARGET AREA</th>
<th>PREHISTORIC SENSITIVITY</th>
<th>HISTORIC SENSITIVITY</th>
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</thead>
<tbody>
<tr>
<td>Airport Lake</td>
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<td>Low</td>
</tr>
<tr>
<td>HABR</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>HABR Gunbutts</td>
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<td>Low</td>
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<tr>
<td>HABR Tunnel</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Charlie SAM Site</td>
<td>Moderately High</td>
<td>Moderately Low</td>
</tr>
<tr>
<td>Cole’s Flat Target Area</td>
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<td>Low</td>
</tr>
<tr>
<td>Coso Military Target Area</td>
<td>High</td>
<td>Moderately High</td>
</tr>
<tr>
<td>FAE Target Area</td>
<td>Moderately High</td>
<td>Low</td>
</tr>
<tr>
<td>Sam’s Town</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>
3.3.11 Public Health and Safety

NAWS China Lake currently has a variety of Standard Operating Procedures and established guidelines in place for range safety procedures to ensure human health and safety. All personnel are required to check in with base command prior to entering NAWS. All testing and military activities are coordinated through the command.

During testing of military activities, portions of NAWS that are being used for these activities are closed off to unauthorized and non-relevant access. During crucial activities, guards and military police are placed at roadblocks and access roads to testing areas to ensure that unauthorized and non-relevant access does not occur. Radio communications are maintained throughout all testing and military activities to ensure that all personnel are aware of areas that are off limits.

China Lake maintains a staff of Explosive Ordnance Disposal (EOD) personnel for post-test operations to inspect test areas upon completion of testing, and to deactivate any potentially dangerous materials. EOD personnel visually inspect test area and verify that the area is safe. If the area is determined to be unsafe, the area is deemed “hot” and is off limits to all personnel other than EOD for a specified length of time until EOD can safely clear the area, in accordance with applicable range safety procedures.

3.3.11.1 Controlled Firing Area Safety Measures

From the standpoint of program management the most important point about a CFA is that test items shall not be allowed to enter the CFA if non-participating aircraft are present. If an aircraft is observed approaching the area after the launch has been initiated and will not clear before the item reaches the CFA border, the item shall be terminated.

In addition to the usual flight test safety reviews held by FTEs, the CFA Letter of Authorization imposes some of its own safety measures. Weather minimums shall be VFR with ceilings no less than 1000 feet above the highest altitude of activity use and visibility shall be sufficient to maintain visual surveillance of the entire CFA and for a distance of 5 miles therefrom in all directions.

SLAMs shall be launched far enough within R-2524 so that a malfunction during this critical phase of flight will result in a ground impact on military withdrawn land. Items shall not be allowed to enter the CFA unless there is a high degree of certainty that it will continue through the CFA to R-2505.

Ground radar shall provide primary aircraft surveillance. Both High Desert TRACON and the China Lake Air Surveillance Center (ASC) process radar data from several FAA ASR-8 and ARSR-4 radars and provide a mosaic display to control positions. Radar coverage from surface to 12,000 MSL for the Trona area is provided by Searles Valley, Indian Wells, and Velvet Peak radars. From 12,000 feet to infinity, the coverage is provided by the Boron, Paso Robles, and Tonapah long range radars. CFA operations are not authorized if radar surveillance is not available. FAA ASR and LRR coverage will be augmented by Nike search radars located within R-2524 or airborne radars, if the firing scenario requires it. If normal radar surveillance is not available, airborne radars will be used to provide CFA radar coverage.

In addition to ground and/or airborne radars, visual observers (VOs) will be used for each firing. The VOs will be stationed at the CFA boundaries to watch for approaching aircraft with high quality FM radios to keep in constant communication with the controlling operation personnel at the Range Control Center (RCC). Both the ASC and the VOs must ensure that the CFA area is clear before an item is approved for launch to enter the CFA. If a VO observes a non-participating aircraft approaching the area and this aircraft will not be clear before the item will reach the CFA border, the item shall be terminated within restricted airspace and impact on military withdrawn land.
3.4 WHITE SANDS MISSILE RANGE

The CEQ Regulations (40 CFR 1502.21) provide for the incorporation of material into a NEPA document by reference when the effect will be to cut down on bulk without impeding agency and public review of the action. The existing environment descriptions and analysis contained in the "Environmental Assessment for the Standoff Land Attack Missile, White Sands Missile Range, New Mexico" (ASI 1994) are incorporated by reference. This document describes the use of two missile sites, J-140 and TS-513, located in the northern part of WSMR in Socorro County near Oscuro, NM, and the environmental effects of SLAM firings on the range. Since this document is not likely to be available locally to the reader, it is being provided as an attachment to this document (Attachment 1).
CHAPTER 4

ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION
AND ITS ALTERNATIVES

Chapter 4 is divided into six sections: one for each range, a matrix comparing the environmental effects of each alternative, and a complete listing of the resource protection procedures and mitigation measures. The discussions within each range are presented in component order with environmental effects presented by alternative under each component.

4.0.1 Probability of Hitting Within the Target Complex

The discussion of the proposed action's effects on the environmental components is dependent upon the missile impacting within the target sites. To provide the best assurance possible that the missiles would impact within the target areas and not outside of them, analyses would be performed using both computer simulations, hardware-in-the-loop tests, and captive carry tests before any live firings would be conducted. Missile mission plan impact location probabilities would be computed and must be contained within the target site boundaries before the plan is approved for use in a firing.

The SLAM T&E office conducted an analysis of the probability that the SLAM ER missile would hit within the target complex at SNI. To perform the analysis a computer simulation was run using a six degree of freedom simulation. The six degrees are the three standard dimensions of height, width, and depth combined with three angular orientations (roll, pitch, and yaw). The use of 6 degree of freedom simulations is a standard Department of Defense method for evaluating the performance of all missiles -- an accepted methodology for calculating missile accuracy rates. Errors were factored into the model by using a Monte Carlo method wherein random values are assigned from expected probability curves for each of the possible system errors. System errors include such things as seeker gimbal bias, seeker scale factor, and navigation errors. The mathematical model incorporates the results from laboratory tests using guidance hardware flying in a computer generated environment, and the results of over 200 captive carry runs over targets using developmental guidance section hardware. The computer simulation generated scatter diagrams and data tables of the ground impact points. It then calculated the location of the ellipse boundary from the data -- the 99 percent confidence limits for the maximum distance the missile might miss the target by. Figure 4-1 shows a typical ellipse for a single missile firing and a target complex footprint that shows the outside edge of all ellipses that would be generated if the aimpoint was moved to the outside corners of each of the target buildings.

The pilots who would control the T&E missiles would be the same pilots who flew the captive carry tests using the real hardware. They would have the best experience for controlling the T&E missiles into the target. Fleet pilots on training exercises would necessarily be less experienced but would have the benefit of training based on lessons learned and be firing production model missiles that have a higher proven reliability. The engineering design of SLAM ER has resulted in a greater probability of hitting the target over the baseline SLAM. Future model SLAMs are expected to continue to improve this probability. Simulation modeling for each firing, aircrew procedures and flight termination protocol, and improving missile operability make it highly unlikely that a missile would impact outside of any target site boundaries.

Any missile impact outside of any target site boundaries would result in an immediate cessation of further firings until the environmental effects and firing procedures can be re-evaluated to prevent a similar missile event. If necessary, additional analyses would be performed and this EA would be supplemented. Reporting and consultation requirements would be met should such an event occur.
Figure 4-1. Predicted Target Complex Terminal Footprint.
4.1 OUTLYING LANDING FIELD SAN NICOLAS ISLAND

Limited biological resources exist in the immediate vicinity of the APE at the SLAM target site. Most biological resources exist along the coast or at the western end of SNI. NAWS PM's Environmental Division has established limited access areas to protect resident species and fragile resources from civilian and off duty military personnel disturbances. The island's ownership by the Navy and military test range access restrictions provide an additional layer of protection to these fragile resources. Care is also taken to control military disturbances of sensitive areas. Whether or not these resources would be affected by the proposed action depends upon their presence, sensitivity to noise, vulnerability to recovery activities; and the season of testing or training.

The environmental effects of the proposed action on each OLF SNI environmental component are described in two subparagraphs under each component: a paragraph combining the effects under the full requirements and minimum requirements alternatives; and a paragraph describing the environmental effects under the no action alternative. The full and minimum requirements paragraphs were combined since the same number of missiles would be fired under each alternative.

4.1.1 Water Resources

The coastal waters of SNI to a distance of one nautical mile or to the 300 foot isobath (whichever is the greater distance) have been designated an ASBS by the California State Water Resources Control Board. There are no surface water resources at or near the target site or in the ingress overflight area shown in Figure 3-2 that might be affected.

4.1.1.1 Ocean Water Quality

Evaluation Criteria

The Water Quality Control Plan for Ocean Waters (Ocean Plan) contains a prohibition against the discharge of wastes into an area designated as an ASBS (PMED 1996). One criterion is whether or not the proposed action would cause any discharge of polluted waters into the ASBS.

Evaluation criteria include compliance with the Clean Water Act (CWA). The CWA prohibits the discharge of a harmful quantity of oil or a hazardous substance into or upon navigable waters of the United States or adjoining shorelines, or into or upon the waters of the contiguous zone, or which may affect natural resources belonging to, or appertaining to, or under the exclusive management authority of the United States. Discharges that do occur must be reported to the Coast Guard (National Response Center) by the most rapid available means. To assist in swift reporting of spills, a nationwide, 24 hour, toll-free telephone number has been established (1-800-424-8802). Hazardous quantities of oil have been defined by the EPA as those which violate applicable water quality standards or cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines, or cause a sludge or emulsion to be deposited beneath the surface of the water or on adjoining shorelines (see 40 CFR 110.3) (NOS 1993).

Full Requirements and Minimum Requirements Alternatives

Any spills of diesel fuel which might occur would be contained on site. The proposed action would not generate any contaminants which could pollute surface waters or runoff into the ocean and impact the ASBS. Wind erosion of soil does occur at the site and is a normal process in areas of sand dunes. However, the target site is unlikely to provide eroded soil that could wash into the ocean since rainfall is low and there are no streams leading from the target site to the ocean. Soil erosion control measures would be implemented if required by the Environmental Division.
Ocean water quality would only be affected if a missile falls into the ocean and jet fuel is released from the tank. The potential would then exist for the release of a small amount of the JP-10 fuel. The maximum amount of JP-10 put in the missiles for each flight is seventeen (16.9) gallons. This volume would be too small to be effectively collected by absorbent booms. Jet fuel, in general, is composed of middle distillates having 10 to 20 carbon atoms including paraffins, aromatics, and napthenes (Malins 1977). However, JP-10 is composed almost exclusively of exo-tetrahydrodi (cyclopentadiene) (C_{10}H_{16}). It is a high density synthetic hydrocarbon with a specific gravity of 0.935 to 0.943 (MIL-P-87107C, 21 February 1989). Because of its density, JP-10 will float on water. Cycloparaffins are commonly called napthenes. As a group paraffins do not react readily with other substances to form new compounds. While JP-10 could spread out on the water and break up into particles, it is not expected to be very water soluble. The winds, waves, and currents are expected to dilute, disperse and evaporate the fuel so that within hours no trace would be visible (no film, sheen, or discoloration) and the concentration in the water would be below that which could harm marine life. It would be expected to have negligible effects on the water column. At most a few of the upper meters of the water column might be affected. Since the quantity of jet fuel remaining at impact would be small, the concentration of the fuel in one location would be significantly reduced by the kinetics of the impact, and paraffins in general are not very toxic, no significant effects are expected to occur from the release of JP-10 into the environment.

Any missile parts and pieces which might fall into the ocean would be left in place since the waters would be over 150 feet deep (these parts would fall in waters more than 3 miles from SNI's shoreline) and recovery is dangerous and cost prohibitive. Recovery operations in waters over 150 feet deep require the use of submersible vehicles to both search for and recover the missile. These operations would subject the divers to the usual hazards of deep water activities, and require potentially significant lengths of time at sea with the attendant expenses. The only hazardous materials other than the fuel on board the missiles consist of minimal amounts of chemicals used to manufacture electronic circuit boards, wiring harnesses, and mechanical assemblies. Little wildlife and no plant life exists at these depths where the missile would come to rest. Therefore, these impacts would be less than significant.

The proposed action would be in compliance with the CWA.

No Action

In the absence of test or training firings there would be no change to the existing water quality.

4.1.1.2 Ground Water Resources

Evaluation Criteria

The criteria used to evaluate environmental effects on terrestrial water resources was that there be no detrimental effects on ground water quality including potable water supplies.

Full Requirements and Minimum Requirements Alternatives

Ground water that might be present in the APE does not feed the potable spring or well fields used by the Navy on the island. There are no surface water bodies in the APE that can be used by wildlife that might be fed by groundwater. Unburned jet fuel at missile impact and diesel fuel and gasoline contained in the generator fuel tanks are potential water pollutants at the target site. While jet fuel might spill on to the ground and seep into the ground, some might reach the ground water table, but the remainder would be expected to evaporate. The missile is not expected to hit any of the generator fuel tanks. Several factors make it unlikely that any spilled jet fuel could affect local ground water quality. The dune sand is well sorted and does not store water efficiently (PMED 1996). Well sorted sands will have a high volume of air per cubic foot which would promote evaporation of any spilled fuel. The fuel is less dense than water so it would not be expected to mix with but float on any ground water that might be
The sand soils are deep which would provide a barrier in terms of distance for any spilled fuel to cover before it could reach any existing ground water. And last, cross-bedding layers of caliche might also be present which would prevent any spilled fuel from reaching lower level ground water. Because of the evaporation of the fuel, any ground water quality deterioration that did occur would only last for a short time. SLAM test and training operations would be conducted in accordance with NAWS PM's Spill Prevention Countermeasures and Control Plan. Any effects on ground water quality would be less than significant.

**No Action**

There would be no effects on the ground water resources under the No Action alternative.

### 4.1.2 Air Quality

The typical SLAM firing operation uses target acquisition, launch, control, and chase aircraft. Generators would be used at the target site. Before and during the firing events, the missile, aircraft, and generators emit exhausts. Typical combustion products of aviation fuels are carbon dioxide, carbon monoxide, water, nitrogen oxides, hydrocarbon compounds, and particulate matter (ASI 1994). The missile burns a high density aviation fuel, JP-10. JP-10 is a synthetic hydrocarbon fuel composed solely of exo-tetrahydrodi(cyclopentadiene). Jet engines do not emit ozone, but do emit ozone precursors -- nitrogen oxides and some hydrocarbons. Emissions, if any, from jet engines of sulfur dioxides and particulate matter would be very minimal. At least two aircraft (two fighter or one fighter and one surveillance type) would participate in each missile firing and use two hours of flight time. Most of the JP-10 would be expected to be burned in flight; less than 32 pounds would be left at impact.

The diesel and gasoline generators run regardless of how many missiles are fired on the operational day. The diesel generators operate for 6 to 8 hours per operational day burning up to 100 gallons of fuel. The principal generator air pollutants would be carbon monoxide, hydrocarbons, and oxides of nitrogen (Shaw 1976). The small portable generator burns up to 2 gallons of gasoline yielding emissions typical of mowing a moderate sized residential yard. Any carbon monoxide emitted during the firing events would be expected to oxidize to carbon dioxide (a normal constituent of air) within a very short time.

#### 4.1.2.1 Southern California Bight Air Quality

**Evaluation Criteria**

The criteria used to evaluate the potential environmental impacts on air quality are that the proposed action not cause any reduction in existing air quality levels: no adverse effects, no increase in the maximum levels of pollution of any nonattainment area, and no increase in the severity or frequency of high levels of pollution. The proposed action must be carried out in full compliance with the federal Clean Air Act.

**Full Requirements and Minimum Requirements Alternatives**

Small amounts of air contaminants would be generated over the SCB by the missile and target acquisition, launch, control, and chase aircraft activities during the test and training firings. These contaminants would be emitted into three different air bodies at elevations from sea level to 30,000 feet above sea level (see Appendix C.3).

Emissions from the launch and control aircraft would be emitted above any temperature inversion ceiling and would not be mixed with ground level air once they are over either of the NAWCWPNS Sea Range or FACSFAC Operating Area. These emissions represent most of the SLAM firing related pollutants. A maximum of 13.7 tons per year of NOx was estimated to be emitted above the inversion layer by these aircraft. For 26 launches and 16 operational days a maximum of 84 aircraft flights would be made. This compares to the more than 5000 flights logged by Point Mugu air traffic control for 1995. Since these flights emit
exhausts above the inversion layer and would be only a small part of the total number of flights in southern California, they would not be expected to have any noticeable effect on air quality at the ground.

Air emissions from the missile and target acquisition aircraft start out above the inversion ceiling and then drop below this ceiling. Missile and aircraft emissions would be spread out over more than fifty miles. When one missile's JP-10 is combusted in normal mode it produces about 1 pound of NO₃ and very little particulate matter. A full two hour FA-18 flight at maximum power produces less than 0.6 tons of NO₃ and very little hydrocarbons. Even if all of the missile's and aircraft's exhausts were to be emitted in the inversion level, increases in air pollutant levels due to the missiles and aircraft would not be detectable since the air, missiles, and jets would be constantly moving and the pollutant levels would be minuscule and less than significant.

Air emissions in the marine layer would be due to the final terminal attack of the missile, the evaporation of any unburned missile fuel, and the exhausts from the generators. Any JP-10 that is in the missile at impact would evaporate upon exposure to air, burn quickly, be dissipated by the wind, or seep into the ground. In the past project personnel have only smelled (not seen) jet fuel when they dug into the ground to recover missile parts and pieces. Waste gases would be uncollectable and vent to the atmosphere. Since the air over SNI is constantly replenished, there would be no noticeable effect of air quality.

Small increases in the level of air contaminants would be generated in the immediate vicinity of the target site generators during the firing operations. Up to 1.2 tons of nitrogen oxides; 40 pounds of hydrocarbons; and 116 pounds of particulate matter would be emitted by the generators during a year involving sixteen operational days. The generators would be operated under permit from the Ventura County Air Pollution Control Board and use all of the appropriate air pollution control equipment. Because of the almost continuous breezes over the target site and the tendency of local eddies and deflection in flow to occur as a result of the rough terrain (DeMarrais et al. 1965), air pollutants from the generators would only be detectable or noticeable when running and only immediately downwind. These amounts are not considered to be significant and mitigation measures are not suggested.

Since peak pollution levels were experienced in the evening at SNI and the test activities occur in the afternoon, test activities would not cause the maximum pollutant levels at SNI to rise. SNI air quality would not be detectably affected by the proposed action. Ventura County, the South Coast Air Basin, and San Diego County are air pollutant nonattainment areas, while SNI's air is unclassifiable/attainment (EPA 1996, reproduced in Appendix C.7). As Figure 3-1 shows, air pollutant emissions from SNI would flow to the east and not impact air quality in either Ventura County or the South Coast Air Basin. Travel over the distance from SNI to San Diego County dilutes and disperses generator air pollutants so that any effect on San Diego's air quality would be undetected. Because of the low concentration and rapid dispersion, there would not be any risk to human health, terrestrial life or marine life. The proposed action would not adversely affect the SCB's air quality, cause the maximum pollutant levels of any nonattainment area to rise, or cause an increase in the severity or frequency of high levels of pollution.

No Action

In the absence of test or training exercise firings there would be no short or long term change to the air quality over and around SNI caused by SLAM operations. Emissions from other military and air carrier operations would continue (including operations at the air field on SNI) to affect the SCB's air quality. While air quality improvements are predicted for mainland Ventura County, these improvements would only be noticeable at SNI in terms of reduced maximum levels of pollutants.

4.1.2.2 General Conformity Rule

The federal Clean Air Act (CAA) requires states to implement air quality improvement plans and that federal actions conform to any such state implementation plan.
(SIP) approved or promulgated under Section 110 of the CAA. The NAAQSs are implemented through source specific emission limitations established by the states in their SIPs. The SIPs are a combination of state plans and local air quality district plans. The proposed action must conform to the locally applied SIP. Since SNI is part of Ventura County, the VCAPCD has jurisdiction over air emissions from SNI and NAWS PM must comply with the VCAPCD Air Quality Management Plan.

The federal agency responsible for the action is required to determine if its actions conform to the applicable SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards. Federal actions have been divided into two types: transportation and general (non-transportation). The general conformity rule covers direct and indirect emissions of criteria pollutants or their precursors that are caused by the federal action, are reasonably foreseeable, and can practicably be controlled by the federal agency. The general conformity rule (40 CFR Parts 6, 51, and 93) was promulgated by the EPA on 30 November 1993. The regulations also require states to submit SIP revisions to the EPA that contain criteria and procedures for making conformity determinations (58 FR 63214/40 CFR 51.853). The Ventura County Air Pollution Control Board adopted Rule 220, General Conformity, on May 9, 1995 (VCAPCD 1995).

The requirements of 40 CFR 51.853(b), General Conformity determination, do not apply to the proposed action with respect to firings at SNI for the following reasons:

- Activities proposed would occur in areas which are in attainment, as discussed in Section 3.1.3.
- The actions would be routine test movements of aircraft performing in operational groups when no new support facilities or personnel are required [40 CFR 51.853(c)(2)(viii)].

Therefore, a Record of Non-Applicability (RONA) is not required.

4.1.3 Topography

**Evaluation Criteria**

The criteria used to evaluate the environmental effects on topography consist of the induced effects topographic changes could cause. Changes in topography by themselves were judged to be neutral. Any changes to local topography should not cause adverse effects on water quality, promote soil erosion, or reduce the quality of visual resources or aesthetics.

**Full Requirements and Minimum Requirements Alternatives**

The existing access roads and target building pads may be expanded within the APE to provide for a wider range of target configurations. APE grading would be limited to that necessary for placement of and access to the cargo van targets. Expansion of these areas would involve both excavating and filling; cutting into and covering portions of the existing sand dunes. (Any excavating activities would be overseen by an archaeological representative of the Environmental Division.) Additional fill dirt would be taken from that stockpiled at the island’s borrow pit. The total area involved in such activities cannot be determined at present but would be contained within the APE. This is a planned result and would be no different from grading streets in a residential area. Changes to the local topography would not cause adverse effects on water quality or promote soil erosion since there are no surface water resources in the vicinity of the APE and the area’s rainfall is minimal. Expansion of the access roads and target pads would not increase the maximum heights of the local topography nor change the general dune character of the area. Expansion of the existing roads and pads would not add features which are new to the landscape. Therefore, the changes would not be sufficient to reduce the quality of visual resources or aesthetics.
No Action

Under the No Action alternative the existing access roads and target building pads would remain. These contours would be stabilized to minimize soil erosion, if required by the Point Mugu Environmental Division. Local winds would continue to shape the sand dunes.

Cumulative Effects

Expanded access roads and target building pads would remain after the completion of the SLAM firing program. They could then support other target requirements.

4.1.4 Soils

Soils may be defined, for environmental assessment purposes, as surface materials which have formed under the combined influence of climatic, vegetative, and geologic factors. In the case of SNI Dune Land, vegetative factors played a minimal role. The soils are critical to the survival of terrestrial vegetation. Impacts to soils may occur as either physical or chemical effects. The removal of soil which serves important functions in its natural state could be a significant loss to plants and other organisms which depend on them. Surface activities could accelerate natural erosion processes which might affect other resources. Cuts in the soil could expose bedrock to weathering activity which might have other secondary effects. Cuts could also expose additional archaeological resources.

Soils at the site consist of very deep calcareous sands. The soil survey (SCS 1985) did not describe any different soil horizons. Therefore, the soil is assumed to be generally uniform in characteristics throughout its depth.

Evaluation Criteria

The evaluation criteria are concerned with the effects on the physical and chemical properties of the soil. Changes to the soils should not have an adverse affect on their ability to support structures or plant growth.

Full Requirements and Minimum Requirements Alternatives

Soils at the target site would be physically disturbed through six activities and potentially a seventh: collection of archaeological information; target building reconfiguration; visual equipment set up and recovery; missile and missile debris impact craters, missile debris recovery activities, target site clean-up; and potential expansion of access roads and target building pads. In order to minimize site impacts, all traffic at the target site would be confined to the paved and unpaved roadways and their shoulders which are sharply delimited by topography. Exercise missile impacts create craters after passing through the containers that are approximately 10 feet by 20 feet and 5 feet deep in the sand (about the size of a mid-sized car). Natural slumping and eolian sand movement is expected to return the surface of missile impact craters to near pre-existing conditions within a year of non-disturbance. These effects would be less than significant.

The potential for increased induced soil erosion exists. The target structures themselves cause localized changes in wind patterns which can result in increased erosion. The erosion has been so severe in the past, that some vans have been undermined. The terrain and climate do not support the movement of any significant amount of soil by water beyond the boundaries of the APE where it might runoff into the ocean or into another water body. The requirement for mitigation measures, such as soil erosion control and soil contour restoration, would be determined in consultation with Point Mugu Environmental Division staff. Mitigation measures would be implemented, if required.

Any jet fuel that is spilled on the ground is expected to evaporate completely leaving no residue. The physical or chemical characteristics and the abilities of the current soils to support plant or wild life would not be changed. No long term adverse effects are expected to result from the proposed activities.
**No Action**

The dunes will continue to shift under the almost constant force of ocean winds. The soils of the dune land might become more stabilized under this alternative as a result of plants growing over the dunes. Movement of dune sand is constrained in some places by caliche. There would be no change to the physical characteristics or the current abilities of the sand to chemically support plant growth.

**Cumulative Effects**

Cumulative effects on the soils consist of more total area being disturbed (more filled craters would be present at the end of the test and training exercise firings and potential expansion of the "improved" area - roads and pads). Since access roads have been constructed and the area has been impacted before at the target site, these impacts would not be new and would be insignificant. Soil disturbances could cause the loss of sand dune integrity. Wind erosion of the dunes could destabilize the dunes causing the loss of plants and archaeological resources. Mitigation measures exist and would be implemented by program sponsored personnel, if required by the Point Mugu Environmental Division, so that there would be no cumulative adverse effects on soils.

**4.1.5 Noise**

**Evaluation Criteria**

The criteria used to evaluate the environmental effects on the noise environment were that the proposed action would not cause an increase in existing ambient noise levels, and would not alter the character of the ambient noise.

**Full Requirements and Minimum Requirements Alternatives**

Cranes would be used to reconfigure the target buildings once every few years. Trucks and vans would be used to carry supplies and personnel to the target site for each day’s operations. During the tests and training exercises, generators (enclosed in cargo vans) would supply power to the heaters. SLAM program fighter/attack (target acquisition and missile safety chase) aircraft would fly over the site and missiles would fly into the site. Following the missile impacts, noise would be generated by the recovery vehicles, including the potential use of winches (see Appendix D). (Typical noise levels of familiar sources are given in Appendix D.4.) Since no new continuous noise sources would be established by the proposed action, there would be no significant effects.

The maximum number of operational firing days per year that might occur as a result of the proposed action is 16. The 16 days would require a maximum of 128 hours of generator operation. The maximum noise level produced by the generators (which are equipped with residential mufflers) would be 92 dB (Appendix D.2). There are no noise receptors of concern in the immediate vicinity of the target site. There would be no significant effects from the generator noise.

SLAM program fighter/attack (target acquisition and missile safety chase) aircraft would be the primary program noise source. The target acquisition aircraft would typically fly in toward SNI at a minimum height above sea level of 500 feet, and reduce power and climb above SNI once they have crossed the coastline. Typical jet overflight noise signatures show very rapid onset, high noise levels, and short durations (EHA 1992). Appendix D.3 provides noise levels for FA-18 aircraft flying at 200 knots in a traffic pattern as an example. In the appendix aircraft emitted a noise level of 101 dB at 500 feet slant range. The 101 dB level would apply directly under the aircraft and would fall to either side of the flight path. At 800 feet slant range, or 625 feet from the centerline of the flight path, the noise level would drop to 97.4 dB. Aircraft noise levels were recorded during the November 1997 study. Sounds varied from almost background level at 2000 feet AGL and 300 KCAS (knots calibrated air speed) to a maximum root mean square (rms) of 108 dB at 500 feet AGL and 500 KCAS. The longest
overflight was only audible for 14 seconds (Greene 1998). Observers in the study commented that noise levels fell off significantly as the aircraft flew over just a short distance away. SLAM participant aircraft would be assigned ground tracks and flight altitudes within NAWCWPNS' Sea Range's restricted airspace which would be designed to avoid impacts on noise sensitive areas.

The maximum number of missile firings per year is 26. The maximum number of 26 firings would involve 16 target acquisition, 16 pre-launch captive carry and 26 chase aircraft overflights. Each overflight takes about a quarter of a minute. These overflights would subject the island to less than 15 minutes of noise per year at a maximum of 108 dB. This noise would be intermittent, can be exceeded by noise from the physical environment, and would not create a significant impact.

Typical noise levels emitted by the missile engine are graphed in Appendix D.1. Based on this graph the noise level at the ground from missile over flights at 500 feet is expected to be much less than 120 dB measured at 150 feet. Aircraft flyover noise can be exceeded by natural environmental noise [Awbrey (1980) occasionally had to set his meters at 120 dB to avoid excessive recording]. Impact noise of the nonwarhead missile has not been measured, but should be similar to a very quick car crash as the missile impacts the cargo van followed by a dull “thud” as the missile buries itself in the sand. These noises would not be significant.

The continuous noise levels at the site would not be affected since the proposed actions are intermittent. Noise from the aircraft and missiles is not expected to increase sound exposure levels (SEls) presently being experienced. The ambient noise levels and character would not be affected. Since the activities take place at sea in an area cleared of civilians there would be no noise impacts to humans. Therefore, the proposed action has no significant impact on the noise environment of SNI.

No Action

The APE is naturally noisy due to wind, wave, and surf noise and the vocalizations of sea lions and elephant seals. The absence of SLAM tests and training exercises would not stop the over flight of other aircraft of the same types at the permitted altitudes, although there would be no SLAM missile or SLAM target acquisition or chase aircraft overflights.

The absence of SLAM ER and SLAM tests would not stop the overflight of other aircraft at the permitted altitudes, although there would be no missile overflights at low altitudes.

4.1.6 Plants

Evaluation Criteria

The criteria used to evaluate the environmental effects on plants were that the proposed action would not cause any appreciable decrease in the numbers of plants, plant health, or plant community diversity; and that no exotic plants be introduced.

Full Requirements and Minimum Requirements Alternatives

The targets are located in areas practically devoid of plants. The surrounding area of sand dunes includes scattered vegetation. The plant species found near the targets are common sand dune plants. No endangered, threatened, or candidate species are found within a half mile of the targets. A minimal amount of plants in the area surrounding the targets would be destroyed as a result of flying missile debris or recovery personnel moving through the plants to retrieve parts and pieces. The potential exists to destroy some plants during access road and target building pad expansion. These plants would be those found on the tops of dunes where the dune has to be excavated to expand the target facilities. New plant growth makes such effects short term and insignificant. Target setup and missile recovery vehicles...
use existing roads and cleared areas and have no effects on plants in the area. These impacts would be minor and would not be significant.

**No Action**

In the absence of test or training firings there would be no adverse change to plant resources. The target site could be used for other test programs or training exercises or could be allowed to go fallow. Depending upon the amount of management given, the area would either revegetate with native or a mixture of native and exotic species. Plant species would be permitted to grow over the ground as they could without interference except for the control of invasive weeds. The species present would be largely those already present but could include exotic species. As part of the ecological habitat restoration program, an intensive project is underway to eradicate several potentially invasive weeds (Junak 1992).

**Cumulative Effects**

No cumulative effects are expected at the target site. The worst case cumulative impact would be due to the damage of vegetation around the target site as more and more of the area is disturbed by missile debris and recovery crews. Partial, if not complete, recovery of plant life is expected each year. Complete recovery would be expected to follow the cessation of the program when the site would be allowed to go fallow. Small additional amounts of dunes might be covered with plants as a result of expansion of native plants over sand and borrow pit soils. There would be no long term adverse effects.

**4.1.7 Birds**

Effects of the proposed action on Brandt's cormorants and Western gulls are described below. Effects on the California brown pelican, Western snowy plover, and American peregrine falcon are covered in later sections. The following comments apply to any sensitive colonial sea bird species.

**Evaluation Criteria**

The criteria used to evaluate the environmental effects on birds consisted of the effects on bird population sizes, health, and diversity. The acceptable criteria of impact is that the proposed action cause no appreciable decrease in the numbers of birds, bird health, or bird community diversity.

**Full Requirements and Minimum Requirements Alternatives**

Some birds may be startled by target acquisition and chase aircraft overflights. Target acquisition and chase aircraft pilots would be given specific instructions as to which routes they are to fly as the missile makes its final approach on the target to avoid impact to nearby sea bird colonies or rookeries. Coordination of activities with the Environmental Division, aircrew instructions, and the infrequent nature of the activities would prevent any significant adverse effect on birds. These environmental effects would be reviewed periodically by the Environmental Division since bird colony and nest locations can change from year to year.

**No Action**

In the absence of test or training exercise firings there would be no adverse effects on sea, migratory, or resident terrestrial birds or their rookeries. There would be no change to the existing conditions of the bird habitats. The reduction in the number of overflights would not be significant. Without the proposed action, there would be no activity at the SLAM target site. This could result in slightly less disturbance to the bird colonies which are a short distance away from the targets and to any terrestrial species in the surrounding dunes. The spread of vegetation over the dunes could create more habitat for birds. Some increase in the number of these animals might be expected.
Cumulative Effects

Since even minimal impacts on birds or bird colonies are unlikely, there would be no long-term or cumulative effects. Firing procedures and protocol would be re-evaluated in the event of any unforeseen adverse impact on bird individuals or populations in order to prevent further adverse effects. Therefore, no cumulative effects are predicted. After completion of the program, SLAM related overflights would cease.

No change to the existing conditions of the bird habitats. The reduction in the number of overflights is not significant.

4.1.7.1 Brandt’s Cormorant

Full Requirements and Minimum Requirements Alternatives

Missiles and aircraft might fly over Brandt’s cormorants in the small colony south of the target site. Given the speed of the aircraft and the missiles, the birds might be expected to respond to the flyovers as if they were just loud, quick noise events. While repeated aircraft over flights could cause cormorants to depart as a flock, aircrews would be permitted only one flyover below 2000 feet MSL during the critical parts of the nesting and breeding season. Schreiber and Schreiber (1980) studied the effects of noise and visual stimuli on Brandt’s cormorants on San Miguel Island as part of the sonic boom study. Based on their carbide cannon (133 dB at 60 meters) and shotgun noise (134 dB at 3 meters) tests, the cormorants could be expected to do a low intensity head jerk followed by a head turning, then do a body shake and settle down again. [In a carbide cannon a spark ignites acetylene released into a chamber.] At most, the cormorants might stand up slowly and move their feet to the sides of a nest if they were incubating any eggs. The noises would only temporarily interrupt normal activities such as preening, nest building, and courting. Experimental and observational evidence indicates that the typical behavioral response of birds to impulse noise is brief. Although birds may fly in response to a loud sound, even sensitive species quickly resume normal activities, usually within a few moments and always within several minutes. The resumption of normal behavior is much quicker after a loud noise than after visual or combined stimuli probably because the birds cannot localize the source of the sound, nor do they associate it with any specific threat (Cooper and Jehl 1980). Cormorants present during the November 1997 noise study showed no response to aircraft overflights. Since the aircraft noises are expected to be no louder than 108 dB, physical environmental noise can reach this level, and the birds are successfully nesting on the island under the current conditions, there would be no significant noise impacts to the birds from the proposed action.

No Action

In the absence of test or training exercise firings there would be no adverse effects on Brandt’s cormorants. There would be no change to the existing conditions of the bird habitat. In the absence of the proposed test and training exercise firings, noises and human activities could continue to startle the birds.

4.1.7.2 Western Gull

Full Requirements and Minimum Requirements Alternatives

Missiles and aircraft would fly over coastal areas used by the Western gulls. The main Western gull colony on SNI stretches from 1/8 mile beyond the Area of Potential Effect (see Figure 3-2) to 1 1/2 miles away towards Vizcaino Point. As with the cormorants, the Western gulls would be expected to respond to aircraft and missile flyovers. The gulls, however, would be expected to show less response; small head jerks, or standing up and
looking around. With repeated over flights some birds might take flight and circle around, landing a short time after the aircraft sound had passed (Schreiber and Schreiber 1980) but aircrews would be permitted only one flyover below 2000 feet MSL during the critical parts of the nesting and breeding season. Since the aircraft would not create sounds louder than the loudest experienced natural sounds, there would be no physiological effects. There would be no significant impacts to the birds from the proposed action.

**No Action**

In the absence of test or training exercise firings there would be no adverse effects on Western gulls. There would be no change to the existing conditions of the bird habitat. In the absence of the proposed test and training exercise firings, noises and human activities could continue to startle the birds.

### 4.1.8 Marine Mammals

The proposed action would be capable of affecting two marine mammal communities: the nearshore and onshore pinnipeds and fissipeds; and the offshore cetaceans and pinnipeds. The first section below discusses potential effects on the nearshore and onshore animals and what would be done to prevent such effects. The second section discusses the chances of a missile hitting a marine mammal at sea. Effects on the fissipeds - the Southern sea otter - are described later.

#### 4.1.8.1 Effects on Nearshore and Onshore Mammals

This section provides general criteria used to evaluate the effects of the proposed action on any pinniped or fissiped, and the effects of the alternatives on these mammals. Specific impacts on California sea lions, Northern elephant seals, and Pacific harbor seals are described below. Once a missile comes within 10 miles of SNI it is predicted to hit the target area, therefore no injuries to nearshore or onshore marine mammals are expected. The 10 mile limit is based on experience that once a missile has flown successfully for its first 30 miles it has acquired GPS guidance signals and would maintain its flight path and impact in the target area. As a contingency measure, if the missile fails to attack the target, it would be controlled so that it flies over SNI and impacts the ocean at least 3 miles beyond the far shoreline of SNI.

#### Evaluation Criteria

The Marine Mammal Protection Act (MMPA) prohibits the taking of marine mammals with a few specific exceptions. Since marine mammals are protected by the MMPA, the standards to judge "significant" impact are more conservative than if the animals were not protected. Significant effects would accrue if an animal is harassed or injured. Level A Harassment is currently defined as any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild. Level B Harassment is currently defined as any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild (50 CFR 216.3).

The criteria used to evaluate the environmental effects on nearshore and onshore marine mammals were that no harassment or injury of marine mammals occur. In this case if there is no harassment, there would be no injury or disturbance.

#### Full Requirements and Minimum Requirements Alternatives

One pre-launch IR target acquisition and two to eight chase aircraft and missiles fly over the SLAM target site on each operational day. Missile noise would be minimal. Typical noise impacts on wildlife are discussed in Section 3.1.6.1. Program activities would not cause any noises which could lead to any physiological damage. Aircraft would fly more than 500 feet...
above the ground level when passing over SNL’s coast. While these flights might be noticed and the animals might evidence alert behaviors, the shortness of the aircrafts’ presence and the anticipated dB input of 108 dB for a 500 foot altitude fly over, would result in no disturbance of marine mammals. As such, no harassment, injury or disturbance of marine mammals is expected to result from the proposed action.

**No Action**

In the absence of the proposed test and training exercise firings there would be no activity at the SLAM target site and no new noises and human activities to disturb the marine mammals. Current overflights from other activities on and near the island would continue. Current trends of marine mammal population growth would continue. There would be no change to the existing conditions of the marine mammal haulout locations.

**Cumulative Effects**

Since no effects are predicted to occur under the proposed action, there would be no long term effects.

### 4.1.8.1.1 California Sea Lion

California sea lions exhibit rapid movements as a result of: 1) heat, 2) rain, 3) waves, 4) boat noise, 5) alarm behavior of birds or other sea lions, 6) disruption by adult elephant seals, usually bulls, 7) sonic booms, 8) low flying aircraft, 9) humans on or near the rookery or hauling out site, and 10) rocks clicking together. These rapid movements can be lumped into two categories: rushing (minor events), and stampeding (major events) (Bowles and Stewart 1980).

In a typical rushing event 75 to 95 percent of the animals raise their heads to look (alert) and 1 to 40 percent (average, 30 percent) run or walk rapidly toward the surfline. Usually it is the smaller animals who react the strongest. If inland animals are startled briefly, they run toward the beach for a few minutes and usually stop moving within 2 to 15 minutes. Animals near the tideline move into the surfzone. But only 20 percent or less actually enter the sea. Those who enter the sea form rafts and watch the shore. Returns begin immediately in some cases, but usually rafts take up to 30 minutes to break up and return. Animals in the water frequently choose to remain playing and fishing at sea after the alert is over. Rushing events have been observed when there was no identifiable cause. If the event is caused by visual and acoustic stimuli such as boats, helicopters, or humans, then the animals may take a few hours to return to the beaches (Bowles and Stewart 1980).

During major events over half of the sea lions on the beach walk rapidly or stampede toward the surfline. In extreme cases all of the animals on the beach enter the water within a few minutes. This movement might last for up to half an hour as inland animals make their way to the water. Return of the animals to the beach and inland areas may then take from hours to two or three days. When the animals take a long time to return they generally redistribute themselves on the beaches. The presence of humans on the beach frequently causes a total emptying of the beach. No increase in mortality or change in distribution due to human related disturbances has been reported except when humans were actually on the hauling site. Bowles and Stewart saw no mortality of adults or young in any species during their research efforts (Bowles and Stewart 1980).

**Full Requirements and Minimum Requirements Alternatives**

Missiles and aircraft would fly over any California sea lions that are present in the surf zone or on the beaches of SNL. Given the speed of the aircraft any sea lions present may give an alert response to each aircraft over flight as if it was just a loud, quick noise event. When Environmental Division staff monitored some aircraft (captive carrying missiles) flying over during November 1997 they saw a few marine mammals sit up. However, none moved toward the water. Depending on how low the aircraft flies, the sea lions might just “alert” or they
might move a short distance towards the beach and tideline. The response to aircraft flyovers above 500 feet AGL is expected to be minimal because such flights already occur intermittently and sea lions are known to be able to learn to ignore loud noises such as fireworks (Bowles and Stewart 1980). Since the aircraft are not expected to create noises louder than 108 dB and physical environmental noise can reach this level, there would be no disturbance caused by the proposed action.

Resource Protection Procedures and Monitoring Plan

A breeding season aircraft overflight study has been planned to supplement the information gathered during the November 1997 noise study. Biologists would use binoculars and video equipment to monitor the reactions of marine mammals on the beaches below the aircraft. The study would entail a series of flyovers at known aircraft speeds, stepping down from 2000 feet AGL to 1500, 1000, 750, and finally to 500 feet. Steps down in altitude would only be permitted if the mammals did not react to the previous higher altitude overflight. The biologists would be in constant radio communication with the pilots and would call off the flyovers if the mammals reacted negatively. The operating concept is that the biologists will be able to detect the animals responding to the flyovers at higher altitudes and thus instruct the pilots not to fly lower thereby preventing any adverse reactions.

Video monitoring would be conducted during critical nesting and breeding seasons so that pilots could be told to modify their flight paths and altitudes to avoid impacts. Video monitoring would be conducted until a sufficient understanding of mammal reactions to overflights was gained. This understanding would permit the establishment of flight protocols. Monitoring requirements would be at the discretion of the Point Mugu Environmental Division.

No Action

In the absence of the proposed test and training exercise firings there would be no new noises and human activities to disturb the marine mammals. Current flyovers from other activities on and near the island would continue.

The California sea lion population is presently increasing. The beaches will fill up with marine mammals as the populations of elephant seals, sea lions, and harbor seals continue to grow. There would be no change to the existing conditions of the marine mammal haulout locations.

4.1.8.1.2 Northern Elephant Seal

Full Requirements and Minimum Requirements Alternatives

Northern elephant seals did not respond to noises or disturbances until a human approached within 5 meters. During the pupping season, females with pups would threaten or charge; other age and sex classes gave threat grunts and retreated when approached closely. Weaned pups were almost completely insensitive during the noon hours, when they were generally asleep. They moved away rapidly in the early morning or late evening. They returned to their original sleeping spots within a few hours despite the presence of humans. No panics or stampeding were witnessed during the sonic boom effects research studies (Bowles and Stewart 1980). Northern elephant seals are not expected to be disturbed by aircraft or missile over flights under the proposed action.

No Action

In the absence of the proposed test and training exercise firings there would be no new noises and human activities to disturb the marine mammals. Current overflights from other activities on and near the island would continue.

The Northern elephant seal population is presently increasing. As the Northern elephant seal colony size increases it will expand eastward along the south side of the island (Stewart et al. 1993). The beaches will fill up with marine mammals as the populations of
elephant seals, sea lions, and harbor seals continue to grow. There would be no change to the existing conditions of the marine mammal haulout locations.

4.1.8.1.3 Pacific Harbor Seal

Pacific harbor seals are the most "nervous" of the three major pinniped species present on SNI. Harbor seals give the impression of constant alertness. They assume an alert posture possibly followed by rapid movement in reaction to: 1) alarm behavior of birds or other pinnipeds, 2) the visible presence of human beings within 200 meters, 3) jets, helicopters, and airplanes, especially if they are visible, 4) sonic booms, and 5) unknown factors such as the time of day and possibly the tides (Bowles and Stewart 1980).

Several degrees of response are exhibited by harbor seals. Minor stimuli can cause a few to all of the seals on a beach to "alert" and move rapidly toward the surf line. However, only a few would enter the surf. This may be a common response to the proximity of observers and is a fairly common occurrence (Bowles and Stewart 1980).

Above this minimal response is the case where a substantial number of the animals abandon the beach and the rest alert. The most intense response is total abandonment of the beach. In this last case, the animals may not return to the beach until the next day, especially if the event occurs late in the afternoon (Bowles and Stewart 1980).

**Full Requirements and Minimum Requirements Alternatives**

Missiles and aircraft may fly over scattered harbor seals occupying the beach and surf zone. Harbor seals would only be expected to give an alert response to an over flight of an aircraft or a missile provided there are not repeated aircraft overflights. Repeated overflights could frighten seals into the water. Mitigation measures include requiring aircrews not to repeat their overflights below 2000 feet MSL during the critical parts of the breeding season. Harbor seals would not be expected to be disturbed under the proposed action.

**No Action**

In the absence of the proposed test and training exercise firings there would be no activity at the SLAM target site and no new noises and human activities to disturb the marine mammals. Current overflights from other activities on and near the island would continue. Current trends of marine mammal population growth would continue.

The Pacific harbor seal population is increasing slowly. The beaches will fill up with marine mammals as the populations of elephant seals, sea lions, and harbor seals continue to grow. There would be no change to the existing conditions of the marine mammal haulout locations.

4.1.8.2 Effects on Offshore Mammals

The only conceivable impact from the proposed action on marine mammals offshore from SNI would be the injury or death of an animal resulting from the physical impact of an aborted or terminated missile. The community at risk consists of those animals more than 10 miles south or more than 3 miles north of SNI under the missile's flight path.

**Evaluation Criteria**

The criteria used to evaluate the environmental effects on nearshore and onshore marine mammals were that no harassment or injury of marine mammals occur. In this case if there is no harassment, there would be no injury or disturbance.

**Full Requirements and Minimum Requirements Alternatives**

Missile aborts have occurred and terminations would be possible when the missile is more than 10 miles from the target site and when it is more than 3 miles beyond SNI's far
An environmental assessment prepared by the NMFS (1993) estimated the number of marine mammals present in the SCB. The number of animals expected in the test range and adjacent waters was calculated using the most recent (for 1993) population estimates available. These calculations required the assumption that animals are distributed uniformly, which they are not. Marine mammals exhibit associative, or clumped, distributions but it is not possible to predict where in space and time a clump, or group, of animals will occur. NMFS calculated their density in terms of number per square nautical mile. Adding these densities, less than 6 animals were found per square mile. If, for the sake of argument, a marine mammal’s footprint area is taken as 250 square feet (8 feet wide and 33 feet long), the chance of a missile (once it was headed down) hitting a marine mammal would be 6 (mammals) X 250 (square feet per mammal) /36,917,776 (square feet per square nautical mile) or about one in 147,700. No marine mammals are expected to be hit by an aborted or terminated missile.

California sea lions will be very rare in the areas that might be subjected to an aborted or terminated missile since their greatest densities are found within three miles of the islands and they are rarely seen more than 30 miles from shore. Elephant seals would not be exposed to aborted or terminated missiles at sea since they migrate out of the Sea Range to feed. Pacific harbor seals are unlikely to be in any area where an aborted or terminated missile is likely to fall since the seals are found and forage in shallow waters and ocean impacts (if they occur) would occur in deep waters.

**No Action**

In the absence of the proposed action there would be no chance of any marine mammal being disturbed or injured by a SLAM.

**Cumulative Effects**

Since no effects are predicted to occur under the proposed action, there would be no long term or cumulative effects.

4.1.9 **Endangered and Threatened Species**

Endangered and threatened species of sea turtles and marine mammals do occur in the waters surrounding SNI. Because the chance of hitting one of these animals would be extremely remote, there would be no effect on these species.

The analysis of potential effects on other specific species caused by the proposed action are described below.

**Evaluation Criteria**

The criteria used to evaluate the environmental effects on an endangered species were that the actions be in full compliance with the ESA and individual species recovery plans. These criteria mean that there should be no taking of any species, no decrease in population sizes or health, and no injury or death of any individual. The ESA requires that any action authorized by a federal agency not jeopardize the continued existence of an endangered or threatened species or habitat which is determined to be critical to a species’s survival. The act makes it illegal to “take” any endangered or threatened species except in very limited circumstances under authority of a permit. “Take” means to harass, harm, pursue, hunt, shoot, wound, trap, capture, or collect, or to attempt to engage in any such conduct. These species are listed in 50 CFR 17.11 and 17.12. For uses here, the criteria of no adverse effect is that no individual plant or animal be “taken.”

Section 4(f) of the ESA requires the Secretary of the Interior to develop and implement recovery plans for listed species. [Species can be considered “recovered” when sufficient habitat has been restored to support viable, self-sustaining populations of the endangered or threatened taxa and when management and use of habitat is such that survivability of the populations is assured (USFWS 1984).] Five recovery plans have been
written which address species present on SNI or which have been present in the recent past. The Bald eagle recovery plan is not discussed since Bald eagles have not been seen at SNI in many years.

4.1.9.1 California Brown Pelican

**Evaluation Criteria**

The California Brown Pelican Recovery Plan (USFWS 1983) recovery criteria should be met in addition to those of the ESA. The primary objective of this recovery plan is to restore and maintain stable, self-sustaining populations throughout the subspecies' range. The accomplishment of this goal would require achievement of the following criterion among three:

- Assure long-term protection of adequate food supplies and essential nesting, roosting and offshore habitat throughout the range (USFWS 1983).

**Full Requirements and Minimum Requirements Alternatives**

California brown pelicans are sensitive to noise. Aircraft could startle the pelicans and scare them off their roosts if they flew in too low. According to the Pelican Recovery Plan (USFWS 1983) occasional disturbance of breeding birds at traditional roosts would probably have little effect on a breeding population. There are no breeding sites located on SNI. SLAM operations would not be frequent and program aircrews would be instructed to fly above 2000 feet AGL except during the pre-launch IR target acquisition missile simulation flight occurring during the normal pelican nesting and breeding season. The simulation flight aircraft would slow down when crossing the coast and climb to minimize potential impacts. The minimal flight level planned for all simulation flights is 500 feet. Some flights would occur at higher altitudes in accordance with a missile's mission plan and target attack mode. Pelicans which were present during the November 1997 study showed no response to aircraft overflights. California brown pelicans roost at Vizcaino Point during the day time and would not be affected by the day time test or training activities. Night time firings could disturb pelicans roosting near Cormorant Beach. Any night time tests would be planned so that the missile ingress route avoids the night time roosts near Cormorant Beach. (Figure 2-6 shows the location of Vizcaino Point and Cormorant Beach.) There would be less than significant effects on roosting pelicans.

None of the activities proposed in this EA would impact the pelican's food chain or essential nesting or offshore habitat. The proposed action would be in compliance with the recovery plan and there would be no effects on the pelican.

**No Action**

No change to existing conditions which favor the California brown pelican. Current aircraft flyovers from other activities would continue. Slow recovery of the pelicans is occurring from the steep population decline which occurred as a result of DDT use.

**Cumulative Effects**

In the absence of any effects from the proposed action there would be no cumulative effects.

4.1.9.2 Western Snowy Plover

**Evaluation Criteria**

In addition to the criteria given by the ESA, areas of proposed critical habitat (as given at 60 FR 11768) should not be adversely affected.
Full Requirements and Minimum Requirements Alternatives

The preferred nesting habitat of the Western snowy plover is the beach just below the wrack line. One small area of plover nesting habitat is located under the potential flight path of missiles on the western coast of SNI more than a mile south of the target site (see Figures 3-2 and 3-4). This site has a very low population of plovers and the plovers may be moving up the beach slightly as the marine mammal populations expand. This 500 foot diameter area was proposed as critical habitat (60 FR 11806). The proposed action would not directly affect this area; its only effects would be indirect effects on the birds from aircraft flyovers. Missile and target acquisition flight paths would be planned to avoid flying over snowy plover proposed critical habitat areas. Aircraft and missiles flying at 400 mph cross a 100 foot wide beach in 0.17 seconds. The birds are not expected to respond to aircraft flying over at 2000 feet or above. The missiles are not expected to be noticed even though they may be flying lower, since they are much smaller and quieter than the aircraft. A short startle reaction might occur. There would be no effects on the Western snowy plovers.

Resource Protection Procedures and Monitoring Plan

A nesting and breeding season aircraft overflight study has been planned to supplement the information gathered during the November 1997 noise study and would be conducted in conjunction with efforts to monitor the marine mammals. Biologists would use binoculars and video equipment to monitor the reactions of snowy plovers on the beaches below the aircraft. The study would entail a series of flyovers at known aircraft speeds, stepping down from 2000 feet AGL to 1500, 1000, 750, and finally to 500 feet. Steps down in altitude would only be permitted if the birds did not react to the previous higher altitude overflight. The biologists would be in constant radio communication with the pilots and could call off the flyovers if the birds reacted negatively.

Video monitoring would be conducted during critical nesting and breeding seasons so that pilots could be told to modify their flight paths and altitudes to avoid impacts. Video monitoring would be conducted until a sufficient understanding of plover reactions to overflights was gained. This understanding would permit the establishment of flight protocols. Monitoring requirements would be at the discretion of the Point Mugu Environmental Division.

No Action

The No Action alternative would not cause any change to existing conditions which favor the Western snowy plover. Current aircraft overflights from other activities would continue. The Environmental Division is monitoring the population status of the snowy plover and restricting access to beach areas where they are known to occur.

Cumulative Effects

In the absence of any effects from the proposed action there would be no cumulative effects.

4.1.9.3 American Peregrine Falcon

Evaluation Criteria

The Peregrine Falcon Recovery Plan (USFWS 1982) criteria should be met in addition to those of the ESA. The recovery plan objectives are designed to attain a self-sustaining population whose natural productivity is equal to or greater than its mortality, without human management. The primary recovery plan objective which applies to the SLAM missile tests and training exercises is to provide adequate conditions to maintain all existing wild Peregrine falcons. In essence, protect and enhance essential habitat.
Full Requirements and Minimum Requirements Alternatives

Peregrine falcons fly over the island and may stop to roost and occasionally over winter but do not nest here. They tend to spend most of their time, when at SNI, near the shore where their food is more prevalent. The one falcon which was seen during the November 1997 study was not apparently disturbed by the overflights. There are no known habitual locations which could be predicted to be affected or not affected.

The proposed action would not affect any Peregrine falcon habitat. The missile tests and exercises would not require the modification or destruction of any essential habitat and uses a pre-developed site. Therefore, the proposed action would be in compliance with the recovery plan, and there would be no effects on any falcons.

No Action

No change to existing conditions which favor the Peregrine falcon, and, therefore, no effects on the falcon.

Cumulative Effects

There would be no cumulative effects on Peregrine falcons since there would be no effects under the proposed action.

4.1.9.4 Southern Sea Otter

Evaluation Criteria

The Southern Sea Otter Recovery Plan criteria should be met in addition to those of the ESA. The recovery plan identified the need to establish at least one additional colony of sea otters, at some site or sites removed from the existing population, to protect the existing population from a major oil spill or other accidental oil spills. This new colony was to be created by translocating individuals to SNI from the existing population. A translocation plan and an EIS covering the translocation were prepared (USFWS 1987).

Two major strategies addressed in the translocation plan that apply to SNI are: 1) minimize impacts of human activities; and 2) restore the population to a level sufficient to preclude decimation by a large-scale oil spill. Tasks identified in the translocation plan include 1) establishing one or more colonies outside the current range but within the historical range; 2) monitoring the recovery process; and 3) integrating the recovery plan with local governments. SNI was selected as the preferred site and the translocation of sea otters occurred in 1987 and 1988 (USFWS 1987). Incidental take of sea otters in waters surrounding SNI is specifically permitted in the Congressional legislation which permitted the translocation experiment to be conducted (PL 99-625).

Full Requirements and Minimum Requirements Alternatives

The only potential effects of the proposed action on sea otters would be an alert response caused when pre-launch IR acquisition and chase aircraft fly over them. Under the proposed action the missiles and aircraft would fly over the near shore area and impact beyond the otters' preferred habitat. Since only 15 to 20 otters total live around SNI it is unlikely that one would be under the missile and aircraft flight path at any given moment. There would be no impact on the sea otters.

No Action

No change to existing conditions which support the Southern sea otter.
Cumulative Effects
There would be no cumulative effects on sea otters since there would be no effects under the proposed action.

4.1.9.5 Island Fox

Evaluation Criteria
In addition to the criteria given by the ESA, additional criteria of the Channel Islands Recovery Plan (USFWS 1984) should be met. The main reason for the depressed condition of many island species addressed in the Channel Islands Recovery Plan, is habitat destruction and competition from exotic plants and animals and human disturbance. Several recovery strategies are listed to protect essential habitat on the islands:

- Implement policies to minimize habitat disturbance,
- Prevent introduction of additional exotic organisms (inspect equipment and vans being transported to SNI and steam clean if necessary).

Full Requirements and Minimum Requirements Alternatives
The California State threatened Island fox is present in the APE. Foxes may seek refuge from wind, heat and other environmental conditions by entering target structures or by burrowing under them. In the absence of mitigation measures, the foxes could be present in or under target buildings during a missile impact. The following procedures are designed to protect foxes from being affected by the missile shots. The proposed action (which incorporates the mitigation measures) would have no effect on the foxes.

Resource Protection Procedures
The risk of injuring an Island fox would be reduced to an insignificant level by adhering to the following protection procedures:

- Any openings or holes into which foxes can enter in the bottom tier of container boxes used in building the target, and all other associated "buildings", would be closed. Openings, including doors left ajar, which might encourage foxes to investigate and even set up den sites would be kept closed.
- Exclude foxes from beneath buildings. Foxes will den beneath buildings if "spaces" are allowed to form. This would be prevented by frequent rotation of boxes/buildings, by piling sand along the base of each box/building, or by attaching an exclusion device along the foundation of each box/building.

No Action
There would be no change in the population level of the Island fox.

Cumulative Effects
Measures would be being taken to prevent injury to any Island fox. In the absence of any effects there would be no cumulative effects.

4.1.10 Military Activities

Evaluation Criteria
The criteria used to evaluate the effects on military activities were that there be no significant impairment or disruption of current or planned activities in the site vicinity or beyond the site that would be evacuated for a firing.
Full Requirements and Minimum Requirements Alternatives

Use of the site would result in a build up of small pieces of missile debris. This is a usual and customary result of weapons impacts.

The proposed use of the APE would be in keeping with the military uses of the range operations area. Very few activities are conducted west of the mesa that would be affected by closure of the west end of the island for a firing. The SLAM testing program and training exercise missions would be a small portion of and compatible with NAWCWPNS PM missions; and mission schedules would be integrated into the Sea Range Master Plan and other program schedules to minimize disruption to other programs. Impacts from the SLAM test and training exercises programs upon other military activities would be less than significant.

No Action

Under the No Action alternative the APE would not be used for SLAM firings and the west end of SNI would not be closed, the range operations area would continue to be used for other tests and training exercises. The SLAM site might be used by another program which could make evacuations and west end closures necessary.

Cumulative Effects

Final site clean up would remove the targets and stored cargo vans. Debris would be cleaned up to an acceptable level as determined by the Environmental Division, but clean-up may be limited by considering the potential for use of the site for other activities and for additional impacts on plants and archaeological resources. There would be no significant cumulative effects to military activities or potential use of the site by another program.

4.1.11 Airspace Use

Evaluation Criteria

The criteria used to evaluate the effects was that there be no significant deterioration of civilian use of the airspace.

Full Requirements and Minimum Requirements Alternatives

The proposed action would not involve any changes to the airspace restrictions of the NAWCWPNS Sea Range. A slight decrease in total number of days available for civilian pilots to fly through the Sea Range airspace could occur if the full or minimum requirements alternative is implemented.

No Action

There would be no change in restrictions. Approximately 150 to 200 range closures for other programs would continue to affect general and commercial aviation aircraft flying over the NAWCWPNS Sea Range north, west, and south of SNI.

4.1.12 Archaeological Resources

Evaluation Criteria

The evaluation criteria used were that the actions be in full compliance with the National Historic Preservation Act (NHPA), Archaeological Resources Protection Act (ARPA), and Native American Graves Protection and Repatriation Act (NAGPRA) and that there be no adverse effects to archaeological resources.

Section 106 of the NHPA requires the head of any Federal agency having jurisdiction over a proposed Federal action in any State, prior to approval of the expenditure of
any Federal funds, to take into account the effects of the action on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The head of the Federal agency shall afford the national Advisory Council on Historic Preservation a reasonable opportunity to comment on the action. (Procedures for complying with Section 106 are contained in 36 CFR 800. The no adverse effects criteria are presented in 36 CFR 800.9.) The Section 106 process is designed to accommodate historic preservation concerns with the needs of Federal actions. It is designed to identify potential conflicts between the two and help resolve such conflicts in the public interest.

An undertaking has an effect on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the National Register. For the purpose of determining effect, alteration to features of the property’s location, setting, or use may be relevant depending on a property’s significant characteristics and should be considered [36 CFR 800.9 (a)].

An undertaking is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties include, but are not limited to:

- Physical destruction, damage, or alteration of all or part of the property;
- Isolation of the property from or alteration of the character of the property’s setting when that character contributes to the property’s qualification for the National Register;
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting, etc. [36 CFR 800.9 (b)].

Effects of an undertaking that would otherwise be found to be adverse may be considered as being not adverse for the purpose of the regulations:

- When the historic property is of value only for its potential contribution to archaeological, historical, or architectural research, and when such value can be substantially preserved through the conduct of appropriate research, and such research is conducted in accordance with applicable professional standards and guidelines, etc. [36 CFR 800.9 (c)].

The ARPA provides protection to archaeological resources and sites to prevent their loss and destruction. ARPA also provides for cooperation and exchange between regulatory agencies, the professional archaeological community, and the public in the collection and preservation of archaeological resources and associated data. The NAGPRA requires federal agencies to provide for the protection of Native American human remains, funerary objects, and sacred objects. These acts must be complied with before the proposed action is begun.

**Full Requirements and Minimum Requirements Alternatives**

Typical archaeological site impacts consist of the immediate loss of integrity by the disturbance, and physical alteration, damage, or destruction of all or part of the property as a result of missile impacts and potential access road and target building pad expansion.

Within the APE archaeological material is generally within the top 40 centimeters of soil. Missile impacts would cause the loss of integrity, physical alteration, damage, and destruction of most of the materials within the crater. These craters would be centered on the back side of the targets, not spread out over the whole APE. Potential access road and target building pad expansion would involve both excavation and filling. Where dunes are excavated, any archaeological resources would be completely disturbed resulting in loss of integrity, physical alteration, and damage. Where expansion activities require filling, any archaeological resources would be covered with sand or borrow pit soils. Heavy equipment would pass over these places to shape and compress the surface. These resources would probably suffer physical alteration and damage with some loss of integrity. However, they would otherwise be left in place. The APE footprint of Figure 3-5, when compared with archaeological site CA-SNI-
168's loci of deposits shown in Rosenthal et al. (1997) only overlaps four of the six loci. Two of 168's loci are entirely outside of the APE. All site loci were addressed in the -168 data recovery program. The one midden of site CA-SN1-169 is contained entirely within the APE.

Intermittent light missile debris is expected to be the primary impact in the remainder of the APE outside the immediate target area. Pedestrian activities to recover this debris would be intermittent. Debris and pedestrian movement would at most only slightly disturb surface resources, and would be less than significant. No subsurface resources would be affected.

There are archaeological sites in the dunes surrounding the APE. There would be a small risk that a site which was important for its scientific value could be impacted by a missile before it had been surveyed. Rosenthal and Jertberg (1998) recovered artifacts and ecofacts from index units in the sites immediately surrounding the APE. Historically, only one missile has impacted SNI outside the APE, and this was due to operator error and procedures have been implemented to minimize the risk of a recurrence.

Sites outside the APE would not be expected to be impacted by missile debris. They have been marked off limits to program personnel. Therefore, no effects would occur to the resources of these sites.

Archaeological resources were determined to be present at the SLAM target site as described in Section 3.1.13. Sampling activities determined that site CA-SN1-168 is eligible for listing in the National Register of Historic Places and, therefore, the Navy must comply with several historic preservation laws. Site CA-SN1-169 is also eligible for listing. The following paragraphs describe the protection procedures and mitigation measures used so that there would be no adverse effects to the archaeological resources at the target site or in the vicinity.

**Resource Protection Procedures**

Archaeological resources protection procedures include very close coordination between the SLAM test and training management team and the NAWS Point Mugu archaeologist. The following procedures would be implemented to avoid potential impacts to archaeological resources. These procedures would be covered in the aircrew and ground crew briefings.

- Compliance with the ARPA, NHPA, and NAGPRA.
- Archaeological site and the APE boundaries would be marked by the Point Mugu archaeologist or his designated representative using red pin flags. Necessary precautions for avoiding disturbance to these sites would be presented. Travel would be restricted to designated access roads (unless specified or approved by the Environmental Division) and to areas outside the designated middens within archaeological sites CA-SN1-168 and -169 and outside other nearby middens. (A midden is a refuse heap as opposed to a structural feature such as a house wall or floor. Middens contain natural, artifactual, and organic resources.) SLAM personnel placing visual equipment on foot would be allowed travel off the access roads. Any disturbance to marked archaeological sites shall result in the suspension of testing activities until measures can be taken to prevent further disturbance. Remote placement of tracking cameras and other equipment outside the APE would be done without grading and away from archaeological sites.
- Require a report on all incidents involving contact with or discovery of archaeological resources to the Point Mugu archaeologist.
- Prohibit the collection of artifacts.
- There shall be no new grading or clearing outside the previously sanctioned area (as delineated by the APE, Figure 2-6). Archaeological resource impacts would be minimized during access road and target building pad expansion by the presence of an archaeological representative to over-see construction activities.
**Mitigation Measures**

Because collocated archaeological site CA-SNI-168 is located within the target area, a sampling program was undertaken in December 1994 to determine whether or not a mitigation program would be required. Sampling studies determined that the site is eligible for listing on the National Register of Historic Places based on its value to contribute to archaeological research. The California State Historic Preservation Officer (SHPO) and the national Advisory Council on Historic Preservation (ACHP) have been given an opportunity to comment on the effects of this undertaking and the proposed mitigation measures in accordance with Section 106 of the NHPA. Additional letters detailing the identified effects of the proposed undertaking and the proposed mitigation measures were sent to the SHPO and the ACHP on 11 September 1996. The letters requested concurrence with a finding of no adverse effect based upon the proposed data recovery efforts. According to 36 CFR 800 a federal agency may assume concurrence after receiving no response after 30 days from notification. To date, no response has been received. Accordingly, the SHPO and ACHP concur with the findings of no adverse effect.

Mitigation consisting of substantially preserving the scientific value through a data recovery program, consistent with the Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (48 FR 44734-44737), was conducted in 1996. A data recovery report following the Department of the Interior's Format Standards for Final Reports of Data Recovery Program (42 FR 5377-5379) has been produced. All recovered ecofacts and artifacts have been retained and are being stored at NAWS PM's environmental facility on SNI in accordance with 36 CFR 79, Curation of Federally Owned and Administered Archeological Collections. The Point Mugu archaeologist has determined that the mitigation program would result in no adverse effects to the archaeological site (see the Appendix F for more details). All excavative research was conducted in full compliance with the requirements of 32 CFR 229, the ARPA, NHPA, and NAGPRA.

Archaeological site CA-SNI-169 is located just north of the target area. A sampling program at site CA-SNI-169 was carried out November and December 1997 which determined that the site is eligible for listing on the National Register. The scientific value of this site will be substantially preserved as at site -168 through a data recovery program in the summer of 1998. No missile impacts would be permitted at this site until the data and its scientific value have been substantially recovered and there would be no adverse effects within the APE.

The SLAM program has complied with the NHPA, ARPA, and NAGPRA.

**No Action**

Archaeological resources would be undisturbed by military activities. Blowing sand dunes would still cause the exposure and loss of integrity of archaeological sites. Wind erosion of dune sand will continue to condense the layer of artifacts at the site and blow away any light artifacts or ecofacts that are exposed. Natural activities will affect all archaeological resources, not just those under the access road and building pad expansions and the missile impact sites.

**Cumulative Effects**

As more and more missiles impact the target site the footprint of damaged archaeological resources within the APE would slowly expand but at less than a one for one rate. The mitigation measures carried out would prevent there being any adverse effects. Footprint expansion would cease when the firing program is completed.

Program monitoring and corrective actions following any mishap would minimize cumulative effects to archaeological sites outside the APE.
4.1.13 Public Safety

Evaluation Criteria

The criteria was that the proposed action cause no significant increase in safety or environmental health risks.

Full Requirements and Minimum Requirements Alternatives

No significant environmental health risks have been identified at the SLAM target site or in the APE. Weapons testing does pose a safety risk. Closure of the target site area to all personnel during firing operations, and range control and target site procedures are designed to make testing as safe as possible. Clearing the range before any launch is permitted and warnings to nonparticipants prevent civilians from being hurt by missile operations.

No Action

The No Action alternative would not generate any safety or environmental health effects.

Cumulative Effects

All missile pieces will be collected by SLAM program personnel after each day’s firing operations. Since the missile pieces originally contain only minimal amounts of EPA 17 materials and most of these pieces will be collected, very little EPA 17 materials should remain where they might accumulate on the site. Therefore, the accumulation of this debris should not pose an environmental health risk. There are no hazardous materials in the missile which require the use of personal protection equipment. Safety risks would be mitigated by the safety procedures.

4.1.14 Relationship Between The Proposed Action And The Objectives Of State And Local Land Use Plans, Policies And Controls

4.1.14.1 Compliance With NAWS Point Mugu Master Plan

The missile firings would impact a target site in the designated range operations area in accordance with the Master Plan. The 1986 Master Plan for the Pacific Missile Test Center shows the SLAM target site is located in open space which is environmentally constrained (NAVFAC 1986). The area is environmentally constrained from the standpoint of being developed by the presence of sensitive plant and animal species including migratory birds, marine mammals, and the Island fox, and archaeological resources.

4.2 NAVAL AUXILIARY LANDING FIELD SAN CLEMENTE ISLAND

Potential effects of an aborted missile on the water quality of the ocean were presented under the section on SNI (Section 4.1.1.1). Limited biological resources exist in the immediate vicinity of the MIR. Most biological resources exist on the terrace shelves along the island’s southwestern coast and over the hill along the northeast side’s escarpment. Archaeological resources are scattered all over the island. NAS North Island’s Natural Resources Office has established programs to protect the endangered and threatened species and archaeological resources. The island’s ownership by the Navy and military test range restrictions provide an additional layer of protection to these fragile resources. Care is also taken to avoid sensitive habitat areas of importance to the species of concern.

Under the Full Requirements Alternative San Clemente Island’s MIR would be used as an occasional target site for SLAMs. Under the Minimum Requirements and No Action Alternatives, this target site would not be used. The environmental effects of the proposed action on each NALF SCI environmental component are described in two subparagraphs under
each component: a paragraph describing the environmental effects under the full requirements alternative; and a paragraph combining the effects under the minimum requirements and no action alternatives. The minimum requirements and no action paragraphs were combined since no missiles would be fired under either alternative.

4.2.1 Air Quality

Emissions at NALF SCI may result from the following activities: aircraft flights over the MIR (flights over the ocean would be mostly above 3,000 feet MSL), operation of generators to support range instrumentation and equipment, vehicles traveling to and from the MIR on paved roads, and the impact of the missile at the target. Aircraft flight emissions over the ocean were covered in Section 4.1.2.1. A typical composition of aircraft during a firing will include two launch and control aircraft (these will perform target acquisition and missile chase duties) and a third surveillance aircraft. Approximately 12 generators will be used at the MIR to power target site equipment and range instrumentation.

Evaluation Criteria

The criteria used to evaluate the potential environmental impacts on air quality are that the proposed action not cause any reduction in existing air quality levels: no adverse effects, no increase in the maximum levels of pollution of any nonattainment area, and no increase in the severity or frequency of high levels of pollution. The proposed action must be carried out in full compliance with the federal Clean Air Act.

A formal conformity determination is required by the federal Clean Air Act for federal actions occurring in nonattainment or maintenance areas when the total direct and indirect stationary and mobile source emissions of nonattainment pollutants or their precursors exceed thresholds or de minimis values. The conformity rule applies only to direct and indirect emissions caused by the federal agency's action. These emissions are limited to those that would not otherwise occur in the absence of the federal agency's action. The conformity rule also specifically exempts "routine operation of facilities, mobile assets, and equipment" [40 CFR 51.853(c)(xiii)].

4.2.1.1 Air Emissions During Set-Up and Clean-Up Activities

Full Requirements Alternative

The primary criteria air pollutant of concern during target site set-up and clean-up would be particulate matter in the form of fugitive dust created by vehicle travel over the dirt at the MIR. Significant dust generation is not expected to occur due to the small area of open dirt at the MIR, the short periods of time during which vehicles would be traveling within the MIR, and the limited number of vehicles that would be used. No exceedances of the State Ambient Air Quality Standard (SAAQS) or NAAQS are expected.

The proposed action would not generate significant amounts of other criteria air pollutants during target site setup and clean-up given the limited amount of vehicle use that would occur. Target site setup and clean-up would therefore not be expected to result in exceedances of SAAQS or NAAQS for other criteria air pollutants.

Minimum Requirements and No Action Alternatives

There would be no air quality effects from implementation of the Minimum Requirements or No Action alternatives.
4.2.1.2 Air Emissions During Firing Activities

**Full Requirements Alternative**

Small amounts of air contaminants would be generated over the SCB and over SCI within the SCAB by the missile and target acquisition, launch, control, and chase aircraft activities during the test and training firings. EPA emission inventory guidance indicates that emissions released more than 3,000 feet above ground level are generally excluded from consideration in state implementation plans. For the purposes of the general conformity rule calculations, only the missile chase aircraft and the missile were judged to fly below 3000 feet AGL within the SCAB. The chase aircraft was estimated to spend 12 minutes within this area and the missile half of its flight time for each firing. Missile and aircraft emissions resulting from four firings per year were estimated to be less than 3 pounds of reactive organic compounds, 175 pounds of nitrogen oxides, less than 8 pounds of carbon monoxide, and 21 pounds of particulate matter. Missile and aircraft emissions would be spread out over more than fifty miles. Increases in air pollutant levels due to the missiles and aircraft would not be detectable since the air, missiles, and jets would be constantly moving and the pollutant levels would be minuscule and less than significant.

Any JP-10 that is in the missile at impact would evaporate upon exposure to air, burn quickly, be dissipated by the wind, or seep into the ground. Since there is very little soil covering the bedrock and the bedrock is relatively impermeable (it is not used as a source of ground water), any spilled missile fuel would be expected to evaporate. Waste gases would be uncollectable and vent to the atmosphere. Since the air over SCI is constantly replenished, there would be no noticeable effect of air quality.

Small increases in the level of air contaminants would be generated in the immediate vicinity of the target site generators during the firing operations. Up to 0.3 tons of nitrogen oxides; 40 pounds of hydrocarbons; 120 pounds of carbon monoxide, and 40 pounds of particulate matter would be emitted by the generators during a year involving two operational days. The generators would be operated under permit from the South Coast Air Quality Management District (SCAQMD) and use all of the appropriate air pollution control equipment. Because of the almost continuous breezes over the target site and the tendency of local eddies and deflection in flow to occur as a result of the terrain (DeMarrais et al. 1965), air pollutants from the generators would only be detectable or noticeable when running and only immediately downwind. These amounts are not considered to be significant and mitigation measures are not suggested.

SCI air quality would not be detectably affected by the proposed action. Ventura County, the South Coast Air Basin, and San Diego County are air pollutant nonattainment areas. As Figure 3-1 shows, air pollutant emissions from SCI would flow to the east and not impact air quality in either Ventura County or the South Coast Air Basin. Travel over the distance from SCI to San Diego County dilutes and disperses aircraft, missile, and generator air pollutants so that any effect on San Diego's air quality would be undetectable. Because of the low concentration and rapid dispersion, there would not be any risk to human health, terrestrial life or marine life. The proposed action would not adversely affect the SCB's or SCAB's air quality, cause the maximum pollutant levels of any nonattainment area to rise, or cause an increase in the severity or frequency of high levels of pollution.

**Minimum Requirements and No Action Alternatives**

In the absence of test or training exercise firings there would be no short or long term change to the air quality over and around SCI caused by SLAM operations. Emissions from other military and air carrier operations would continue (including operations at the air field on SCI) to affect the SCB's and SCAB's air quality.
4.2.1.3 General Conformity Rule

Since SCI is part of Los Angeles County and the South Coast Air Basin, the SCAQMD has jurisdiction over air emissions from SCI and NAS NI must comply with the SCAQMD Air Quality Management Plan. The requirements of 40 CFR 51.853(b), General Conformity determination, do apply to the proposed action with respect to firings involving the impact site at the MIR.

A detailed conformity analysis was performed for SLAM and is included in Appendix C.8. The emissions for four SLAM firings involving two operational days during one year at SCI were estimated to be 0.17 tons of reactive organic compounds (an ozone precursor), 0.50 tons of nitrogen oxides, 0.41 tons of carbon monoxide, and 0.13 tons of PM₁₀. These amounts are well within the de minimis thresholds of 10, 70, 100 and 100 tons, respectively, and qualify for an exemption under 40 CFR 51.853(c)(1): “Actions where the total of all reasonably foreseeable direct and indirect emissions do not equal or exceed the de minimis levels.” Details are provided in Table 4-1.

4.2.2 Soils

Evaluation Criteria

The evaluation criteria are concerned with the effects on the physical and chemical properties of the soil. Changes to the soils should not have an adverse affect on their ability to support structures or plant growth.

Full Requirements

The only effect on the soil would be the movement of soil by target placement vehicles, creation of a hole by the missile, creation of potential small depressions by missile debris, and disturbance of soil by the recovery team in picking up the missile components. Since the target site has been disturbed before to build other targets, no adverse effects on soil quality or quantity from the proposed actions are predicted.

The potential for increased induced soil erosion exists. An errant missile and/or its recovery could leave a depression in the ground which could lead to the creation of a gully. Mitigation measures would be taken to restore any soil contours to their original shape, as required by the NAS NI Natural Resources Office, so that there would be no induced soil erosion.

Any jet fuel that is spilled on the ground is expected to evaporate completely leaving no residue. The physical or chemical characteristics and the abilities of the current soils to support plant or wild life would not be changed. No long term adverse effects are expected to result from the proposed activities.

Resource Protection Procedures

Approval of the NAS NI Natural Resources Office (NRO) will be received prior to the placement of any equipment or instruments outside the boundaries of the MIR on SCI.

Mitigation Measures

In the event that vehicles are required to travel over the grassland to recover missile debris, and they leave ruts, the ruts would be filled in and the area returned to its former contours to minimize the inducement of erosion channels in accordance with instructions from the Natural Resources Office.
TABLE 4-1. SUMMARY OF EMISSIONS FROM 4 ANNUAL FIRINGS OF SLAMS WITH EXERCISE SECTIONS AT SAN CLEMENTE ISLAND.

<table>
<thead>
<tr>
<th>Subarea with Flight Activity under 3,000 Feet AGL</th>
<th>Emission Category</th>
<th>Maximum Low Altitude Aircraft and Missile Emissions (tons/ year) Assuming Four Missile Firings per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Source</td>
<td>ROC</td>
</tr>
<tr>
<td>Launch and Flight Areas:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventura County</td>
<td>Aircraft</td>
<td>0.14</td>
</tr>
<tr>
<td>Offshore Areas</td>
<td>Aircraft &amp; Missiles</td>
<td>0.00</td>
</tr>
<tr>
<td>South Coast Air Basin</td>
<td>Aircraft and Missile</td>
<td>0.00</td>
</tr>
<tr>
<td>Termination Area for Firings:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Coast Air Basin</td>
<td>Generators</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>Trucks</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Cranes and Forklifts</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>TOTALS:</td>
<td>0.17</td>
</tr>
</tbody>
</table>

Notes:
- ROC - reactive organic compounds
- NOX - nitrogen oxides
- CO - carbon monoxide
- PM<sub>10</sub> - inhalable particulate matter

Flight activity distances are estimated since each missile flight path can be different and each aircraft pilot has control of his own aircraft. For emissions analysis purposes, flight activity within 3,000 feet (914 m) of ground level is considered low altitude activity. Aircraft takeoffs and landings are assumed to occur at NAWS Point Mugu in Ventura County. EPA emission inventory guidance indicates that emissions released more than 3,000 feet (914 m) AGL are generally excluded from consideration in state implementation plans.

Data Sources:
Minimum Requirements and No Action Alternatives

Some soil erosion might occur if the field was left fallow without recontouring and revegetation. Returning the site to previous contours before closing it and revegetating it with native species would preserve the existing soil. However, it is anticipated that this site would continue to be used by other programs such as Tomahawk and JSOW whether or not SLAM missiles impact the site.

Cumulative Effects

Cumulative physical effects in the areas of rock and soil disturbance would be possible but minimal given the frequent scraping of the area to prepare the MIR for other weapon system impacts and to minimize the chances of a wildfire spreading. The inducement of soil erosion and gully formation would be mitigated through the implementation of soil conservation measures.

4.2.3 Noise

Evaluation Criteria

The criteria used to evaluate the environmental effects on the noise environment were that the proposed action would not cause an increase in existing ambient noise levels, and would not alter the character of the ambient noise.

Full Requirements

The loudest noises would come from the flight of jet aircraft and moderate noise from missile flight and impact. There are very few marine mammals on the beaches and no concentrations of birds under the flight path of the missile as it heads to the MIR target site. Further, since the target is located approximately 900 feet above the beaches, chase aircraft and the missiles would be higher above any marine mammals. The noise level is predicted to be 17 dBA less at the beach than at the SNI beach or 91 dBA (based on a slant range of 1600 feet and using Appendix D.3). Generators running on the site to power the heaters and instruments would make the most noise. (They would be operated for a maximum of 50 days over the 20 years covered by this EA.) They would have the most impact since they would be running for several hours for each test as compared to a flyover that only lasts for seconds. However, wind noise would be expected to exceed generator noise.

The noise environment of the island and the SCB would not be significantly affected. The total number of tests envisioned by the proposed actions is a maximum of 80. Thus, since these tests involve a maximum of 130 aircraft and 80 missile flights there would be a potential increase in the noise levels for only a couple of hours at most over the 20 year span of these tests. The ambient noise levels and character would not be affected. Since there are no sensitive noise receptors in the area and the impacts would be low and infrequent the effects would not be significant.

Minimum Requirements and No Action Alternatives

The absence of SLAM ER and SLAM tests would not stop the overflight of other aircraft at the permitted altitudes, although there would be no SLAM missile overflights at low altitudes. Other Department of Defense missile programs would continue to use this site such as Tomahawk and JSOW.
4.2.4 Plants

**Evaluation Criteria**

The criteria used to evaluate the environmental effects on plants were that the proposed action would not cause any appreciable decrease in the numbers of plants, plant health, or plant community diversity; and that no exotic plants be introduced.

**Full Requirements**

The target for these field tests is located on an existing military explosives test range which has been previously disturbed. The local vegetation is ruderal. Missile debris recovery operations are expected to be limited to the MIR. Minimal damage is expected to occur to the grass, annuals and perennials of the project area due to target reconfiguration and missile debris recovery. Because of all the past site disturbances, species present are expected to be hardy and able to regrow and repopulate the area so that there would be no significant effects.

**Resource Protection Procedures**

Approval of the NAS NI NRO will be received prior to the placement of any equipment or instruments outside the boundaries of the MIR on SCI.

**Minimum Requirements and No Action Alternatives**

If plant species were permitted to grow over the ground as they could without interference, the exotic species already present as seed would likely take over the area. The Natural Resources Office would like to manage the area so that the native vegetation is encouraged.

In the absence of the SLAM program, testing of other weapon systems (e.g., Tomahawk and Joint Standoff Weapon System), also involving target reconfigurations, would continue to be conducted at the MIR.

**Cumulative Effects**

If the tests occur as planned, there would be no cumulative biological effects since the site is regularly disturbed by weapons testing activities.

4.2.5 Birds

**Evaluation Criteria**

The criteria used to evaluate the environmental effects on birds consisted of the affects on bird population sizes, health, and diversity. The acceptable criteria of impact is that the proposed action cause no appreciable decrease in the numbers of birds, bird health, or bird community diversity.

**Full Requirements**

Since the MIR does not support suitable nesting habitat for native bird species and does not contain foraging habitat for any species, very few birds are expected to be present. Motion pictures taken of the target sites shortly before and through the missile impact show birds flying away from the area just before the missile arrives. Birds are unlikely to be hit by a missile or its flying debris. No effects are expected on birds.

**Minimum Requirements and No Action Alternatives**

No change to the existing conditions of the bird habitats.
Cumulative Effects

If the tests occur as planned, there would be no cumulative biological effects since there would be no cumulative change to the existing conditions.

4.2.6 Marine Mammals

Evaluation Criteria

The criteria used to evaluate the environmental effects on nearshore and onshore marine mammals were that no harassment or injury of marine mammals occur in accordance with the MMPA. In this case if there is no harassment, there would be no injury or disturbance.

Full Requirements

There are few marine mammals present at the beaches below the aircraft and missile flight paths as they approach the MIR. Further, since all aircraft and missiles would be flying more than 1000 feet above the mammals, they would not be expected to notice the flyovers and there would be no effects.

Minimum Requirements and No Action Alternatives

In the absence of the proposed tests, there would be no overflights of marine mammals at the coast either to the southwest or northeast that might be present and there would be no effects.

4.2.7 Endangered and Threatened Species

Evaluation Criteria

The criteria used to evaluate the environmental effects on an endangered species were that the actions be in full compliance with the ESA.

Full Requirements

Recovery procedures outside the MIR could potentially affect sensitive plant species. All known populations of sensitive plant species (the closest being five colonies of San Clemente Island larkspur) are located over 0.75 miles from the MIR. An exact impact on one of these colonies is highly unlikely.

Two separate USFWS biological opinions cover the effects that a fire might have on sensitive biological resources on San Clemente Island. Potential effects on sensitive plants as a result of fires, even though allowable as an incidental take under the biological opinion, would be lessened significantly as a result of SLAM test procedures requiring that EOD personnel and fire equipment be stationed near the test site to prevent fire damage to surrounding vegetation. During fire season, a USFS fire fighting helicopter would also be present, as stipulated in the biological opinion. Missile debris would be collected in accordance with the range recovery plan. No taking of special status plant species would occur and there would be no loss of critical habitat as a result of SLAM firings.

No protected wildlife species have been observed at the MIR and none are expected to be present due to the habitat preferences of each species and because of the disturbed (open, flat, graded) nature of the MIR target site. None of the island’s federally protected species (San Clemente Island loggerhead shrike, San Clemente Island sage sparrow, Western snowy plover, California brown pelican, American bald eagle, American peregrine falcon, Island night lizard, Guadalupe fur seal, Southern sea otter) occur within 0.75 miles of the MIR.

The proposed action would not impact any endangered or threatened species or their habitat. Mitigation measures have been planned to cover the unlikely event of an early
termination's or mishap's damage to an essential habitat area. Construction equipment and vans would be cleaned before transporting to SCI as required. Therefore, the proposed action would not result in any taking of a listed species and is in compliance with the recovery plan.

**Resource Protection Procedures**

Approval of the NAS NI NRO will be received prior to the placement of any equipment or instruments outside the boundaries of the MIR on SCI.

A major threat to the continued existence of endangered and threatened species at SCI is the presence of exotic plants and animals. Exclusion of these species is one means to protect the endangered and threatened species. These exotic and non-native species would be excluded from the island by cleaning any equipment and vans before they are moved to the island.

**Minimum Requirements and No Action Alternatives**

There would be no change in the health or population levels of endangered and threatened species of wildlife or plants.

4.2.8 **Military Activities**

**Evaluation Criteria**

The criteria used to evaluate the effects on military activities were that there be no significant impairment or disruption of current or planned activities south of the site.

**Full Requirements**

Military personnel on the island work both at the north end, in the middle and at the south end of SCI. The requirement to block off the roads in the vicinity of the MIR stops the flow of traffic between work stations at the north end of the island and those at the middle and southern sections. Ridge Road is closed at the turn off to the Naval Ordnance Testing System pier (located on the eastern side of the island) just north of the old airfield. Approximately 10 to 15 personnel would be affected by each MIR closure to conduct tests, if the tests were conducted during the regular work weekdays and not on weekends. Three to five of these personnel located at the Tombstone threat avoidance site would have to evacuate their work spaces during a firing.

Equipment and instrumentation is at risk of loss in the target area. Extended closure of the range due to test event delays could cause the loss of days of work effort at the south end of the island by other government and military employees who were denied access to their work stations.

The proposed activities are a normal part of the business of the island. No significant effects upon the accomplishment of efforts are expected since at most four firing days per year would be used at SCI.

**Minimum Requirements and No Action Alternatives**

Closures of the MIR would continue in support of other weapons system testing.

4.2.9 **Fire Management**

**Evaluation Criteria**

The criteria used to evaluate the effects on wildfires were that there be no added inducement of wildfires as a result of the proposed action.
Full Requirements

The sparse vegetation around the target site would not support a wildfire and one is not expected to occur. Only one missile has burned on impact in the past – in a sand dune area within the APE on SNI.

Resource Protection Procedures

Resource protection procedures consist of maintaining fire breaks around the target site as indicated in Figures 3-7 through 3-10 and being prepared to fight a wildfire. The grassland in the vicinity, within the firebreaks, may be pre-burned both to aid in the location of archaeological sites and to reduce fire fuel. Measures to protect the mesa grassland from wildfire consist of stationing EOD personnel and fire equipment near the test site to prevent fire damage to surrounding vegetation. During fire season, a USFS fire fighting helicopter would also be present, as stipulated in the biological opinion.

Minimum Requirements and No Action Alternatives

There would be no chance of wildfires caused by an errant SLAM missile. Risk of fire would still exist as a result of other ongoing weapons tests. This is a small risk reduction.

Cumulative Effects

The worst case cumulative impact would be due to the results of more than one wildfire. The occurrence of the first wildfire would result in an immediate review of these procedures to minimize the chances of a recurrence. Mitigation measures would be implemented to minimize the potential for wildfires.

4.2.10 Infrastructure

Evaluation Criteria

Risk to utility line damage should be minimized. Minimal interruption of utility services to the south end of the island.

Full Requirements

A minimal risk exists that a missile flying over the target site or missile debris could damage a utility pole or sever a telephone or power cable. This would result in a loss of power or telephone service to military facilities south of the MIR. The SLAM program would reimburse SCI for the cost of any cable repairs. Any needed repairs would be a program priority and would be expedited. All missiles and debris are expected to impact within the MIR. No debris is expected to damage the utility lines.

Minimum Requirements and No Action Alternatives

There would be no risk of damaging utility poles or cutting telephone or power cables by SLAM missiles or missile debris in the absence of the proposed firings.

4.2.11 Archaeological Resources

Evaluation Criteria

The evaluation criteria used were that the actions be in full compliance with the National Historic Preservation Act, Archaeological Resources Protection Act, and Native American Graves Protection and Repatriation Act and that there be no adverse effects to archaeological resources. (See Section 4.1.12 for details.)
Full Requirements

Typical archaeological site impacts consist of the immediate loss of integrity by the impact, which may disturb the site to several feet underground. While numerous archaeological sites surround the MIR, the MIR was delineated to avoid known archaeological sites. The surrounding sites have not been surveyed and could contain important resources. SLAMs are expected to impact the target. Since it is highly unlikely that a missile would impact an archaeological site, there would be no adverse effects on any site.

Resource Protection Procedures

Approval of the NAS NI NRO will be received prior to the placement of any equipment or instruments outside the boundaries of the MIR on SCI.

Avoidance of cultural resources would be accomplished by marking all archaeological sites with signed posts within the target vicinity. Marking the sites would enable recovery team personnel to avoid collateral damage to the sites during missile recovery activities.

Mitigation Measures

In the unexpected event of a missile impact on an archaeological site, the scientific data from that site would be recovered. The site would be resurfaced to prevent soil erosion which could cause further site deterioration.

Minimum Requirements and No Action Alternatives

Cultural and historic resources would be undisturbed by SLAM activities. However, other programs would continue to use the MIR target site and present the potential to disturb nearby archaeological sites.

Cumulative Effects

Since archaeological resources do not exist in the MIR, but around it and the proposed action would not impact any resources, there would be no cumulative effects.

4.2.12 Public Safety

Evaluation Criteria

The criteria was that the proposed action cause no significant increase in safety or environmental health risks.

Full Requirements

No significant environmental health risks have been identified at the MIR. Weapons testing does pose a safety risk. Closure of the center of the island to all personnel during firing operations, and range control and target site procedures are designed to make testing as safe as possible. Clearing the range before any launch is permitted and warnings to nonparticipants prevent civilians from being hurt by missile operations.

Minimum Requirements and No Action Alternatives

The Minimum Requirements and No Action alternatives would not generate any safety or environmental health effects.

Cumulative Effects

All missile pieces will be collected by SLAM program personnel after each day's firing operations. Since the missile pieces originally contain only minimal amounts of EPA 17
materials and most of these pieces will be collected, very little EPA 17 materials should remain where they might accumulate on the site. Therefore, the accumulation of this debris should not pose an environmental health risk. There are no hazardous materials in the missile which require the use of personal protection equipment. Safety risks would be mitigated by the safety procedures.

4.2.13 Relationship Between The Proposed Action And The Objectives Of State And Local Land Use Plans, Policies And Controls

4.2.13.1 Compliance with NAS North Island San Clemente Island Compatibility Study
Since SLAM would use the designated cruise missile impact zone designated as the Missile Impact Range, it would be in compliance with the Compatibility Study.

4.2.13.2 Compliance with Natural and Cultural Resources Management Plan for Lands Administered by the US Navy, Naval Air Station, North Island, San Diego, California

A SCI Natural Resources Management Plan is being developed in response to the requirements of applicable federal laws (such as NEPA, ESA, and NHPA) and subsequent Department of Defense and Navy directives concerning the conservation and protection of natural resources on lands administered by the Navy. The NAS NI NRO recognizes its roles to both support the Navy’s military mission and to conserve the natural resources of SCI. The NRO’s belief is that high quality military training and natural resources management are compatible. The plan is expected to incorporate the concept of zones for military training and for resource conservation.

The proposed testing at SCI would be in compliance with this plan.

4.2.13.3 Memorandum of Understanding Regarding Marine Mammal Populations
This agreement governs the protection, management, and study of the pinnipeds and stranded cetaceans on SCI. In the memorandum, NAS NI agreed to assist the NMFS in protecting and managing pinnipeds that haulout and/or breed on SCI and to cooperate with the NMFS in the investigation of all unauthorized activities regarding the pinnipeds on SCI, an to refer all cases of illegal take, including harassment of pinnipeds to the NMFS (Watts and Ford 1981). The proposed action would not affect any marine mammals.

4.3 NAVAL AIR WEAPONS STATION CHINA LAKE
The proposed action would be carried out on existing, active, military lands and within military controlled flight corridors, utilizing available facilities and employees. All SLAM flight test plans would be in accordance with flight restrictions established for all routes and target sites. Existing access roads would be used and no road improvements or new roads are proposed.

Planned tests would be conducted on 9 target sites that are currently used for similar tests. The proposed target sites include: Airport Lake (including HABR, HABR Gunbutts, HABR Tunnel), Charlie SAM site, Coles Flat, Coso Military Target Range, FAE, and Sam’s Town. Each of the targets is located within an established zone of disturbance (ZOD) that would be large enough to completely contain debris from any SLAM variant impact. These ZODs have been disturbed by previous testing and operational activities, and are generally maintained by grading on a regular basis. As such, no biological resources remain intact. Since the ZOD sites are highly disturbed areas typically devoid of vegetation, minimal habitat and foraging opportunities exist for wildlife species. It is unlikely that any special status species would be found within a ZOD site. In addition, intact cultural deposits are unlikely to occur within these areas. Use of these previously disturbed target sites by SLAM would result in minimization of potential environmental impacts.
The environmental effects of the proposed action on each NAWS China Lake environmental component are described in two subparagraphs under each component: a paragraph combining the effects under the full requirements and minimum requirements alternatives; and a paragraph describing the environmental effects under the no action alternative. The full and minimum requirements paragraphs were combined since approximately the same number of missiles would be fired under either alternative.

4.3.1 Land Use

Evaluation Criteria

Effects of the proposed action would be significant if they would disrupt the current use of land or if they would result in conflicts with planned or adopted land use policies.

Full Requirements and Minimum Requirements Alternatives

Use of the target sites would result in a build up of small pieces of missile debris. This is a usual and customary result of weapons impacts. The proposed use of the target sites would be in keeping with the military uses of these areas.

Proposed target areas at NAWS China Lake are all active target facilities, and use by the SLAM Program would be compatible with the current and planned uses of each. All target sites have established ZODs large enough to contain debris from any SLAM variant. Activities associated with SLAM termination at each of the proposed sites, such as installing targets and instrumentation and removing post-test equipment and debris and missile impact, would occur within areas previously disturbed by weapons testing. Access to the target areas would be on existing roads.

All activities under the proposed action would be conducted in active military target areas and would be consistent with the prescribed land uses of these areas. SLAM test activities within the R-2508 Airspace Complex over NAWS China Lake would not measurably disrupt current land uses or be inconsistent with land use plans and policies for areas beneath the airspace. A less than significant impact to land use within the R-2508 Airspace Complex would occur as a result of the proposed action, and no mitigation measures are required.

No Action

Should the Navy discontinue testing of the SLAM, there would be no impacts to land use. The NAWS China Lake facilities would continue to be used for other military testing and training.

Cumulative Effects

Final site clean up would remove the targets and stored cargo vans. Debris would be cleaned up to an acceptable level as determined by the Environmental Project Office, but clean-up may be limited by considering the potential for use of the site for other activities. There would be no significant cumulative effects to land use or potential use of the site by another program.

4.3.2 Water Resources

4.3.2.1 Water Resource Depletion

Evaluation Criteria

Significance of water resources depletion effects is based on the potential for long-term effects on ground water quantity.
**Full Requirements and Minimum Requirements Alternatives**

Water might be required during blading of target sites to suppress dust. Water would be trucked to the target sites from existing water wells. The quantity of water needed for dust suppression would be extremely small, and would be used for a very short time (generally one to two days). Water use for dust control would therefore not significantly deplete water resources in the vicinity.

**No Action**

There would be no hydrologic effects from implementation of the No Action alternative. Withdrawals for dust suppression in support of other weapons programs would continue.

### 4.3.2.2 Ground Water Quality

**Evaluation Criteria**

The criteria used to evaluate environmental effects was that there be no detrimental effects on ground water quality including potable water supplies.

**Full Requirements and Minimum Requirements Alternatives**

There are no surface water bodies in the target areas that can be used by wildlife. Unburned jet fuel at missile impact and diesel fuel and gasoline contained in the generator fuel tanks are potential water pollutants at the target site.

A fuel release might occur during diesel or gas generator refueling or from rupture of a SLAM’s fuel tank on impact. The jet fuel might evaporate before it could be cleaned up. Standard spill control and recovery measures would be implemented. These measures are designed to contain the fuel and prevent it from entering a water body, to limit the spread of the release, and to clean up any residual fuel. Standard clean-up methods include the use of containment devices, absorbent materials, and soil removal. A less than significant impact to water resources would occur as a result of a fuel release at a target site.

In addition to the potential for a release from the missile or generator refueling, fuel releases could occur as a result of operating support activities. Chase planes and ground vehicles that support the mission carry fuel into the environment. These operations are similar to other operations that occur without the proposed activity, and the small number of flights proposed per year represent an incremental increase in the risk of a release that could impact surface or ground water resources. If a release occurs, standard spill control and recovery measures would be implemented, as described above. A less than significant impact to water resources would occur as a result of a fuel release on a road or in another area on the ranges.

**No Action**

There would be no significant effects on the ground water resources under the No Action alternative. No mitigation is required under this alternative.

### 4.3.3 Air Quality

Emissions at NAWI China Lake may result from the following activities: aircraft flights over the test areas (although these would mostly be above 3000 feet above ground level), operation of diesel generators to support range instrumentation, vehicles traveling to and from impact areas on paved and unpaved roads, and the impact of the missile at the target area.
Evaluation Criteria

The criteria used to evaluate the potential environmental impacts on air quality are that the proposed action not cause any reduction in existing air quality levels: no adverse effects, no increase in the maximum levels of pollution of any nonattainment area, and no increase in the severity or frequency of high levels of pollution. The proposed action must be carried out in full compliance with the federal Clean Air Act.

A formal conformity determination is required by the federal Clean Air Act for federal actions occurring in nonattainment or maintenance areas when the total direct and indirect stationary and mobile source emissions of nonattainment pollutants or their precursors exceed thresholds or de minimis values. The conformity rule applies only to direct and indirect emissions caused by the federal agency's action. These emissions are limited to those that would not otherwise occur in the absence of the federal agency's action. The conformity rule also specifically exempts "routine operation of facilities, mobile assets, and equipment [40 CFR 51.853(c)(xiii)]."

4.3.3.1 Air Emissions During Set-Up and Clean-Up Activities

Full Requirements and Minimum Requirements Alternatives

The primary criteria air pollutant of concern during target site set-up and clean-up (i.e., blading of roads and vehicle travel) would be particulate matter in the form of fugitive dust. Significant dust generation is not expected to occur due to the small area that would be affected by the proposed action, the limited number of vehicles that would be in operation, and the short periods of time during which activities will occur. No exceedances of the SAAQS or NAAQS are expected.

The proposed action would not generate significant amounts of other criteria air pollutants during target site setup and clean-up given the limited amount of vehicle use that would occur. Target site setup and clean-up would therefore not be expected to result in exceedances of SAAQS or NAAQS for other criteria air pollutants.

Mitigation Measures

In order to minimize dust generation during setup and clean-up of the proposed target areas, water would be sprinkled on the target areas and access roads in the immediate vicinity as necessary. Although the proposed action would not be expected to result in significant dust generation or exceedances of NAAQS or SAAQS for PM$_{10}$, watering would minimize localized increases in particulate matter concentrations.

No Action

There would be no air quality effects from implementation of the No Action alternative. No mitigation measures would be necessary.

4.3.3.2 Air Emissions During Firing Activities

Air pollutant emissions during firing activities would occur from aircraft usage, SLAM flights, and test support activities.

4.3.3.2.1 Aircraft Usage

Full Requirements and Minimum Requirements Alternatives

A maximum of four SLAM firings a month may be conducted. Each firing would require the use of one launch and one chase aircraft (most likely an F/A-18 or comparable aircraft). The launch and chase aircraft would emit criteria air pollutants such as hydrocarbons, oxides of sulfur (SO$_x$), and oxides of nitrogen (NO$_x$); however, these emissions would be considered negligible given the infrequency of aircraft use and the limited number of aircraft that
would be used for the proposed action. The air emissions would not be expected to result in any exceedances of NAAQS or SAAQS. In addition, the use of the SLAM aircraft would be consistent with the current use of aircraft at NAWS China Lake, and would not require a change in the frequency of aircraft operations. The use of aircraft for firing missions such as SLAM has already been planned for at NAWS China Lake. The proposed action would not cause a significant adverse effect on air quality due to aircraft use.

No Action

There would be no air quality effects from implementation of the No Action alternative. No mitigation measures would be necessary.

4.3.3.2.2 Firing Support Activities

Full Requirements and Minimum Requirements Alternatives

Firing support activities would involve the use of vehicles to transport personnel to and from the target sites. Diesel generators would be used to power equipment at the target sites. All China Lake generators have been permitted and are approved for testing.

The primary concern for vehicle use would be emissions of PM$_{10}$ from travel on unpaved roads. Dust generation from vehicle use would not be considered significant due to the limited number of vehicles that would be in operation, and the infrequent nature of firing activities. Air quality effects from dust generation during firing activities would be localized and temporary. Any increases in particulate matter concentrations in the target site vicinity would be localized and short-term, and would not be expected to be significant or result in exceedances of the SAAQS or NAAQS. The proposed action would not generate significant amounts of other criteria air pollutants given the limited and infrequent amount of vehicle use that would occur during firings, and would not be expected to result in exceedances of any SAAQS or NAAQS for other pollutants.

Given the limited and infrequent use of generators that would be required during testing, it is not expected that significant amounts of criteria air pollutants would be generated, and SAAQS and NAAQS would not be exceeded. Each firing would take approximately 4 hours, and a maximum of 20 firings per year would occur. The primary pollutant of concern with diesel generators is NO$_X$. Based on the consumption rate of 2.0 gallons per hour of No. 2 diesel oil by the generators, each generator would be expected to produce about 0.70 pounds per hour (lb/hr) of NO$_X$ emissions. With all 20 generators operating simultaneously, NO$_X$ emissions would be about 13.9 lb/hr. This extremely low rate of hourly NO$_X$ emissions would not be expected to result in exceedances of the one-hour SAAQS for NO$_X$ (470 µg/m$^3$). On an annual basis, generator use by the proposed action could result in up to 1,112 pounds per year (lb/yr) of NO$_X$ emissions (if the maximum of 20 4-hour tests are conducted). As a comparison, 40 tons per year of NO$_X$ is considered a significant pollutant emission rate by the EPA. This extremely low rate of annual NO$_X$ emissions would not be expected to result in exceedances of the annual NAAQS for NO$_X$ (100 µg/m$^3$).

No Action

There would be no air quality effects from implementation of the No Action alternative. No mitigation measures would be necessary.

4.3.3.2.3 Summary

Full Requirements and Minimum Requirements Alternatives

Each firing (from aircraft take-off to departure of test personnel from the target site following SLAM impact) would take a few hours to complete. When combined, air pollutant emissions from aircraft usage, SLAM flights, and test support activities during firing activities would not be expected to be significant due to the low levels of air emissions, the short
timeframe of operation, and the limited amount of equipment and vehicles that would be in use. Firing activities would therefore not be expected to result in exceedances of SAAQS or NAAQS for any criteria air pollutants, and there would not be an adverse affect on air quality.

**No Action**

There would be no air quality effects from implementation of the No Action alternative. No mitigation measures would be necessary.

### 4.3.3.3 General Conformity Rule

The proposed action must comply with the EPA rule on “Determining Conformity of General Federal Actions to State or Federal Implementation Plans” (40 CFR 93, Subpart B), because this is a federal project with potential air quality effects and the China Lake area is considered non-attainment for PM$_{10}$. A detailed conformity analysis was previously performed for the Joint Standoff Weapon (JSOW) Baseline, BLU-108, and Unitary Test and Evaluation Program (see Appendix C.9). That program was virtually identical (in scope, nature, and location) to the program being evaluated in this document. The “worst year” emissions for the JSOW project were estimated to be 8.45 tons of PM$_{10}$, 0.08 tons of NO$_x$, and 0.03 tons of VOC. These amounts are well within the de minimis thresholds of 100, 50, and 50 tons, respectively. Since the emissions from the SLAM ER program would be very similar, this action qualifies for an exemption under 40 CFR 51.853(c)(1): “Actions where the total of all reasonably foreseeable direct and indirect emissions do not equal or exceed the de minimis levels.” Provided that the scope remains as proposed, no further analysis for conformity is required for this project.

### 4.3.4 Soils

**Evaluation Criteria**

The evaluation criteria are concerned with the effects on the physical and chemical properties of the soil. Changes to the soils should not have an adverse affect on their ability to support structures or plant growth.

**Full Requirements and Minimum Requirements Alternatives**

The only effect on the soil would be the movement of soil during blading, by target placement vehicles, creation of a hole by the missile, creation of potential small depressions by missile debris, and disturbance of soil by the recovery team in picking up the missile components. Since the target site has been disturbed before to build other targets, no adverse effects on soil quality or quantity from the proposed actions are predicted.

All of the proposed target sites are located in flat areas that do not include drainages. In addition, the proposed action would not alter the topography of the target sites. Implementation of the proposed action would therefore not be expected to increase the potential for erosion in the area.

The proposed action would not withdraw any groundwater, and would therefore not result in any subsidence in the area.

Any jet fuel that is spilled on the ground is expected to evaporate completely leaving no residue. The physical or chemical characteristics and the abilities of the current soils to support plant or wildlife would not be changed. No long term adverse effects are expected to result from the proposed activities.

**No Action**

There would be no differential effects on soils from implementation of the No Action alternative.
4.3.5 Noise

**Evaluation Criteria**

The criteria used to evaluate the environmental effects on the noise environment were that the proposed action would not cause an increase in existing ambient noise levels, and would not alter the character of the ambient noise.

4.3.5.1 Target Area Setup Noise

**Full Requirements and Minimum Requirements Alternatives**

Noise during target area setup would result primarily from the use of equipment to prepare the target areas for testing. The sites could require blading to provide a smooth surface for monitoring the results of testing. The blading equipment would operate in a relatively isolated area for a short period of time, and would not be expected to substantially increase ambient noise levels in the area or expose people to severe noise levels. Target area setup would therefore not result in adverse noise levels.

**No Action**

There would be no noise effects from implementation of the No Action alternative.

4.3.5.2 Noise During Testing Activities

**Full Requirements and Minimum Requirements Alternatives**

Noise occurring during firing activities would consist primarily of aircraft noise, impact noise, and noise from missile monitoring equipment at the target sites and on the ranges. Noise generated by SLAM-associated aircraft would occur throughout the China Lake vicinity during aircraft take-off and test operations. This noise would be consistent with noise levels generated by existing aircraft flights at China Lake, and would not represent a change from the existing environment of occasional increased noise levels in the area from aircraft flyovers.

Noise from missile impact and from missile monitoring equipment would occur at the target sites and on the ranges. Noise from test monitoring equipment would consist primarily from low-level noise generated by the diesel generators that would be at the target sites and on the ranges. The noise generated by SLAM impact would last for less than 10 seconds. This temporary noise pulse would not substantially increase ambient noise levels in the area. In addition, test personnel would be supplied with noise protection devices to protect against temporary increases in noise levels. The isolated locations of the test areas on NAWS China Lake would ensure that other people are not exposed to this noise.

Given that testing activities would occur for a short period of time in a relatively isolated location removed from populated areas, these activities would not be expected to substantially increase ambient noise levels in the area or expose people or wildlife to severe noise levels. Continuous ambient noise levels would not be changed. Firing activities would therefore not result in adverse noise effects.

**No Action**

There would be no noise effects from implementation of the No Action alternative.
4.3.5.3 Target Area Clean-Up Noise

Full Requirements and Minimum Requirements Alternatives

Noise during target area clean-up would be generated by the same equipment that would generate noise during target area setup and would also not result in adverse noise effects.

No Action

There would be no noise effects from implementation of the No Action alternative.

4.3.6 Plants

Evaluation Criteria

The criteria used to evaluate the environmental effects on plants were that the proposed action would not cause any appreciable decrease in the numbers of native plants, plant health, or plant community diversity nor an increase in exotic plants.

4.3.6.1 Airport Lake, HABR, HABR Gunbutts, and HABR Tunnel

Full Requirements and Minimum Requirements Alternatives

The Airport Lake target site is located entirely on a playa lake bed of dry alkaline soil. The target area is devoid of vegetation. Implementation of the proposed action at this target area would not adversely affect vegetation.

No Action

Should the Navy not conduct SLAM testing, the Airport Lake Range target sites would continue to be used for other military testing and training. Target site maintenance would be continued in support of other weapons testing programs within the ZODs.

4.3.6.2 Charlie SAM Site

Full Requirements and Minimum Requirements Alternatives

The entire SAM site target area exhibits some degree of disturbance; the soft, sandy soil is a highly disturbed, and the vegetative disposition is significantly altered. Sparse vegetation (mostly cheesebush, Indian riagrass, and burrobush) was removed from approximately 24 acres at the site to support JSOW tests. Activities associated with SLAM, such as installation of targets and instrumentation, and removal of equipment and debris after the test, would occur within areas previously disturbed by similar tests. Access to the site would be on existing roads. Implementation of the proposed action at this target site would not adversely affect vegetation.

No Action

Should the Navy not conduct SLAM testing, the Charlie SAM site would continue to be used for other military testing and training. Target site maintenance would be continued in support of other weapons testing programs within the ZOD.
4.3.6.3 Coles Flat

Full Requirements and Minimum Requirements Alternatives

The Coles Flat target area is centered on an existing target and is devoid of vegetation. Implementation of the proposed action at this target area would not adversely affect vegetation.

No Action

Should the Navy not conduct SLAM testing, the Coles Flat target site would continue to be used for other military testing and training. Target site maintenance would be continued in support of other weapons testing programs within the ZOD.

4.3.6.4 Coso Target Range

Full Requirements and Minimum Requirements Alternatives

The Coso targets are located on a broad mountainous plateau in the northwest portion of the North Range area. They area is characterized by rough mountainous terrain covered with pinyon pine, juniper trees, and brush. Activities associated with SLAM, such as installation of targets and instrumentation, and removal of equipment and debris after the test, would occur within areas previously disturbed by similar tests. Access to the site would be on existing roads. Implementation of the proposed action at this target site would not adversely affect vegetation.

No Action

Should the Navy not conduct SLAM testing, the Coso Target Range sites would continue to be used for other military testing and training. Target site maintenance would be continued in support of other weapons testing programs within the ZODs.

4.3.6.5 FAE Target Site

Full Requirements and Minimum Requirements Alternatives

There is minimal vegetation on the FAE target site. Over 80% of the proposed FAE target area exhibits evidence of previous disturbance due to debrushing, plowing, or furrowing. The sparse Creosote Bush Scrub vegetation on approximately 113 acres was removed to support JSOW tests. Implementation of the proposed action at this target site would not adversely affect vegetation.

No Action

Should the Navy not conduct SLAM testing, the FAE target site would continue to be used for other military testing and training. Target site maintenance would be continued in support of other weapons testing programs within the ZOD.

4.3.6.6 Surrounding Areas

Full Requirements and Minimum Requirements Alternatives

The vegetative communities surrounding the target areas consist of vegetation similar to the target areas, although with a higher degree of plant diversity and density than the target areas. It is expected that all SLAM testing would occur within the target areas, and would not affect vegetation in surrounding areas. In addition, test setup activities (i.e., placement of cameras and monitoring equipment) in areas surrounding the target sites would generally be contained to existing roads and disturbed areas, and would not adversely affect vegetation.
If an errant SLAM missile lands outside of a target area, some individual plant species may be affected by the impact of the SLAM. Effects might include crushing or uprooting. However, this would not represent a significant effect on or loss of vegetation. In addition, the proposed action would not be expected to affect the desert holly and Joshua tree (the only two special status species in the vicinity of the target areas) given the low density of these species. Test setup activities would avoid disturbing these species. The proposed action would not result in a significant loss of vegetation and would not be expected to significantly affect special status species in the surrounding areas.

**No Action**

Should the Navy not conduct SLAM testing, the areas surrounding the target sites might be used for other military testing and training instrumentation, but are anticipated to remain natural.

4.3.7 **Wildlife**

**Evaluation Criteria**

The criteria used to evaluate the environmental effects on wildlife was that the proposed action cause no appreciable decrease in the numbers of wildlife, wildlife health, or wildlife community diversity.

**Full Requirements and Minimum Requirements Alternatives**

The proposed target sites use areas that have been previously disturbed and avoid sensitive wildlife areas. The target sites are considered to be unsuitable habitat for most wildlife species. The Airport Lake target site does not support vegetation and does not sustain a food source for wildlife species; this site is therefore considered to have low habitat value for wildlife. The Coles Flat target area supports no vegetation and is of very low habitat value for wildlife. The Coso Targets supports little vegetation suitable for habitat. Both the FAE and SAM sites could provide marginal habitat for rodents and a few reptile species, but are not suitable for avian or larger mammals. Given the low habitat quality at the proposed target areas, no impacts to wildlife would be expected to result from implementation of the proposed action at the target areas.

No impacts to wildlife in areas surrounding the target sites are expected to result from the proposed action. It is expected that all SLAM testing would occur within the target areas, and would not affect wildlife species or habitat in surrounding areas. In addition, test setup activities in areas surrounding the target sites would generally be contained to existing roads and disturbed areas, and would not adversely affect wildlife habitat.

**No Action**

There would be no wildlife effects from implementation of the No Action alternative.

4.3.8 **Special Status Species**

This section discusses the potential effect that the proposed action may have on sensitive biological resources. Sensitive biological resources are resources that are currently or would be in the foreseeable future regulated by federal law, such as the ESA. The federal ESA provides the general framework for the protection of endangered and threatened species. An "endangered" species is defined as any species that is in danger of extinction through all or a significant portion of its range. A "threatened" species is defined as any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Protection under ESA also extends to those species proposed for listing as threatened or endangered, as well as those that are candidates for listing by the USFWS or NMFS.
Evaluation Criteria

The criteria used to evaluate the environmental effects on an endangered species were that the actions be in full compliance with the ESA. Implementing the proposed action would have a significant impact if it would:

- Substantially affect species (or their habitat) listed as threatened or endangered by state or federal resource agencies and other species specifically protected by applicable laws; or
- Substantially affect species and/or their habitats, including those that are restricted at a regional scale, habitats that serve as concentrated breeding or foraging areas and are limited in availability, or habitats that support substantial concentrations of one or more special status species.

Section 9 of the Endangered Species Act prohibits the “take” of listed species. If an incidental take would occur from a project (that is, if individuals of a listed species would be inadvertently harmed, harassed, or collected, or would suffer significant habitat modification), consultation with the USFWS or NMFS is required. Permission for the “take” of a listed species incidental to an otherwise lawful activity may be granted via procedures identified in Section 7 of the ESA. Although the ESA requires formal consultation only on those species currently listed as threatened or endangered, the USFWS and NMFS recommend that effects on proposed and candidate species also be considered because they may become listed during the design and construction phases of a project.

Full Requirements and Minimum Requirements Alternatives

No special status plant species have been identified or are known to occur at any of the proposed target areas. The proposed action would not affect the 10 special status plant species (including desert holly and Joshua tree) with the potential to occur in the project vicinity. Suitable habitat for these species does not exist at the target areas.

No special status wildlife species have been identified or are known to occur at any of the proposed target areas. The target sites were specifically chosen to be in areas not suitable for desert tortoise burrows. The proposed action would not affect the 18 special status wildlife species with the potential to occur in the project vicinity because suitable habitat for these species does not exist at the target areas. The proposed action would therefore not affect any special status wildlife species.

Under the proposed action, chase aircraft and missiles would overfly terrestrial habitats at China Lake. Sensitive habitats for the desert tortoise, the Mohave tui chub, the Inyo California towhee, and some sensitive vegetation would be flown over. Rare endemic plants, as well as small, less mobile animal populations, are potentially vulnerable to direct impacts in the unlikely event of an off-range impact. Adverse effects could be expected if a sensitive species were affected directly, either by loss of an individual, or by destruction of their habitat. These are considered to be extremely remote risks for individual organisms. None of these species are known to have been injured to date. In all cases, the probability of a direct impact by a missile is extremely low. These impacts would be considered insignificant due to the relatively low probability that a stray missile would actually affect a sensitive biological resource. This conclusion is based on the accuracy and reliability of the SLAM missile, on the infrequency of missile firing events, and on the relatively sparse distribution of special status species within the SLAM target areas at China Lake.

No Action

No taking of special status species would occur and there would be no loss of critical habitat as a result of the proposed action.
4.3.8.1 Desert Tortoise

**Full Requirements and Minimum Requirements Alternatives**

NAWS China Lake has an aggressive tortoise management/protection program to minimize human impact on the tortoise or their environment. The primary means is through the use of avoidance procedures including pre-construction site surveys, erection of fencing around projects in proximity of known tortoise activity, and briefings to personnel on provisions of the ESA as it applies to the desert tortoise at China Lake. In March 1995, NAWS China Lake requested an updated biological opinion from the USFWS on the effect of the Desert Tortoise Habitat Management Plan on the critical habitat designated for the tortoise. The USFWS prepared and published an opinion in June 1995 in which it determined that the proposed plan and its management actions are adequate to foster the continued existence of the desert tortoise within its critical habitat. In accordance with this biological opinion, any action that would disturb more than 2.5 acres inside or 50 acres outside the Desert Tortoise Habitat Management Area requires notification to the USFWS. The probability of SLAM striking a tortoise is extremely remote.

A more likely impact scenario is loss of habitat after a missile impact. Damage to the ground on which sensitive species and habitats exist could impact them for long periods. Slow-growing desert tortoise species are especially sensitive to compaction and are slow to recover. The possibility also exists for habitat destruction due to an impact-related fire or contamination of an area due to spilled fuel. In the event of any of the preceding conditions, individual animals would most likely be able to move away from the small portion of their affected habitat. The likelihood of a fire is considered to be low. The recovery teams would conduct missile cleanup according to standard operating procedures. No taking of special status species would occur and there would be no loss of critical habitat as a result of recovery operations. Therefore, less than significant direct or indirect impacts to habitats or biological resources would be expected from recovery site operations.

**Resource Protection Procedures**

The NAWS China Lake Desert Tortoise Habitat Management Plan defines methods to protect desert tortoises that could exist in the vicinity of the Airport Lake Range (including the HABR targets), Charlie SAM Site, Coso Target Range, and FAE Target Site areas. In order to minimize effects to desert tortoises, the target sites were specifically selected to be located in areas of sandy soils that would not support burrows. Reasonable and prudent measures to minimize the potential for desert tortoises, which are defined in the NAWS Desert Tortoise Habitat Management Plan (DON 1992), would be implemented for operations in the Airport Lake Range, Charlie SAM Site, Coso Target Range, and FAE Target Site target areas:

- Clear the area of tortoises prior to testing,
- All personnel who are granted access downrange would be briefed by the environmental office staff as to appropriate protocol for protecting tortoises and habitat,
- Ingress and egress to the target sites and off-road travel shall be via designated routes,
- Minimize off-road traffic in the test areas, and
- If tortoises are located within the test area, reasonable precautions would be taken, including the temporary removal and replacement of individuals to the exact location collected.

**No Action**

There would be no effects from implementation of the No Action alternative on the desert tortoise. No taking of the species would occur and there would be no loss of critical habitat as a result of the proposed action.
4.3.9 Military Activities

Evaluation Criteria

The criteria used to evaluate the effects on military activities were that there be no significant impairment or disruption of current or planned activities in the facilities that would be evacuated for a firing.

Full Requirements and Minimum Requirements Alternatives

SLAM firings which are initiated in the South Range, cross the Trona Gap, and impact in the North Range would require the evacuation of some facilities in the southeast corner of the North Range. Approximately 15 to 20 personnel would have to leave their spaces for approximately 3 hours for each firing. As many as 30 personnel might have to evacuate. The SLAM program would pay for the time that these personnel are away from their spaces. The SLAM testing program and training exercise missions would be a small portion of and compatible with NAWS China Lake missions; and mission schedules would be integrated into the Land Range Master Plan and other program schedules to minimize disruption to other programs. Impacts from the SLAM test and training exercises programs upon other military activities would be insignificant.

No Action

Under the No Action alternative the target sites would not be used for SLAM firings, but the target areas would continue to be used for other tests and training exercises which could make evacuations necessary.

4.3.10 Airspace

Evaluation Criteria

Effects of the proposed action would be significant if they would disrupt the current use of airspace or if they would result in conflicts with planned or adopted airspace use policies.

Full Requirements and Minimum Requirements Alternatives

The R-2508 Complex User's Handbook recommends that all aircraft, including SLAMs, avoid flying below 3,000 feet AGL over inhabited areas and communities, including Keeler, Olanche, Trona, Inyokern, Ridgecrest, Tehachapi, Randsburg, Johannesburg, and Red mountain. Ordnance testing areas and military facilities are designated as avoidance areas over which flights can be permitted when flying at a certain altitude or when people in the area have been evacuated. The R-2508 Complex User's Handbook also recommends that low-level flights be avoided over obviously inhabited areas, paved roads, a private ostrich farm near the intersection of highways 395 and 14, and Little Lake during duck hunting season from October to January.

Proposed target areas at NAWS China Lake are all active target facilities, and use by the SLAM program would be compatible with the current and planned uses of each.

All activities under the proposed action would be conducted in active military flight corridors and target areas and would be consistent with the prescribed land uses of these areas. All SLAM flight test plans would be developed and implemented in accordance with flight restrictions established for all routes or ranges proposed to be used in the firings. SLAM firing activities within the R-2508 Airspace Complex over NAWS China Lake would not measurably disrupt current land uses or be inconsistent with land use plans and policies for areas beneath the airspace. All SLAM flights are conducted in accordance with the R-2508 Complex User's Handbook, which designates restrictions for all flights within the R-2508. SLAM flights would be consistent with the current uses of the airspace within the R-2508 Complex. A
less than significant impact to airspace use within the R-2508 Airspace Complex would occur as a result of the proposed action, and no mitigation measures are required.

The Trona, California, Controlled Firing Area (CFA) would be used by SLAM missiles transiting from launch areas within R-2524 to target areas within R-2505 while using the R-2508 Restricted airspace. The CFA would also be used by High Speed Anti-Radiation Missiles, Advanced Medium Range Air-to-Air Missiles, Joint Standoff Weapons, and potentially other free flight weapon systems. The Letter of Authorization to operate the CFA requires the Navy to notify the local airports at Inyokern and Trona at least 24 hours in advance. The Trona CFA may be activated for no more than two hour time blocks and only between the hours of 7 am and 5 pm Monday through Friday. A maximum of two blocks may be used during any given day. The CFA is expected to be activated an average of 36 times per year. The maximum use of the CFA by SLAM is 20 times for 2 hours each or the equivalent of one work week per year. Provided that local pilots call ahead to Inyokern or Trona airports to determine whether or not the CFA would be activated during their proposed flight, there should be only a minimal amount of interference with their plans. The safety of these plots is ensured through standard range clearance procedures wherein launches are not permitted while nonparticipant aircraft are or may enter the hazard area. Visual spotters with direct radio contact are placed to watch for nonparticipant aircraft within the CFA and to call range control to destruct the missile if necessary to avoid the possibility of hitting an aircraft.

No Action

Should the Navy discontinue testing of the SLAM, there would be no changes in current airspace use. The NAWS China Lake facilities and the CFA would continue to be used for other military testing and training.

4.3.11 Cultural Resources

As a federal agency, the Navy is responsible for complying with the NHPA of 1966 (16 USC § 470), as amended (PL 89-515). Section 106 of NHPA and its implementing regulations (36 CFR 800) require federal agencies to consider the effects of their actions on properties listed or eligible for listing in the National Register of Historic Places (NRHP) and to provide the Advisory Council on Historic Preservation an opportunity to comment on actions that may affect those properties that qualify for inclusion on the NRHP. Criteria for inclusion in the NRHP can be found in 36 CFR 60.4.

Evaluation Criteria

An action is considered to have an adverse effect on a site listed or eligible for listing on the NRHP if it diminishes the integrity of the site’s location, design, setting, materials, workmanship, feeling, or association or if it has an impact on the setting or access to a traditional cultural property.

Traditional cultural properties, by definition, are eligible for listing on the NRHP and are subject to the provisions of the NHPA. In addition, the NAGPRA (25 USC §§ 3001-3013) requires federal agencies to inventory and identify human remains and funerary items in their collections that may be affiliated with contemporary federally recognized native peoples and to return them, upon request, to lineal descendants or to Indian tribes with the closest cultural affiliation. The American Indian Religious Freedom Act of 1978 (PL 95-341) established as policy the protection and preservation for Native Americans their inherent right of freedom to believe, express, and exercise traditional religious practices with access to sites, use, and possession of sacred objects and the freedom to worship through ceremonial and traditional rites.

Full Requirements and Minimum Requirements Alternatives

No significant impacts would occur to cultural resources located beneath the R-2508 Airspace Complex as a result of the proposed action. Because test flight activities in this
airspace include air operations only, and no construction or development is planned, there would be no ground-disturbing activities beneath the airspace. Therefore, there would be no adverse effects to cultural resources located beneath the R-2508 Airspace Complex from ground-disturbing activities. No mitigation measures would be required.

Adverse effects from noise disturbance could occur as a result of SLAM activities to the Coso Hot Springs traditional cultural property during ceremonial use of the property by Native American groups. These impacts would be avoided by coordinating SLAM flights with the Native American groups, as specified in the 1979 Memorandum of Agreement (US Navy 1979). If the Memorandum of Agreement is followed, no impacts would occur and no mitigation measures would be required.

No significant impacts would occur to NRHP-eligible cultural resources located within the NAWS China Lake test ranges as a result of the proposed action. Each of the proposed target areas at China Lake are within established ZODs. Due to the existing heavy disturbance of these areas, intact cultural deposits are unlikely to occur. Although several of the targets are located in areas with high or moderately high sensitivity for prehistoric or historic resources, any cultural resources that may exist within the ZODs would have sustained heavy disturbances from previous activities and would lack integrity necessary for eligibility to the NRHP. No impacts to NRHP-eligible cultural resources from activities associated with the use of these targets are expected and no mitigation measures are required.

**No Action**

Should the Navy not conduct SLAM firings at China Lake, there would be no impacts to cultural resources. NAWS China Lake would continue to be used for other military testing and training.

### 4.3.12 Public Health and Safety

**Evaluation Criteria**

The criteria was that the proposed action cause no significant increase in safety or environmental health risks.

#### 4.3.12.1 Overall Range Safety

**Full Requirements and Minimum Requirements Alternatives**

Proposed testing of weapons systems inherently poses a potential hazard to human health and safety. The SLAM program includes several measures to ensure that no adverse effects to human health and safety would occur during firing operations.

The SLAM Program includes measures to ensure removal of project materials immediately following each firing. Other military activities (undertaken by offices other than the SLAM office) may also take place at the target areas between firings. In order to avoid potential hazards during SLAM activities at the target sites and to ensure compliance with existing NAWS range safety regulations, qualified range safety officers would identify and ensure the removal of all potential hazards prior to initiation of the firings.

Specific test plans would be developed for each SLAM firing. The following describes the general safety protocol that would be followed.

Prior to initiation of each test, the Range Manager (RM) would clear the vicinity (surface and air) of non-essential personnel by utilizing existing two-way radio and surveillance radar networks headquartered at the NAWCWPNS China Lake Range Control Center (RCC). Additional ground personnel would man strategically located road blocks surrounding the target area and would be responsible for preventing vehicles or personnel from inadvertently entering the test area. The target area would also be monitored at RCC throughout the test by telemetrically linked remote and permanent camera/video stations. Discovery of any
The firing would be monitored and controlled from the RCC, and it would be manned by a SLAM Flight Test Engineer (FTE). The RM would be in charge of all SLAM range operations during the test. All range personnel would coordinate their activities and locations at the RM's direction. The FTE would continuously monitor all "go/no go" criteria (as identified in the test plan) throughout operations. Firing operations would be terminated if any "no go" actions are identified (e.g., mechanical breakdowns of aircraft, tracking facilities, or telemetry). The FTE and/or the Range Safety Officer (RSO) would also suspend operations if visual conditions such as fog, rain, or high winds could prevent safe range operations, or the ability to acquire high-quality test data.

Given the numerous measures that are included in the SLAM program and that would be enacted to avoid potential effects human health and safety, the proposed action would not be expected to adversely affect overall range safety.

No Action

There would be no increased risk to human health and safety from implementation of the No Action alternative.

4.3.12.2 Errant SLAM Vehicles

Full Requirements and Minimum Requirements Alternatives

There is the potential that the SLAM vehicle could deviate from its scheduled flight plan due to mechanical error or unforeseen weather conditions. However, the SLAM test engineers would be in constant electronic contact with the SLAM system during each flight. Should the system begin to deviate from the predetermined flight plan, the SLAM RM would have the ability to immediately initiate the FTS of the SLAM. The FTS contains redundant back-up capability. The FTS would cause the missile to crash within the safety of the cleared test range.

In the unlikely event that a SLAM crash occurs outside of a designated target area, the RM and EOD personnel would follow all standard measures and procedures to render the area safe. This would minimize the risk of adverse effects to human health and safety.

No Action

There would be no increased risk to human health and safety from implementation of the No Action alternative.

4.3.12.3 SLAM Impact

Full Requirements and Minimum Requirements Alternatives

Impact of the SLAM would be expected to occur entirely within the cleared target areas, and would therefore not pose a potential hazard to human health and safety. Observation points would be situated at a sufficient distance away from the target areas to ensure no threat to human health and safety.

No Action

There would be no increased risk to human health and safety from implementation of the No Action alternative.
4.3.12.4 Range Recovery

**Full Requirements and Minimum Requirements Alternatives**

The SLAM airframe would be collected and returned to the SLAM test engineers for laboratory analysis and disposal. Range recovery crews would also collect any additional debris resulting from the test for disposal. Disposal would be in compliance with all applicable rules and regulations. These measures would ensure that the proposed action would not adversely affect human health and safety during inert testing range recovery.

**No Action**

There would be no increased risk to human health and safety from implementation of the No Action alternative.

4.4 WHITE SANDS MISSILE RANGE

Seven live fire tests have been conducted between 1989 and 1994 at two sites at WSMR: TS-513 and J-140. These tests involved over land launches of SLAMs against temporary ground targets. This testing was covered by existing WSMR-wide programmatic environmental documentation. No adverse environmental effects were known to have resulted from this project development and testing phase. A new EA was written for SLAM testing to be conducted beginning in calendar year 1994 and extending through 2008 at a rate of no more than three per year for a total of 42 missions. The objective of these tests is to verify proper operation of the missiles. These tests also consist of firing flight test missiles at temporary ground targets (ASI 1994).

The existing environmental effects analysis contained in the “Environmental Assessment for the Standoff Land Attack Missile, White Sands Missile Range, New Mexico” (ASI 1994) (Attachment 1) are incorporated by reference. The results of these analyses are included in Table 4-2, Comparison Matrix of Environmental Effects. Appendix G contains a letter from WSMR Environmental Office concurring with the SLAM T&E Office that the WSMR EA covers the proposed firings under this EA’s proposed action.

4.5 COMPARISON OF THE ENVIRONMENTAL EFFECTS OF THE ALTERNATIVES

Table 4-2 summarizes the environmental effects of the full requirements (preferred) alternative, minimum requirements alternative, and the no action alternative by environmental component allowing the reader to compare the effects between alternatives.

4.6 RESOURCE PROTECTION PROCEDURES, MITIGATION MEASURES, AND MONITORING PLANS

Mitigation measures considered for impacts from the proposed action include avoiding the impact altogether by not conducting the action or parts of the action (potentially restricting the missile inbound route to avoid overflying a sensitive resource); minimizing impacts by limiting the degree or magnitude of the action and its implementation; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by recovering the resource before it is impacted.
<table>
<thead>
<tr>
<th>Alternative Component</th>
<th>Full Requirements Alternative (Preferred Alternative)</th>
<th>Minimum Requirements Alternative</th>
<th>No Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAND USE</td>
<td>All activities conducted in active military target areas consistent with prescribed land use.</td>
<td>All activities conducted in active military target areas consistent with prescribed land use.</td>
<td>Current uses would continue</td>
</tr>
<tr>
<td>WATER RESOURCES: Water Resources Depletion</td>
<td>Very small quantity of water may be used for dust suppression at NAWS China Lake. Not significant</td>
<td>Extremely small quantity of water may be used for dust suppression at NAWS China Lake. Not significant</td>
<td>No change</td>
</tr>
<tr>
<td>Ocean Water Quality</td>
<td>No discharges of wastewater into the SNI or SCI Area of Special Biological Significance (ASBS). An aborted missiles could release a very small quantity of JP-10. No detectable harm to marine life.</td>
<td>No discharges of wastewater into the SNI ASBS. Aborted missiles could release a very small quantity of JP-10. No detectable harm to marine life.</td>
<td>No change</td>
</tr>
<tr>
<td>Surface Water Quality</td>
<td>No change.</td>
<td>No change.</td>
<td>No change</td>
</tr>
<tr>
<td>Ground Water Quality</td>
<td>JP-10 spilled on impact might enter ground water at SNI. Ground water is not a source of potable water for wildlife or humans. No detectable effect. Any fuel spilled at NAWS China Lake would be collected in accordance with standard spill control and recovery procedures.</td>
<td>JP-10 spilled on impact might enter ground water at SNI. Ground water is not a source of potable water for wildlife or humans. Any fuel spilled at NAWS China Lake would be collected in accordance with standard spill control and recovery procedures.</td>
<td>No effects</td>
</tr>
<tr>
<td>AIR QUALITY</td>
<td>Small temporary increases in air emissions from vehicles, aircraft, and missiles are consistent with current uses and are not expected to be detectable after a very short distance. Generators operated under permit. Firing activities would not cause existing maximum levels to rise. General conformity determination not required at SNI or WSMR. SLAM emissions at NALF SCI would be well below de minimis thresholds. JSOW emissions at NAWS China Lake, which are virtually identical to SLAM emissions, were well below de minimis thresholds. SLAM program qualifies for an exemption under 40 CFR 51.853(c)(1) at NALF SCI and NAWS China Lake. RONA prepared for NALF SCI and NAWS China Lake. Fugitive dust stirred up by vehicles at NALF SCI, NAWS China Lake and WSMR. Not significant.</td>
<td>Small temporary increases in air emissions from vehicles, aircraft, and missiles are consistent with current uses and are not expected to be detectable after a very short distance. Generators operated under permit. Firing activities would not cause existing maximum levels to rise. General conformity determination not required at SNI. JSOW emissions at NAWS China Lake, which are virtually identical to SLAM emissions, were well below de minimis thresholds. SLAM program qualifies for an exemption under 40 CFR 51.853(c)(1). RONA prepared for NAWS China Lake. Fugitive dust stirred up by vehicles at NAWS China Lake. Not significant.</td>
<td>No effect on existing air quality</td>
</tr>
<tr>
<td>Component</td>
<td>Full Requirements Alternative (Preferred Alternative)</td>
<td>Minimum Requirements Alternative</td>
<td>No Action</td>
</tr>
<tr>
<td>-----------</td>
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<td>----------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td><strong>TOPOGRAPHY</strong></td>
<td>Local contours may be changed at SNI. No reduction in quality of visual resources. No changes to topography at any other sites.</td>
<td>Local contours may be changed at SNI. No reduction in quality of visual resources. No changes to NAWS China Lake sites.</td>
<td>Local wind will continue to shape dunes on SNI. No effects at other sites.</td>
</tr>
<tr>
<td><strong>SOILS</strong></td>
<td>At SNI missile impact craters would disappear as a result of natural slumping and wind blown sand. Potential for induced wind erosion around target buildings. Erosion not expected at NAWS China Lake because sites are flat. Possible erosional loss of soil at WSMR. Soil erosion control techniques would be used at any site where it is necessary.</td>
<td>At SNI missile impact craters would disappear as a result of natural slumping and wind blown sand. Potential for induced wind erosion around target buildings. Erosion not expected at NAWS China Lake because sites are flat. Soil erosion control techniques would be used at any site where it is necessary. No change to soil physical or chemical characteristics.</td>
<td>Current erosive forces continue at all sites. No change to soil physical or chemical characteristics. Most will continue to experience weapon impacts.</td>
</tr>
<tr>
<td><strong>NOISE</strong></td>
<td>Very short term increases in noise during aircraft flyovers at all sites. Flyover noise can be expected by natural environmental noise at SNI and SCI. Aircraft altitude maintained to avoid impacts to wildlife at SNI. No receptors of concern located in vicinity of targets at SCI, NAWS China Lake, or WSMR. Would not change ambient noise levels at any target site.</td>
<td>Very short term increases in noise during aircraft flyovers at SNI and NAWS China Lake. Flyover noise can be exceeded by natural environmental noise at SNI. Aircraft altitude maintained to avoid impacts to wildlife at SNI. No receptors of concern located in vicinity of target sites at NAWS China Lake. Would not change ambient noise levels.</td>
<td>No change.</td>
</tr>
<tr>
<td><strong>PLANTS</strong></td>
<td>SLAM target site at SNI is sparsely covered with plants. Potential for some common dune plants to be destroyed and for very small loss of Lupinus plant community during access road and target building pad expansion. There is little to no vegetation at SCI or NAWS China Lake target sites. SCI, NAWS China Lake, and WSMR sites have been previously disturbed by other programs. Proposed action would have no significant impact on plants present at any target site.</td>
<td>SLAM target site at SNI is sparsely covered with plants. Potential for some common dune plants to be destroyed and for very small loss of Lupinus plant community during access road and target building pad expansion. NAWS China Lake target sites have been previously disturbed by other programs. This alternative would have no significant impact on plants present at any target site.</td>
<td>No adverse change. Sites would be allowed to go fallow or would continue to be used by other weapon development and training programs.</td>
</tr>
<tr>
<td><strong>BIRDS</strong></td>
<td>Some startles of birds in the area of the SLAM target site on SNI are possible due to target acquisition aircraft flyovers during breeding season but would be avoided by maintaining minimum altitudes. Visual monitoring of the birds will be conducted until flight protocols can be established which protect them. No effects during non-breeding season due to flyovers. Missile noise is expected to be insignificant. Human presence could produce temporary disturbances to the few birds that might be present at all sites. Human disturbance</td>
<td>Some startles of birds in the area of the SLAM target site on SNI are possible due to target acquisition aircraft flyovers during breeding season but would be avoided by maintaining minimum altitudes. Visual monitoring of the birds will be conducted until flight protocols can be established which protect them. No effects during non-breeding season due to flyovers. Missile noise is expected to be insignificant. Human presence could produce temporary disturbances to the few birds that might be present at all sites. Human disturbance</td>
<td>No change.</td>
</tr>
</tbody>
</table>
### TABLE 4-2. COMPARISON MATRIX OF ENVIRONMENTAL EFFECTS (Continued).

<table>
<thead>
<tr>
<th>Alternative Component</th>
<th>Full Requirements Alternative (Preferred Alternative)</th>
<th>Minimum Requirements Alternative</th>
<th>No Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Network</strong></td>
<td>avoided through established resource protection procedures. No suitable bird habitat at SCI or NAWS China Lake sites. Effects not significant.</td>
<td>noise is expected to be insignificant. Human presence would produce temporary disturbances to the few birds that might be present at all sites. Human disturbance avoided through established resource protection procedures. No suitable bird habitat at NAWS China Lake sites. Effects not significant.</td>
<td>No change. Continued growth of pinniped populations at SNI and SCI.</td>
</tr>
<tr>
<td><strong>MARINE MAMMALS</strong></td>
<td>Potential alert reactions from some pinnipeds at SNI as acquisition and chase aircraft fly over during the breeding season but minimized by maintaining minimum aircraft altitudes. Visual monitoring of the pinnipeds will be conducted until flight protocols can be established which protect them. No effects during non-breeding season due to flyovers. Alert reactions are less than typical natural startles and do not meet minimum disturbance levels to qualify as Level B harassment. Few marine mammals present on the beach below the missile flight path at SCI. Due to altitudes flown when crossing shore at SCI, the marine mammals would not be expected to notice the aircraft or missile flyovers. No effects on marine mammals.</td>
<td>Potential alert reactions from some pinnipeds at SNI as acquisition and chase aircraft fly over during the breeding season but minimized by maintaining minimum aircraft altitudes. Visual monitoring of the pinnipeds will be conducted until flight protocols can be established which protect them. Alert reactions are less than typical natural startles and do not meet minimum disturbance levels to qualify as Level B harassment. No effects on marine mammals.</td>
<td>Cessation of continued growth of pinniped populations at SNI and SCI.</td>
</tr>
<tr>
<td><strong>TERRESTRIAL MAMMALS</strong></td>
<td>Minimal suitable mammal habitat at NAWS China Lake target sites. Missile and launch aircraft noise and human presence could produce temporary disturbances to mammals at WSMR. Effects at all sites not significant.</td>
<td>Minimal suitable mammal habitat at NAWS China Lake target sites. Effects at all sites not significant.</td>
<td>No effects.</td>
</tr>
<tr>
<td><strong>ENDANGERED AND THREATENED SPECIES</strong></td>
<td>Effects on pelicans and Western snowy plovers would be avoided by maintaining minimum aircraft altitudes. Visual monitoring of the pinnipeds will be conducted until flight protocols can be established which protect them at SNI. No effects during non-breeding season due to flyovers. Proposed action would not affect any Peregrine falcon habitat. Potential alert reaction by sea otters but no impact. State threatened Island fox visits the target site. Mitigation measures would physically exclude Island foxes from target buildings. No endangered or threatened species observed or expected at the MIR. At NAWS China Lake no species are known to be present at any of the target sites. Procedures would be implemented to protect Desert tortoise. No endangered or threatened plants are known to be present at the WSMR target sites. Environmental Services Division would survey to identify plants before they can be harvested.</td>
<td>Effects on pelicans and Western snowy plovers would be avoided by maintaining minimum aircraft altitudes. Visual monitoring of the pinnipeds will be conducted until flight protocols can be established which protect them at SNI. No effects during non-breeding season due to flyovers. Proposed action would not affect any Peregrine falcon habitat. Potential alert reaction by sea otters but no impact. State threatened Island fox visits the target site. Mitigation measures would physically exclude Island foxes from target buildings. At NAWS China Lake no species are known to be present at any of the target sites. Procedures would be implemented to protect Desert tortoise. No taking of any Federal or state plants.</td>
<td>No change to existing conditions.</td>
</tr>
<tr>
<td>Alternative Component</td>
<td>Full Requirements Alternative (Preferred Alternative)</td>
<td>Minimum Requirements Alternative</td>
<td>No Action</td>
</tr>
<tr>
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<tr>
<td></td>
<td>Target sites would be surveyed two weeks before each firing for Northern aplomado falcons, the only wildlife species of concern. Firings would be on hold until falcons leave the area. No taking of any Federal or state endangered or threatened species by injury or death.</td>
<td>Target site use is a usual and customary activity. Existing target sites would be used. Closure of west end of SNI may prevent personnel from occasionally reaching their buildings. Closure of SCI’s Ridge Road requires workers south of the target site to stay on-site. Firings could be conducted on weekends. Evacuation of facilities (15-30 personnel) would be required during missile fly over from South to North Range at NAWS China Lake. Ranches at WSMR may have to be evacuated. SLAM schedules are integrated with other program schedules to minimize disruptions.</td>
<td>Land allowed to go fallow at SNI. Target sites at SCI, NAWS China Lake and WSMR would be used by other programs. Closures of Ridge Road, evacuations of some facilities at NAWS China Lake and evacuation of ranches at WSMR would continue to be required by other activities.</td>
</tr>
<tr>
<td>MILITARY ACTIVITIES</td>
<td>Target site use is a usual and customary activity. Existing target sites would be used. Closure of west end of SNI may prevent personnel from occasionally reaching their buildings. Closure of SCI’s Ridge Road requires workers south of the target site to stay on-site. Firings could be conducted on weekends. Evacuation of facilities (15-30 personnel) would be required during missile fly over from South to North Range at NAWS China Lake. Ranches at WSMR may have to be evacuated. SLAM schedules are integrated with other program schedules to minimize disruptions.</td>
<td>Target site use is a usual and customary activity. Existing target sites would be used. Closure of west end of SNI may prevent personnel from occasionally reaching their buildings. Evacuation of facilities (15-30 personnel) would be required during missile fly over from South to North Range at NAWS China Lake. SLAM schedules are integrated with other program schedules to minimize disruptions.</td>
<td>Land allowed to go fallow at SNI. Target sites at SCI, NAWS China Lake and WSMR would be used by other programs. Closures of Ridge Road, evacuations of some facilities at NAWS China Lake and evacuation of ranches at WSMR would continue to be required by other activities.</td>
</tr>
<tr>
<td>FIRE MANAGEMENT</td>
<td>Sparse vegetation at target site at SCI would not support a wild fire. Firebreaks maintained as part of range operations. US Forest Service fire fighting helicopter would be on standby during fire season as a precaution. A fire at WSMR’s J-140 could spread some distance. No spread expected at TS-513. Mitigate by mowing target sites to reduce chance of starting and spreading fire. No fires expected.</td>
<td>Risk of wildfires caused by other weapon programs would continue.</td>
<td>Risk of wildfires caused by other weapon programs would continue.</td>
</tr>
<tr>
<td>INFRASTRUCTURE</td>
<td>Minimal risk that power and telephone lines running along SCI’s Ridge Road could be damaged by missile debris.</td>
<td>No effects.</td>
<td>No effects.</td>
</tr>
<tr>
<td>AIRSPACE</td>
<td>No change to airspace restrictions at any range. Minimal decrease in days available to civilian pilots to fly through southern California Sea Range airspace. Activation of Trona Controlled Firing Area at NAWS China Lake may inconvenience a few flyers, but CFA is used for other programs also.</td>
<td>No change to airspace restrictions. Minimal decrease in days available to civilian pilots to fly through NAWCPNS Sea Range airspace. Activation of Trona Controlled Firing Area may inconvenience a few flyers, but CFA is used for other programs also.</td>
<td>No change in airspace restrictions.</td>
</tr>
</tbody>
</table>
TABLE 4-2. COMPARISON MATRIX OF ENVIRONMENTAL EFFECTS (Continued).

<table>
<thead>
<tr>
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<th>Minimum Requirements Alternative</th>
<th>No Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCHAEOLOGICAL RESOURCES</td>
<td>Immediate loss of integrity, and physical alteration, damage, or destruction to part of site where impacted by missile and missile debris or potential access road and target building pad expansion. Scientific value of CA-SNI-168 has been substantially preserved. Scientific value of CA-SNI-169 will be substantially preserved before any missiles are permitted to impact it. No adverse effects to CA-SNI-168 or -169. Procedures implemented to protect any newly discovered resources. No archaeological or historic sites are located within the MIR. Missile accuracy would ensure that any resources overflown are not disturbed. Previous heavy disturbance of target sites at NAWS China Lake makes it highly unlikely that any resources eligible for listing in the National Register still exist. No archaeological or historical sites are located within the WSMR target sites. Close coordination with Environmental Services Division to preclude impacts to unknown cultural sites.</td>
<td>Immediate loss of integrity, and physical alteration, damage, or destruction to part of site where impacted by missile and missile debris or potential access road and target building pad expansion. Scientific value of CA-SNI-168 has been substantially preserved. Scientific value of CA-SNI-169 will be substantially preserved before any missiles are permitted to impact it. No adverse effects to CA-SNI-168 or -169. Procedures implemented to protect any newly discovered resources. Previous heavy disturbance of target sites at NAWS China Lake makes it highly unlikely that any resources eligible for listing in the National Register still exist. Known sites would be marked that are outside target areas at SNI so that they are not disturbed. Access restrictions to prevent damage to undiscovered sites.</td>
<td>Natural wind erosion of SNI dunes can cause loss of integrity, loss of fine materials, and natural deterioration of organic materials through exposure. No remaining resources at other target sites that might be affected.</td>
</tr>
<tr>
<td>CULTURAL RESOURCES</td>
<td>SLAM firings would be conducted in accordance with MOA so that there would be no noise disturbance to Coso Hot Springs ceremonial use by Native American groups.</td>
<td>SLAM firings would be conducted in accordance with MOA so that there would be no noise disturbance to Coso Hot Springs ceremonial use by Native American groups.</td>
<td>No effects</td>
</tr>
<tr>
<td>PUBLIC SAFETY</td>
<td>Range control and target site procedures are designed to make testing safe.</td>
<td>Range control and target site procedures are designed to make testing safe.</td>
<td>No generation of actions which could create a risk.</td>
</tr>
</tbody>
</table>
4.6.1 OLF San Nicolas Island

In order to comply with range safety restrictions, and in order to minimize the effects of the SLAM program on environmental resources, several constraints have been placed on mission plans. There are safety constraints on the direction from which the target can be attacked, and how long the missile can be allowed to fly in the event of system problems or operator error. Other constraints are given in the following paragraphs.

4.6.1.1 Flight Procedures

The on-site IR camera would be used before the aircraft take off to check the target's signature. The signature may be modified so that the missile's seeker can track the target better. The proposed test flights would be rehearsed by captive carrying a SLAM. A captive carry seeker lock-on test would be performed before and within 3 hours of any test to ensure that a satisfactory IR lock-on can be obtained.

SLAM participant aircraft would be assigned ground tracks and flight altitudes within NAWCWPNS Sea Range's restricted airspace which would be designed to avoid impacts on noise sensitive resources. Mitigation measures include restricting aircrews to only one flyover below 2000 feet MSL.

If the missile appears to be off target when it reaches the target site, the missile would be allowed to fly over the island past the far shoreline so that it can be terminated over open waters where the chance of affecting a sensitive resource would be extremely small.

As an environmental safety measure, any missile impact outside of the Area of Potential Effects (APE) would result in an immediate cessation of further firings until the environmental effects and firing procedures can be evaluated to prevent a similar target miss.

4.6.1.2 Biological Resources Protection Procedures

At the onset of testing and training activities and as an on-going practice before each operational day, SLAM program personnel would be briefed as to their responsibilities under appropriate statutes and regulations in regards to sensitive environmental concerns such as protected plant and animal species. The briefing includes the following:

- Applicable natural resource laws and regulations.
- General locations of sensitive plant and wildlife resources and areas to be avoided. (The location of sensitive plants and wildlife can change from season to season and year to year.) Designated and cleared routes for all vehicular traffic.
- Disturbing, harassing, injuring, capturing, or feeding wildlife, or injuring plants is prohibited.

The following physical measures would be being taken to avoid impacts to biological resources:

- To avoid target site preparation and post-impact clean-up activities inadvertently straying outside the defined APE, the SLAM program shall clearly mark the APE boundary along the west, north, and east sides.
- During test and training activities, all SLAM personnel, equipment (except visual equipment), and vehicles would be restricted to designated access routes. Vehicular traffic outside designated access roads is prohibited, unless specified or approved by the Point Mugu Environmental Division. Cameras placed outside the APE (Figure 2-6) would be carried by personnel on foot, or existing roads would be used.
- SLAM staff and contractor personnel would be prohibited from disturbing, harassing, injuring or capturing any wildlife or collecting or injuring any plants. All personnel...
would be prohibited from feeding any wildlife including Island foxes. Foxes lured to an artificial food source would establish territories in the area, thereby increasing the likelihood of negative impact.

- Any equipment which must be moved to the island for use in the SLAM testing and training program must be carefully cleaned to avoid introducing exotic plants and animals.

Specific mitigation measures have been developed for the California State threatened Island fox which could use open target containers or holes under the containers for dens. Potential impacts to Island foxes would be mitigated to an insignificant level by adhering to the following procedures:

- The bottom tier of container boxes used in building the target, and all other associated "buildings", would not have any openings or holes into which foxes can enter. Openings, including doors left ajar, encourage foxes to investigate and even set up den sites.

- Exclude foxes from beneath buildings. Foxes will den beneath buildings if "spaces" are allowed to form. This would be prevented by frequent rotation of boxes/buildings, by piling sand along the base of each box/building, or by attaching an exclusion device along the foundation of each box/building.

4.6.1.3 **Archaeological Resources Protection Procedures**

Archaeological resources protection procedures include very close coordination between the SLAM test and training management team and the NAWS Point Mugu archaeologist. The following procedures would be implemented to avoid potential impacts to archaeological resources. These procedures would be covered in the briefings.

- Compliance with the Archaeological Resources Protection Act, National Historic Preservation Act, and Native American Graves Protection and Repatriation Act.

- Archaeological site and the APE boundaries would be marked by the Point Mugu archaeologist or his designated representative using red pin flags. Necessary precautions for avoiding disturbance to these sites would be presented. Travel would be restricted to stay on designated access roads (unless specified or approved by the Environmental Division) and to areas outside the designated middens within archaeological sites CA-SNI-168 and -169 and outside other nearby middens. SLAM personnel placing visual equipment on foot would be allowed travel off the access roads. Any disturbance to marked archaeological sites shall result in the suspension of testing activities until measures can be taken to prevent further disturbance. Remote placement of tracking cameras and other equipment outside the APE would be done without grading and away from archaeological sites.

- Require a report on all incidents involving contact with or discovery of archaeological resources to the Point Mugu archaeologist.

- Prohibit the collection of artifacts.

- There shall be no new grading or clearing outside the previously sanctioned area (as delineated by the APE, Figure 2-6). Archaeological resource impacts would be minimized during access road and target building pad expansion by the presence of an archaeological representative to over-see construction activities.

4.6.1.4 **Archaeological Site Mitigation**

Because collocated archaeological site CA-SNI-168 is located within the target area, a sampling program was undertaken in December 1994 to determine whether or not a mitigation program would be required. Sampling studies determined that the site is eligible for listing on the National Register of Historic Places based on its value to contribute to archaeological research. The California SHPO and the national ACHP have been given an
opportunity to comment on the effects of this undertaking and the proposed mitigation measures in accordance with Section 106 of the NHPA. Additional letters detailing the identified effects of the proposed undertaking and the proposed mitigation measures were sent to the SHPO and the ACHP on 11 September 1996. The letters requested concurrence with a finding of no adverse effect based upon the proposed data recovery efforts. According to 36 CFR 800, a federal agency may assume concurrence after receiving no response after 30 days from notification. To date, no response has been received. Accordingly, the SHPO and ACHP concur with the findings of no adverse effect.

Mitigation consisting of substantially preserving the scientific value through a data recovery program, consistent with the Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (48 FR 44734-44737), was conducted in 1996. A data recovery report following the Department of the Interior's Format Standards for Final Reports of Data Recovery Program (42 FR 5377-5379) has been produced. All recovered ecofacts and artifacts have been retained and are being stored at NAWS PM's environmental facility on SNI in accordance with 36 CFR 79, Curation of Federally Owned and Administered Archeological Collections. The Point Mugu archaeologist has determined that the mitigation program would result in no adverse effects to the archaeological site (see the Appendix F for more details). All excavative research was conducted in full compliance with the requirements of 32 CFR 229, the ARPA, NHPA, and NAGPRA.

Archaeological site CA-SNI-169 is located just north of the target area. A sampling program at site CA-SNI-169 was carried out November and December 1997 which determined that the site is eligible for listing on the National Register. The scientific value of this site will be substantially preserved as at site -168 through a data recovery program in the summer of 1998. No missile impacts would be permitted at this site until the data and its scientific value have been substantially recovered and there would be no adverse effects within the APE.

4.6.1.5 Monitoring Plan

The monitoring plan has four parts: 1) periodic reviews of the missile success rate; and monitoring for 2) wind erosion of soil around the target buildings, 3) biological effects, and 4) archaeological effects. The proposed action is based on the achievement of a very high degree of accuracy in hitting the SLAM target site once the missile is within 10 miles of SNI (see Section 4.0.1 and Figure 4-1). Periodic reviews of the missile APE impact success rate would be held after one, five, ten, and fifteen years. If a missile were to impact SNI outside the defined APE, all further action would cease and the need for further environmental impact analysis would be reviewed.

Wind erosion has been sufficient in the past to cause target buildings to fall over. Missile impacts and recovery effort scars could require some correction. Preventative measures consist of an Environmental Division representative monitoring soil disturbance and evaluating whether or not any actions are needed. The representative may prescribe surface restoration and revegetation efforts.

The SLAM program office would keep the Environmental Division informed of every upcoming operational day to permit them to spot check the condition of any sensitive biological resources before and after SLAM operations, and record the absence or presence of any impacts to biological resources. The Environmental Division would be notified immediately if any animal is found which is injured or mortally wounded.

Video monitoring would be conducted during critical nesting and breeding seasons until resource protection protocols can be established so that pilots could be told to modify their overflights to avoid impacts on the snowy plover. Once the protocols have been established, additional monitoring requirements would be at the discretion of the Environmental Division.

A special breeding season monitoring study has been planned and would be conducted during the next normal breeding season to assess the effects of aircraft overflights on migratory birds and marine mammals. (El Niño conditions of 1998 do not provide normal breeding season conditions.) This study would complement the one done in November 1997. It
would use a series of altitudes and aircraft power settings while field personnel check for the kind and strength of any reactions among the wildlife that are present. Western snowy plover reactions and marine mammals would be observed.

The Environmental Division would advise the SLAM T&E Program Manager if any sensitive species moved into an area where it might be affected by the proposed action. New mitigation measures might have to be developed and/or new environmental effects analyses conducted.

Periodic (potentially annual) site checks would be made to ascertain whether or not wind or water erosion or other activities have exposed new archaeological resources within the target area.

Contingency plans exist to cover the unlikely events of a fire or spill (Appendix B.5).

4.6.2 NALF San Clemente Island

Approval in writing of the NAS NI NRO will be received prior to the placement of any equipment or instruments outside the boundaries of the MIR on SCI. This approval will protect sensitive species and archaeological resources. Mitigation measures for endangered and threatened species on SCI have been established.

4.6.2.1 Soils

In the event that vehicles are required to travel over the grassland to recover missile debris, and they leave ruts, the ruts would be filled in and the area returned to its former contours to minimize the inducement of erosion channels in accordance with instructions from the Natural Resources Office.

4.6.2.2 Plants

The worst case scenario involves the ignition of a wildfire by the missile's jet fuel on impact with the possible loss of sensitive habitat for plants and wildlife. Plant location maps would be used to refine the estimate of potential effects on endangered and threatened plant species.

4.6.2.3 Exclusion of Exotic Species

A major threat to the continued existence of endangered and threatened species at SCI is the presence of exotic plants and animals. Exclusion of these species is one means to protect the endangered and threatened species. These exotic and non-native species would be excluded from the island by cleaning any equipment and vans before they are moved to the island.

4.6.2.4 Mitigation of Effects on the Sage Sparrow

An errant missile could, through an initiated wildfire, cause the loss of some Sage sparrow habitat. Mitigation would involve reseeding the area and installing a drip irrigation system.

The worst case scenario for SCI is for an errant missile to impact in preferred habitat of the SCI sage sparrow and cause a wildfire with the resultant loss of habitat. Mitigation would consist of habitat restoration after-the-fact. Control aircraft aircrews would be briefed on the sensitive nature of these resources so that they can avoid impacting these areas either by steering the missile away from the sensitive areas or terminating the flight over open ocean.

4.6.2.5 Wildfire Protection Procedures

Resource protection procedures consist of maintaining fire breaks around the target site as indicated in Figures 3-7 through 3-10 and being prepared to fight a wildfire. The
grassland in the vicinity, within the firebreaks, may be pre-burned both to aid in the location of archaeological sites and to reduce fire fuel. Measures to protect the mesa grassland from wildfire consist of stationing EOD personnel and fire equipment near the test site to prevent fire damage to surrounding vegetation. During fire season, a USFS fire fighting helicopter would also be present, as stipulated in the biological opinion.

4.6.2.6 Archaeological Protection Procedures

Archaeological sites surrounding the MIR have been marked. SLAM project personnel would avoid them.

4.6.2.7 Archaeological Resource Mitigation Measures

In the unexpected event of a missile impact on an archaeological site, the scientific data from that site would be recovered. The site would be resurfaced to prevent soil erosion which could cause further site deterioration.

4.6.3 NAWS CHINA LAKE

4.6.3.1 Ground Water Resources Quality

A fuel release might occur during diesel or gas generator refueling or from rupture of a SLAM’s fuel tank on impact. If a release occurs, standard spill control and recovery measures would be implemented.

4.6.3.2 Air Quality

In order to minimize dust generation during setup and clean-up of the proposed target areas, water would be sprinkled on the target areas and access roads in the immediate vicinity as necessary. Although the proposed action would not be expected to result in significant dust generation or exceedances of NAAQS or SAAQS for PM$_{10}$, watering would minimize localized increases in particulate matter concentrations.

4.6.3.3 Plants

Desert holly and Joshua tree plants are found in the vicinity of some of the target areas. These special status species would be avoided by ground personnel during the setup and take down of equipment at the target sites.

4.6.3.4 Endangered and Threatened Species

The NAWS China Lake Desert Tortoise Habitat Management Plan defines methods to protect desert tortoises that could exist in the vicinity of the Airport Lake Range, Charlie SAM Site, Coso Target Range, and FAE Target Site areas. In order to minimize effects to desert tortoises, the target sites were specifically selected to be located in areas of sandy soils that would not support burrows. Reasonable and prudent measures to minimize the potential for desert tortoises, which are defined in the NAWS Desert Tortoise Habitat Management Plan (DON 1992), would be implemented for operations in the Airport Lake Range, Charlie SAM Site, Coso Target Range, and FAE Target Site areas:

- Clear the area of tortoises prior to testing,
- All personnel who are granted access downrange would be briefed by the environmental office staff as to appropriate protocol for protecting tortoises and habitat,
- Ingress and egress to the target sites and off-road travel shall be via designated routes,
- Minimize off-road traffic in the test areas, and
• If tortoises are located within the test area, reasonable precautions would be taken, including the temporary removal and replacement of individuals to the exact location collected.

4.6.3.5 Traditional Cultural Property

Adverse effects to the ceremonial use of the Coso Hot Springs traditional cultural property by Native American groups would be avoided by coordinating SLAM firings with the Native American groups. Details of the coordination procedures are specified in the 1979 Memorandum of Agreement (US Navy 1979).
CHAPTER 5

OTHER CONSIDERATIONS REQUIRED BY NEPA

This chapter addresses topics required by NEPA in an EA. These include identifying and analyzing cumulative effects; indirect effects and their significance; the relationship between the proposed action and the objectives of federal policies and controls; irreversible and irretrievable commitments of resources; the relationship between local short term use of man’s environment and maintenance and enhancement of long term productivity; and probable unavoidable adverse environmental effects. Issues related to Environmental Justice, in accordance with Executive Order 12898, and Protection of Children from Environmental Health Risks and Safety Risks, in accordance with Executive Order 13045, are also presented.

5.1 CUMULATIVE EFFECTS

The CEQ regulations, 40 CFR 1500-1508, implementing the procedural provisions of the NEPA of 1969, as amended, 42 USC §§ 4321 et seq., define cumulative effects as:

The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7).

This analysis considers additional effects arising from the currently proposed SLAM firings, together with effects of other known current and future actions in the region. These other actions could include existing, proposed, or reasonably foreseeable Department of Defense or other federal or nonfederal major actions.

In order to analyze cumulative effects, a cumulative effects region must be identified. This area would be one in which effects of the proposed action and other past, proposed, and reasonably foreseeable actions would be cumulatively recorded or experienced. The region where cumulative effects may occur must include all military testing areas that are considered in this EA (NAWCWPNS Sea Range, including SNI; the FACSFAC San Diego Operating Area (W-291), including SCI; NAWCWPNS China Lake; and WSMR). Since this area is so extensive and the nature of the SLAM action is so limited in terms of numbers of firings and degree of impact, a more limited cumulative effects area is defined that focuses principally on the airspace and target areas that would be used under the proposed action. These areas are limited but would be the focus of the most intense aspects of SLAM firing and, therefore, most potential cumulative effects. Land ranges where these activities occur also have heavily used airspace that may be affected by SLAM tests and other identified cumulative actions.

Baseline conditions for the cumulative effects region is considered to be the conditions as described in the affected environment chapter of this EA and includes land use, water resources, air quality, soils, noise, biological resources, airspace, fire management, archaeological resources, and public safety. Past, present, and reasonably foreseeable actions in the cumulative effects region are identified and briefly described below. Changes to the baseline conditions for each environmental component are then characterized based on the combined effects of the proposed action and all other identified actions. Chapter 4 included paragraphs describing the cumulative effects at the SNI, SCI, and NAWCS China Lake target sites from the accumulation of SLAM impacts. The cumulative effects section below addresses the potentially synergistic effects of SLAM firings combined with the other military activities described below that are foreseen to occur at the four ranges.

5.1.1 Actions in the Cumulative Effects Region

The following paragraphs describe other activities which have, are, or are foreseeable to occur in the vicinity of resources affected by the SLAM firings.
5.1.1.1 OLF San Nicolas Island

Environmental Impact Statement (EIS) and Overseas EIS for Proposed Future Operations on the Point Mugu Sea Range, NAWCWPNS Point Mugu, California

This document's scope is to assess the potential impacts of future operations within the 36,000 square miles (93,200 square km) of NAWCWPNS Sea Range, which extends from San Luis Obispo to Santa Catalina Island, and seaward for more than 180 miles (290 km). This proposed action includes three main elements: increased testing, increased training, and facility modernization. Examples include new types of testing at SNI, including multiple alternative air-launched presentations, airborne laser testing, and cruise missile defense with near shore intercepts at SNI. More Fleet training exercises are proposed as well as an increase in small-scale amphibious landings at SNI. A third element of the proposed action includes modernization of SNI facilities, such as a construction of a pier or other landing area and a new missile launcher.

The EIS will provide an evaluation of potential environmental impacts on a range-wide basis. The Navy currently studies potential environmental impacts of each new activity in the Sea Range on a case-by-case basis; however, this hampers efforts to examine the cumulative effects of operations. The EIS is to better understand potential environmental impacts in a range-wide context, and will therefore better examine potential cumulative effects in the region. The Draft EIS is scheduled to be available in Summer 1998.

Tomahawk Land Attack Missile (TLAM) Testing at SNI

This proposed action would entail launching of inert-warhead TLAMs from a ground launch site on SNI to fly to and terminate at other military test ranges such as the MIR on SCI, and target sites at NAWS China Lake, Tonopah Test Range, Utah Test and Training Range, and the B-17 Range at NAS Fallon. The TLAM is a self-guided, terrain-following, subsonic cruise missile that is used as a low-altitude land-attack weapon. The missile is designed to be launched from Navy ships and submarines against land targets. At this time, the Navy proposes to conduct between six and twelve TLAM flight tests per year until 2017. Very few of these would be launched from SNI.

The launch site on SNI is located on the west end of the island in an area heavily disturbed by previous activities. The Building 807 complex (Figure 2-6) consists of a blockhouse (Building 807) and three launch pads, one of which would be used for all missile launches. The missile launches would be oriented to the west, out over the ocean and away from SNI.

5.1.1.2 NALF San Clemente Island

SPECWAR Small Arms, Demolition Ranges, and Training Areas

The scope of this proposed action includes the installation and upgrading of special warfare training areas and ranges at various locations on SCI, including small firing ranges, explosion containment areas, personnel protection bunkers and berms, a street scene training area, and a close-quarter battle area. One of the areas (training area and range 16) represents a specialized use of the MIR.

Island-wide Operations Management Plan (OMP)

The Operations Management Plan is a compatibility study that analyzes current and proposed air, land, and sea, operations and their activities within operational zones. The operations described in the OMP are required to meet Fleet Operational training requirements and test objects. The goals of the OMP are to:

- Verify current military operations, activities, and conditions;
- Identify reasonably foreseeable future activities that are planned or proposed;
• Develop compatibility criteria with respect to character, intensity, timing, and location;
• Develop a zoning concept for operations based on the compatibility of current and future operations and activities that may occur concurrently;
• Evaluate the compatibility of current and future operations with operational zones; and
• Present a strategic vision for SCI.

Subsequent to the OMP will be the development of a comprehensive EIS for SCI Operations. The island-wide EIS will incorporate information from the OMP and will analyze potential environmental impacts as a result of implementation of the OMP. This EIS will analyze the potential cumulative effects of the OMP and, therefore, all operations and activities on SCI.

Tomahawk Land Attack Missile (TLAM) Testing at the SCI MIR

This proposed action would entail testing of both live-warhead and inert-warhead TLAMs at the MIR on SCI. Live-warhead TLAM flight tests would be restricted within the land and airspace of established test facilities or in areas where nonmilitary land with an extremely low population density is overflown infrequently. The TLAM either impacts a target or deploys a parachute following overflight of a target. At this time, the Navy proposes to conduct between six and twelve TLAM flight tests per year until 2017. Flight tests will consist of missile launches from surface ships, submarines, and land sites, missile flight over water and land, and missile termination at the MIR.

Joint Standoff Weapon (JSOW) Baseline, BLU-108, and Unitary Test and Evaluation Program at SCI

This action involves design compliance and live-fire testing for the JSOW program at the SCI MIR. The JSOW program is a US Navy-lead, joint program with the U.S. Air Force. The JSOW weapons system provides a common airframe capable of carrying three different weapon payload variants [a single 500-pound (227 kg) bomb and two submunition variants]. The missile is launched from aircraft to the SCI MIR. This program began in March 1996 and will continue through 2007. The scope of this action included expanding the boundaries of the MIR as well as data collection of JSOW testing and site cleanup activities.

Land Attack Standard Missile (LASM)

This proposed action involves the inert testing of the LASM launched from ships positioned 75 NM (86 km) west of SCI with missile termination at the SCI MIR. The LASM Program does not propose any live-fire testing and would involve four ship-launched tests through fiscal year 2000, with the first test proposed for June 1, 1998.

Tri-Service Standoff Attack Missile (TSSAM) Program Over Water Launch at SCI

This action involved a series a tests designed to evaluate the capabilities of the TSSAM weapon system to attack targets under a variety of scenarios when launched over the open ocean. These tests involved inert warhead missiles only. Two TSSAMs were launched from aircraft and impacted at the MIR in late 1994 and early 1995.

5.1.1.3 NAWS China Lake

China Lake Comprehensive Land Use Management Plan

The purpose of the China Lake Comprehensive Land Use Management Plan (CLUMP) is to implement a comprehensive land use management plan which includes ongoing and future military training, public health and safety practices, and ongoing and future
environmental resource management and conservation at NAWS China Lake. The CLUMP analyzes alternatives based on the degree of use intensity.

An EIS will be prepared subsequent to the CLUMP. The EIS will incorporate information from the CLUMP and will analyze potential environmental impacts as a result of implementation of the CLUMP.

**West Mojave Coordinated Management Plan**

The West Mojave Coordinated Management Plan is a comprehensive, interagency planning effort for the conservation of biological resources in the West Mojave region. In 1992, agencies within the West Mojave planning area established a multi-agency partnership to prepare this plan. Agencies involved in this partnership include:

- Five military installations (NAWS China Lake, Edwards Air Force Base, Fort Irwin National Training Center, Marine Corps Logistics Base in Yermo, and Marine Corps Air Ground Combat Center at Twentynine Palms);
- Four federal land managers (BLM, NASA at Goldstone, National Biological Service, and Boron Prison);
- Five state of California agencies (the Department of Transportation [Caltrans], the Department of Parks and Recreation, the State Lands Commission, the California Energy Commission, and the University of California Reserve System);
- One special district (Indian Wells Valley Water District);
- Five counties (Inyo, Kern, Los Angeles, Riverside, and San Bernardino); and
- Eleven incorporated towns and cities (Adelanto, Apple Valley, Barstow, California City, Hesperia, Lancaster, Palmdale, Ridgecrest, Twentynine Palms, Victorville, and Yucca Valley).

The goal of the West Mojave planning process is to develop a cost-effective and efficient conservation strategy for the planning area that will lead to the recovery of listed species within the planning area and minimize the need to list species in the future in a manner that provides for community growth and resource utilization. Adoption of the plan will benefit land users, land management agencies, and regulatory agencies by providing a streamlined permit process, defining consistent mitigation and compensation obligations, reducing the need for biological surveys in certain areas, reducing the need for project-specific incidental take permits, and reducing the uncertainty related to requirements for long-term species and habitat conservation. Management alternatives are being developed and a draft EIS is scheduled for public distribution in the spring of 1998 (Bureau of Land Management 1997).

**Northern and Eastern Mojave Planning Effort.** The Northern and Eastern Mojave interagency planning team consists of representatives from the National Park Service, the BLM, and the USFWS. Cooperating agencies include the Bureau of Indian Affairs; Fort Irwin National Training Center; NAWS China Lake; United States Army Corps of Engineers; US EPA; California Department of Fish and Game; California State Parks; Caltrans; State Lands Commission; California SHPO; Nevada SHPO; San Bernardino, Inyo, and Mono counties in California; Clark, Nye, and Esmeralda counties in Nevada; and the Timbisha/Shosone, Mojave, and Chemehuevi Native American tribal councils. The management plan goals are to provide management direction for the CDPA additions to Death Valley National Park and the Mojave National Preserve, amend the California Desert Conservation Area Plan to reflect the CDPA, and to recover the threatened desert tortoise and prevent further listings of sensitive species throughout the planning area. Scoping meetings for this effort were held in May 1997 and the final EIS is scheduled for distribution in September 1998 (Bureau of Land Management 1997).
Tomahawk Land Attack Missile (TLAM) Testing at NAWS China Lake

This proposed action would entail testing of both live-warhead and inert-warhead TLAMs at target sites on the North or South Range. Live-warhead TLAM flight tests would be restricted within the land and airspace of established test facilities or in areas where nonmilitary land with an extremely low population density is overflown infrequently. The TLAM either impacts a target or deploys a parachute following overflight of a target. At this time, the Navy proposes to conduct between six and twelve TLAM flight tests per year until 2017. Flight tests will consist of missile launches from surface ships, submarines, and land sites at SNI and at NAWS China Lake, missile flight over water and land, and missile termination. The following termination areas could be used for Tomahawk termination:

- Airport Lake
- FAE Target Area
- G-ZAP-O
- Sam's Town
- Igloo
- Parachute Drop Zone
- George Range Aircraft Revetment
- Wingate Airfield
- PMT Site
- JSOW Target Site

The Airport Lake, FAE Target Area, and Sam's Town would also be used by SLAM.

NAWCWPNS China Lake Ground Launch Facility

The proposed site for development of a ground launch facility at NAWCWPNS China Lake is Randsburg Wash (ID #6026) on the Gun Range within the South Range Complex. This is the site of a previously installed naval gun system and an accompanying control center. This launch facility is expected to be used an average of once every three to five years. The actual missile launch would be followed by a post-launch cleanup of any debris and other activities to return the facility, as much as possible, to its pre-launch condition. Chase and support aircraft would take off from NAWCWPNS China Lake under this scenario.

Fort Irwin Expansion

The Fort Irwin expansion calls for the withdrawal of 310,296 acres of public lands from entry under public land laws to support the training mission of the US Army National Training Center at Fort Irwin, California. The public lands are currently managed by BLM. Withdrawn lands would be used to support military training.

Western Mojave Land Tenure Adjustment Project

This project is a partnership among the BLM, Air Force, and local governments to implement a voluntary land exchange program to create more logical ownership patterns, protect important resources, ensure protection of critical DOD airspace assets in the region, and promote the disposal of isolated public lands in developed and developing areas. The project contains 2.8 million acres (1,133,160 ha) and abuts the western edge of the existing National Training Center south of Goldstone and west of Fort Irwin Road.

Four-lane Highway Project

Caltrans is in the early planning stage of two four-lane expansion projects for Highway 395. One project is in Inyo County through Olancha. The second project is in Kern County from Johanessburg to the Highway 14 interchange.

5.1.1.4 White Sands Missile Range

The focus for analyzing the accumulation of effects must be derived from a comprehensive baseline composed of historic and current data. This baseline which compiles in one place all of the data does not presently exist in a final form which can be used in this EA. The following paragraphs describe the typical types of activity occurring at WSMR which might affect the environment in cumulative ways when combined with the SLAM activities.
Training activities in the WSMR airspace include bomb delivery, Air Combat Command and Air National Guard air-to-air combat and supersonic flight tactics, and other military exercises. In addition, drone flights and tests of missiles, rockets, and space vehicles occur in WSMR airspace. Large areas of the airspace are used as safety buffer zones for missile and rocket firings. The Air Force uses the airspace over the range areas of WSMR for approach and departure routing to Holloman AFB, for flights transiting the area enroute to western and northern tactical training areas, for gunnery pattern routes using the Red Rio and Oscura Gunnery ranges, and for supersonic air combat training. The Army in its support role primarily uses the airspace over WSMR for helicopter flight operations, search and rescue, drone recovery, test debris recovery, range evacuation missions, and general helicopter flights transiting all areas. Other significant activities in the operational testing areas of WSMR include missile launches, ordnance explosions, aircraft drone overflights, gun firing, general vehicle traffic, and low altitude military jet traffic.

The primary weapon systems under development at WSMR are air-to-air, air-to-ground, ground-to-ground, and ground-to-air missiles and rockets. Each system produces a noise source that may affect humans, domestic animals, and wildlife. A representative air-to-air missile under testing at WSMR is the Air Force Advanced Medium Range Air-to-Air Missile (AMRAAM). The supersonic AMRAAM is aircraft launched at 5000 feet (1524 m) AGL or above, and follows a downward trajectory to target drone impact at approximately 500 feet (152 m) AGL. Representative surface-to-air missiles are the Army HAWK missile and the Navy Rolling Airframe Missile (RAM). The HAWK and RAM are ground launched and follow an upward trajectory to target drone impact at or above 1000 feet (305 m) AGL. A representative surface-to-surface weapons system being tested is the Army Multiple Launcher Rocket System (MLRS). The MLRS is a free-flight rocket system that comprises a tracked armored vehicle equipped with a protected cab for three crew members. The system is capable of firing 12 rockets. The Defense Nuclear Agency conducts high explosive tests in an area west of the Oscura Mountains at the Permanent High Explosive Test Site.

5.1.2 Effects of the SLAM Project in Combination with Actions Identified

The effect of SLAM firings were analyzed for cumulative effects. Due to the nature of the SLAM firing, which is characterized by a single event as opposed to a continuous activity, impacts are typically not cumulative or continuous, nor do they cause or induce any off-site impacts.

The potential for cumulative effects to occur as a result of implementing SLAM firings in concert with the other actions was evaluated. SLAM firings are not likely to contribute measurably to cumulative conditions due to the nature of the action. SLAM flight tests would be conducted infrequently at each range and the effects of these tests would be distributed over the extensive areas of the testing facilities. As a result, it was determined that the proposed action would not incrementally increase the degree of collective impact to a level of significance at any of the testing facilities.

5.1.3 Cumulative Effects on Resources

In the following sections, the degree to which SLAM flight tests contribute to the collective impact of all actions being analyzed is discussed for each relevant environmental issue. The analysis considered the effects of all planned SLAM activities conducted during the captive carry phase, the missile flight phase, the missile impact, and the missile recovery phase.

5.1.3.1 Land Use

Cumulative effects at the target sites would consist of the gradual accumulation of missile debris.

Areas where missile failure is most likely to occur are conducted exclusively above restricted military test ranges. All testing facilities under the proposed action are existing, active
military target range facilities. Actions that would have a high degree of overlap with SLAM flight testing, such as the TLAM, JSOW, and LASM at the MIR and NAWS China Lake target sites, would contribute to cumulative effects. While each of these actions would contribute some degree of impact to the target sites, all of these actions combined would still represent only a minimal effect since each action proposes only a few tests and many of these would be inert missiles.

Other actions such as infrastructure development near NAWCWPNS China Lake that would bring increased numbers of people into SLAM testing areas would have the potential for creating greater land use conflicts in the SLAM test areas. The SLAM would not fly over populated areas.

5.1.3.2 Water Resources

A majority of the area within the cumulative effects region is either open ocean or arid lands. While cumulative effects to water resources would be expected in both areas as military and non-military actions contribute to water quality degradation and compete for scarce water resources, no significant cumulative effects to water resources would result from SLAM testing.

In the event that a missile flight would terminate in ocean waters, or in the case of an impact at the target site, the fuel tank could rupture, and the fuel released could result in localized contamination. The amount of fuel released would be small (less than 17 gallons (64 L)] and would be expected to quickly disperse due to currents, wave action, the volume of water relative to the small amount of fuel, and the volatility of the fuel. Fuel release in most inland target areas would not be likely to result in contamination of ground or surface waters due to the scarcity of both resources in the region.

Site preparation activities (grading) at the target would expose bare soil to erosion thereby increasing the potential for water quality degradation due to sedimentation. Erosion control devices such as waterbars and cut-off collars would reduce erosion potential to the point where no adverse water quality effects would be expected. This may be most significant on SCI where there are a number of on-going and proposed actions in a limited area.

5.1.3.3 Air Quality

Both military and nonmilitary actions in and around the SLAM test facilities would contribute to cumulative air quality effects. Several counties that encompass SLAM testing areas are classified as non-attainment areas for criteria pollutants, in particular ozone and PM$_{10}$.

SLAM testing would generate dust and PM$_{10}$ emissions during target site setup (grading), clean-up, and testing (refer to Appendix C for air quality data); however, as described in Sections 4.1.2, 4.2.1 and 4.3.3, Air Quality, total project emissions would be less than the de minimis thresholds for all potentially affected areas. The proposed action would result in a very small, temporary contribution to PM$_{10}$ concentration, when considered together with other sources in the region. The proposed action would not result in cumulatively significant air quality effects.

5.1.3.4 Soils

Cumulative effects at the MIR would consist of the continued disturbance of the soil surface as a part of target setup, missile debris clean-up, and fire prevention and containment measures. SLAM activities would result in a less than significant increase in these effects.

5.1.3.5 Noise

Noise in the cumulative effects region may be from a countless number of sources; however, in the test ranges that would be used by the SLAM, noise is most likely to be the result of military activity from aircraft overflights, helicopter operations, ground-based training, including vehicle operations, and live ordnance explosions. Military testing activities at each of
the test ranges considered in this EA could contribute to cumulative noise conditions. In addition, actions such as the explosives testing programs being considered at SCI, would contribute to the noise environment.

The principal source of noise during SLAM testing would emanate from the engines of the SLAM and supporting aircraft. Launch and overflight of chase planes could approach 108 dB at ground or surface level, lasting up to several seconds at any given point along the flight path. Secondary sources of noise would occur as a result of missile impact at a target site.

Much of the SLAM flight test and all secondary noises would occur within restricted areas where no sensitive human receptors are present. Due to the infrequency of tests and the brief residence time of the SLAM during overflight of any sensitive resources, the added noise effects on such areas would be minimal. Continued SLAM testing would not result in a cumulatively significant noise impact.

In addition, because all other activities within the testing area terminate for the duration of the test, no cumulative noise impacts would occur. Consequently, no significant noise impacts would be experienced by noise-sensitive wildlife species, including marine mammals (e.g., the California sea lion), terrestrial mammals (e.g., the SNI fox), and avifauna (e.g., the Western snowy plover). Impacts to wildlife receptors would be infrequent, of short duration, and would not represent a significant cumulative impact.

5.1.3.6 Biological Resources

Cumulative effects on biological resources would be expected from military and non-military actions in the cumulative effects region from individual or group fatalities and habitat loss or degradation. In some cases, management plans such as the West Mojave Coordinated Management Plan, the Northern and Eastern Mojave Planning Effort, and Channel Islands Recovery Plan would improve conditions for biological resources and may offset some specific negative effects.

The proposed action would not be expected to result in a significant loss of flora or fauna at any of the project locations. No new development would be required. The SLAM target site may be expanded within the APE on SNI. None of the proposed target sites that would be used by the SLAM or any other program provides habitat necessary to support any endangered, threatened, or sensitive species. Thus, significant cumulative effects to biological resources would not be expected.

Since the Tomahawk launch site on SNI is so close to the SLAM target site, only one activity will occur on any given operational day. Very few TLAM launches are expected to occur in any given year. Range scheduling, coordination via the Point Mugu Environmental Division, and sufficient wildlife monitoring will prevent a synergistic combination of overflights which might startle the birds or mammals located on the beaches south and west of these sites. This would be less than a significant effect which is minimized by scheduling, coordination, and wildlife monitoring.

5.1.3.7 Airspace

The SLAM project would not measurably affect the use of any affected airspace area and would not result in a cumulatively significant impact.

5.1.3.8 Fire Management

Since SLAM firings would use only inert warheads and only one missile has burned, the increased risk of a wildfire caused by adding SLAM activities to the other activities at the SCI MIR is less than significant.
5.1.3.9 Archaeological Resources

Archaeological resources within the cumulative effects area could be impacted; however, current practices in place to identify and protect these resources, combined with comprehensive planning actions being undertaken at several locations, including China Lake, SNI, and SCI would lessen the cumulative effect on archaeological resources.

As more and more missiles impact the target site the footprint of damaged archaeological resources within the APE would slowly expand but at less than a one for one rate. The mitigation measures carried out would prevent there being any adverse effects. Footprint expansion would cease when the firing program is completed.

Past and future SLAM testing has had, and would continue to have, no effect on archaeological resources at the other three ranges. The proposed action would require avoidance of all known archaeological resource sites during grading and for all test setup and clean-up activities in all test areas. A cumulatively significant impact would not be expected to occur.

5.1.3.10 Public Safety

Although military activities have introduced an element of risk to the public in the ocean areas and Trona Gap, most testing, and the most dangerous parts of firings, would be conducted in restricted military areas where public access is severely limited. In addition, existing and proposed safety procedures, buffers, and training restrictions at the facilities and the ranges have reduced or would reduce the potential magnitude of risk to an acceptable level at these military facilities and ranges. Although weapons testing actions may introduce incremental increases in risk, other actions such as the SCI OMP and China Lake CLUMP, would minimize risk to the public by improving management of these operations. The addition of the proposed action would not measurably increase the risk to human health and safety over current conditions and would not result in a cumulatively significant impact.

Since the missile pieces contain only minimal amounts of hazardous materials, the accumulation of missile debris should not pose an environmental health risk.

5.2 INDIRECT EFFECTS AND THEIR SIGNIFICANCE

Indirect effects such as erosion induced damage to archaeological sites will be minimized by frequent monitoring of the target sites for the occurrence of erosion. Should erosion be occurring which might impact a sensitive resource, measures will be taken to control the erosion in coordination with the local range's environmental office staff.

Successful development of SLAM ER, and/or other SLAM models could lead to future developmental and operational test and evaluation efforts. Upon introduction to the Fleet, follow-on training exercises would be continued, potentially leading to more shots at the target sites. Otherwise, the short time periods involved in these tests and the small scale of operations are insufficient to generate any significant indirect effects such as new off-site construction, continuous increase in traffic or a change in air or water quality.

5.3 RELATIONSHIP BETWEEN THE PROPOSED ACTION AND THE OBJECTIVES OF FEDERAL POLICIES AND CONTROLS

This section describes the compliance efforts with national environmental and natural resource laws, State of California laws, and local Navy base programs and plans.

5.3.1 National Environmental Policy Act

The National Environmental Policy Act of 1969, as amended, contains policy and guidance to ensure that potential impacts from proposed federal actions are assessed using a systematic and interdisciplinary approach. This EA has been prepared in accordance with
Section 102(2)(c) of NEPA, the Council on Environmental Quality regulations on implementing NEPA procedures (40 CFR 1500-1508), and Department of the Navy regulations on implementing NEPA procedures (32 CFR 775), found in OPNAVINST 5090.1B (OPNAV 198).

5.3.2 Environmental Effects Abroad of Major Federal Actions

Executive Order 12114, Environmental Effects Abroad of Major Federal Actions, requires responsible federal officials to inform themselves of the potential environmental effects of their actions on the environment outside the United States, its territories, and possessions. This is done through documenting the potential environmental effects. In this way the executive order furthers the purpose of NEPA. OPNAVINST 5090.1B, Appendix E, provides specific procedures for Navy officials to comply with the executive order. Since significant effects on the global commons were not expected an EA rather than an EIS was prepared. This EA serves the purposes and includes the content required for an Overseas EA spelled out in the instruction. An Overseas EA is to include:

- A brief description of the proposed action,
- The need for the action,
- Concise discussion of the environmental effects of the proposed action, and
- Any modifications to the proposed action to minimize any environmental impacts.

This EA discussed the potential for effects on offshore marine mammals, offshore air quality, and ocean water quality.

5.3.3 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations [59 Federal Register 7629 (Section 1-101)], requires that the relative impacts of federal actions on minority and low-income populations be addressed to avoid placing a disproportionate share of adverse impacts of these actions on these groups. The Full Requirements and No Action alternatives have been evaluated with regard to the criteria contained in Executive Order 12898, Environmental Justice. The preferred alternative's actions would be essentially confined to military airspaces and test ranges and would not disproportionately affect minority or low income populations.

5.3.4 Protection of Children from Environmental Health Risks

Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks (62 FR 19885), states that each federal agency shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children and ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. Environmental health risks and safety risks mean risks to health or to safety that are attributable to products or substances that the child is likely to come into contact with or to ingest.

SLAM testing is conducted on military ranges where children are not present.

5.3.5 Compliance with Other Environmental and Natural Resources Laws

Compliance with environmental and natural resource laws was described above under the applicable natural or archaeological resource (see Table 5-1). Recovery plans for endangered and threatened species were developed under the Endangered Species Act and were discussed in the applicable sections.
### TABLE 5-1. NATURAL RESOURCES AND ENVIRONMENTAL LAWS DISCUSSED IN THE EA.

<table>
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<tr>
<th>ACT</th>
<th>TEXT SECTION</th>
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<tbody>
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<td>California Brown Pelican Recovery Plan</td>
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<td>Peregrine Falcon Recovery Plan</td>
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<tr>
<td>American Indian Religious Freedom Act</td>
<td>4.3.11</td>
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#### 5.4 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The irreversible and irretrievable commitments of natural and manmade resources would consist of the materials used to build the SLAMs and cargo vans; energy consumed to conduct the tests and training exercises; and the impact to the archaeological sites. Proportional amounts of fuels and supplies used for range maintenance and operation would be irretrievable. The human resources that have been invested in the past are also irretrievable. Once an archaeological site is impacted, its integrity is at least partially lost which would cause the loss of some of the data it contained. Field testing and training exercise requirements have been minimized for cost reasons. The project would not require the use of nonrenewable resources in excessive or disproportionate amounts. Mitigation efforts and sparseness of terrestrial resources would minimize the effects of the proposed action on the terrestrial environment and no irreversible or irretrievable commitment of terrestrial resources is expected.

#### 5.5 RELATIONSHIP BETWEEN LOCAL SHORT TERM USE OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG TERM PRODUCTIVITY

The SLAM weapon system is being developed and fielded to defend the United States against all enemies; and to ensure the security of the United States, its possessions, and areas vital to its interests; and to safeguard the internal security of the United States into the next century.

Local short term use of these sites would enhance national security and inhibit actions of enemies who might cause severe damage to natural and manmade resources of the United States and be in accordance with the existing planned use. Mitigation measures
minimize any potential accidental impact. The pre-test archaeological studies indicated that the
SLAM target area on SNI is collocated with archaeological sites CA-SNI-168, -169, and -170.
Mitigation measures have been implemented to recover the data from sites -168 and -169 so
that there would be no adverse effects. The use of the target sites on SNI and SCI, and on the
ranges of NAWS China Lake and WSMR would be a continuation of the long-term uses of
these ranges for weapon system tests and training.

5.6 PROBABLE UNAVOIDABLE ADVERSE ENVIRONMENTAL
EFFECTS

Small quantities of air pollutants would be emitted and noise generated. A small
number of individual plants may be destroyed, and the ground surface would be disturbed by
missile recovery and target site clean-up activities. There is a chance that some fuel left in the
missile at impact might reach ground water below the target site. Disturbance of the ground
surface could impact archaeological resources but this effect has been mitigated so that there
would be no adverse effects.

5.6.1 Land Use

Use of the site as a missile impact area would preclude the use of the site for any
other purposes other than open space and natural habitat. However, because the targets can
be readily removed, the site's use can be reverted to open space upon completion of the test
activities. Continuing the use of the target site would prevent natural revegetation of the impact
areas. Also implied would be a gradual accumulation of miscellaneous debris, including missile
parts which are not found or get buried in the sand before recovery crews can collect them.

5.6.2 Impacts of Normal Operation

The most serious impact on the island's environment aside from the land use itself is
the potential change in the local topography. Aircraft and missile noise and exhaust emissions
would be infrequent, intermittent, and leave the area after their occurrence. The cumulative
effects consist of potential changes to local topography, the accumulation of missile debris and
the expansion of the footprint of missile impact craters. Potential impacts to wildlife populations
consist of random and infrequent alert and startle responses. The impacts from the proposed
action would be contained within the island and more specifically under the missile flight path
and within the APE.

5.6.3 Exposure to the Risk of Accidents

A range fire is unlikely to result from a missile impact because of the sparseness of
the vegetation. Generators and instrumentation would be at risk of loss in the target area.

Missile impacts outside the APE are not expected. There would be a very minimal
risk that a missile would impact on the beach into an active marine mammal colony. A missile
that reaches the near shore environment would be flying on course (it would have aborted or
been terminated before this otherwise) and would be functioning properly. Thus once it is
within a few miles of shore, it would reach the APE. No problems are expected to occur with
SLAM ER or future model missiles.

Mitigation measures have been designed to minimize any potential accidental
effects to the not significant level.

Any missile that fails to reach the island after being launched is expected to fall into
deep ocean waters. Such missiles would probably be abandoned in place. Any spilled JP-10
would quickly disperse and be diluted to undetectable levels in a short period of time. Given
that there would be very minimal amounts of hazardous materials in the missile no significant
adverse environmental impacts are expected. There would be no adverse impacts on ocean
water quality or ocean wildlife.
CHAPTER 6

CONSULTATION AND COORDINATION

The following agencies and individuals will be provided with a notice of the availability of this EA. Copies of correspondence requesting comments on archaeological resources and on wildlife effects are included in Appendix E.

Name, title, agency, location

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CHAPTER 7
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GLOSSARY

Basin. The bottom of the SCB contains areas which are depressed below the surrounding area. Water in these areas is trapped because it cannot flow downhill by gravity. The basins are like natural lake areas which are covered by water instead of air. The highest elevation of the basin is taken to be the lowest elevation of the bottom or rim which surrounds the depression.

Controlled Firing Area. CFAs contain activities which, if not conducted in a controlled environment, could be hazardous to nonparticipating aircraft. The distinguishing feature of the CFA, as compared to other special use airspace, is that its activities are suspended immediately when spotter aircraft, radar, or ground lookout positions indicate an aircraft might be approaching the area. There is no need to chart CFAs since they do not cause a nonparticipating aircraft to change its flight path. (Aeronautical Information Manual 1/6/94)

Global Positioning System. The GPS is a space-based radio positioning, navigation, and time-transfer system developed by the Department of Defense. When fully deployed, the system is intended to provide highly accurate position and velocity information, and precise time, on a continuous global basis, to an unlimited number of properly equipped users. The system will be unaffected by weather, and will provide a world wide common grid reference system. The GPS concept is predicated upon accurate and continuous knowledge of the spatial position of each satellite in the system with respect to time and distance from a transmitting satellite to the user. The GPS receiver automatically selects appropriate signals from the satellites in view and translates these into a three dimensional position, velocity, and time. Predictable system accuracy for civilian users is projected to be 100 meters horizontally. (Aeronautical Information Manual 1/6/94)

Military Operations Area. MOAs consist of airspace of defined vertical and lateral limits established for the purpose of separating certain military training activities from Instrument Flight Rules (IFR) traffic. Whenever a MOA is being used, nonparticipating IFR traffic may be cleared through a MOA if IFR separation can be provided by air traffic control. Otherwise, air traffic control will reroute or restrict nonparticipating IFR traffic. Military pilots conducting flight within Department of Defense aircraft within a designated and active MOA are permitted to perform acrobatic and abrupt flight maneuvers. (Aeronautical Information Manual 1/6/94)

Military Training Routes. National security depends largely on the deterrent effect of our airborne military forces. To be proficient, the military services must train in a wide range of airborne tactics. One phase of this training involves “low level” combat tactics. The required maneuvers and high speeds are such that they may occasionally make the see-and-avoid aspect of VFR flight more difficult without increased vigilance in areas containing such operations. MTR routes are mutually developed between the Department of Defense and the Federal Aviation Administration (FAA) for the purpose of conducting low-altitude, high-speed training. There are IFR and VFR Military Training Routes. Operations on IFR routes (marked with “IR” on charts) are conducted in accordance with IFRs regardless of weather conditions. Operations of VFR routes (marked with “VR” on charts) are conducted in accordance with VFRs except, flight visibility shall be 5 miles or more; and flights shall not be conducted below a ceiling of less than 3000 feet AGL. (Aeronautical Information Manual 1/6/94)

Restricted Area. Restricted areas contain airspace identified by an area on the surface of the earth within which the flight of aircraft, while not wholly prohibited, is subject to restrictions. Activities within these areas must be confined because of their nature or limitations imposed upon aircraft operations that are not a part of those activities or both. Restricted areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Penetration of Restricted Areas without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants. If the restricted area is not active and has not been released to the controlling agency (FAA), the air traffic control facility will allow the aircraft to operate in the restricted airspace without issuing specific clearance for it to do so. If the restricted area is active and has not been released to the controlling agency (FAA), the air traffic control facility will issue a clearance which will ensure
the aircraft avoids the restricted airspace unless it is on an approved altitude reservation mission or has obtained its own permission to operate in the airspace and so informs the controlling facility. (Aeronautical Information Manual 1/6/94)
REFERENCES

References used in an appendix are listed at the end of that appendix.

58 FR 12864. 5 March 1993. Endangered and threatened wildlife and plants; determination of threatened status for the Pacific coast population of the Western snowy plover.

60 FR 11768. 2 March 1995. Endangered and threatened wildlife and plants; proposed designation of critical habitat for the Pacific coast population of the Western snowy plover.


Beauchamp, R. Mitchel, and Klaus W. H. Radtke. 30 January 1989. Fire management at San Clemente Island, California. Prepared for Natural Resources Office, Staff Civil Engineer, Naval Air Station North Island, San Diego, California. Prepared by Pacific Southwest Biological Services, National City, California; and GEO SAFETY, Pacific Palisades, California.


CALDFG (California Department of Fish and Game). July 1993. State and federal endangered and threatened animals of California.


EPA (US Environmental Protection Agency). 5 December 1996. Letter from David P. Howeckamp, Director, Air Division, Region IX, San Francisco, California to Richard H. Baidwin, Air Pollution Control Officer, Ventura County Air Pollution Control District, Ventura, California. Subject: attainment status of San Nicolas and Anacapa Islands.


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SCS (Soil Conservation Service). Unpublished. Soil survey of Channel Islands area, San Clemente Island part, interim report. Prepared by the USDA Soil Conservation Service in cooperation with the Regents of the University of California; the Department of the Navy, Staff Civil Engineer, Natural Resources Management Branch, Naval Air Station, North Island, San Diego, California; and Natural Resources Management Branch, Western Division, Naval Facilities Engineering Command, San Bruno, California.

SCS (Soil Conservation Service). 1985. Soil survey of Channel Islands area, California, San Nicolas Island part, interim report. US Department of Agriculture, Soil Conservation Service. In cooperation with Department of the Navy, Pacific Missile Test Center, Point Mugu, California and the Regents of the University of California, Agricultural Experiment Station, Davis, California.


U.S. Navy. 1979. Memorandum of Agreement Between the Commander Naval Weapons Center, on behalf of the U.S. Government and the Coso Ad Hoc Committee, and the Owens Valley Paiute-Shoshone Band of Indians and certain Indian People in the Kern Valley Indian Community Concerning the Area Known as Coso Hot Springs, Naval Weapons Center, China Lake, California.


Watts, Robert D., and Allan L. Ford. 8 September 1981. Memorandum of understanding between the National Marine Fisheries Service, Southwest Region, and the Naval Air Station, North Island, regarding management and protection of the marine mammal populations on San Clemente Island.

A.1 HAZARDOUS MATERIALS AND ITEMS

In 1993 McDonnell Douglas Aerospace (MDA) conducted a consumable and hazardous material usage survey to standardize, minimize, and control hazardous and consumable materials used in the maintenance of baseline SLAM missiles. The ultimate purposes of the review included:

- reducing materials harmful to the environment,
- eliminating the use of ozone depleting substances (ODS), and
- reducing the use of materials containing carcinogens.

No SLAM unique hazardous material requirements were identified.

SLAM ER was and future models of SLAM will be developed under a hazardous materials management program which meets the requirements of National Aerospace Standard 411. The SLAM ER hazardous materials management program is directed toward systematic elimination, reduction, or control of hazardous materials during all acquisition phases including demilitarization of the weapon system. Hazardous materials management is mandated for the protection of human health and the environment while producing compliant, cost-effective products which meet high performance standards. The design focus is on eliminating the use of Class I ODS, reducing VOCs in coatings (primers and topcoats), and elimination and reduction of the use of the EPA 17 chemicals. The list of 17 chemicals was derived from the most heavily used Toxic Release Inventory reported pollutants. These chemicals are mostly chlorinated solvents and heavy metals. MDA evaluated and justified the usage of materials which contain EPA 17 chemicals with the following exceptions:

- extremely small amounts of material usage, as in metals which contain alloying fractions,
- broad usage cases for which an acceptable alternative has yet to be identified, e.g., lead based solders for electrical connections or lead alloy coating in electrical assemblies, and
- VOCs which are compliant in accordance with the proposed National Emission Standard for Hazardous Air Pollutants (NESHAP) Control Technology Group requirements and do not contain chromium, lead, cyanide, cadmium, mercury, or nickel.

SLAM and SLAM ER use cadmium plated electrical connectors and small structural fasteners where required by galvanic compatibility constraints and parts availability. The most common use of an EPA 17 material is the use of chromium in corrosion control coatings (sealing of anodic coating, chromate conversion coating of aluminum for low electrical resistance bonding, and chromated primers used for adhesive bonding and as a paint base). In these cases, industry alternatives are still being evaluated, and, until adequate alternatives are identified and the implementing processes developed at MDA, the existing technology materials will, of necessity, be used. Nickel plating is used in some cases as an alternative to cadmium. SLAM ER does not use any ODS Class I materials. SLAM and SLAM ER employ fuel lead ballast.

Hazardous materials expected in the exercise missiles also include a number of energy devices which, upon activation or destruction, could result in injury to personnel and/or damage to equipment. These sources of energy release have been termed "hazardous items" and include explosive (pyrotechnic) devices, spring loaded devices, jet fuel, pressure vessels,
and radio frequency radiation devices (power density > 0.001 watt/cm²). The only live pyrotechnic device left in the baseline SLAM just before impact is the FTS fuel cut off device. All SLAM ER missile electro-explosive devices are expended before impact. Once the missile impacts the ground the radiation devices will be nonfunctional. Table A-1 lists these hazardous items that are found in SLAM and SLAM ER missiles.

A.2 TACTICAL AUTOMATED MISSION PLANNING SYSTEM

TAMPS is an interactive, graphics-aided mission planning computer system used to develop, analyze, store, and download mission data for strike aircraft, support aircraft, and stand-off weapons. TAMPS provides the US Navy and Marine Corps with an automated means to plan and analyze mission routes against targets in an operational area. The TAMPS prepares and maintains an extensive data base of geographical and cultural features supporting specialized weapons that have unique mission planning requirements.

A.3 MISSION PLANNING MODULE

McDonnell Douglas Aerospace has been tasked with the design, documentation, and testing of a SLAM Mission Planning Module (MPM). This will result in an automated SLAM mission planning system that will operate on the US Navy Standard Desk-Top Tactical Support Computer (DTC-2). The SLAM MPM will be hosted on the TAMPS. The SLAM MPM will be consistent with TAMPS data bases, will be used to plan and validate SLAM missions, will provide an interface to the SLAM Memory Loader, and will provide a baseline mission planning system for future SLAM product improvements.
<table>
<thead>
<tr>
<th>ITEM</th>
<th>SLAM ER</th>
<th>TYPE OF HAZARD</th>
<th>AMOUNT OR NET EXPLOSIVE WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GUIDANCE SECTION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cryoengine Assembly</td>
<td></td>
<td>High Pressure (with avionics power off)</td>
<td>10 liters HE @ STP, 165 cc @ 900 psi</td>
</tr>
<tr>
<td>Air Data System Probe</td>
<td></td>
<td>Hot surface, burn</td>
<td>&gt; 140°F @ ambient</td>
</tr>
<tr>
<td><strong>EXERCISE SECTION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safe-Arm/Contact Fuze (SLAM)</td>
<td>Electro-explosive</td>
<td></td>
<td>2.17 gm</td>
</tr>
<tr>
<td>Safe-Arm/Contact Fuze (SLAM ER)</td>
<td>Electro-explosive</td>
<td></td>
<td>1.96 gm</td>
</tr>
<tr>
<td>Air Pressure Probe</td>
<td>Electro-explosive</td>
<td></td>
<td>.29 gm</td>
</tr>
<tr>
<td>Crush Sensor Probes</td>
<td>Electro-explosive</td>
<td></td>
<td>.45 gm</td>
</tr>
<tr>
<td>Wing Deploy - Initiator/Cartridge (2)</td>
<td>Electro-explosive</td>
<td></td>
<td>15.628 gm</td>
</tr>
<tr>
<td>FTS Battery (Silver/Zinc)</td>
<td>Electro-explosive, electrical, corrosive</td>
<td></td>
<td>1/missile</td>
</tr>
<tr>
<td><strong>SUSTAINER SECTION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initiators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start Tank Valve</td>
<td>Electro-explosive</td>
<td></td>
<td>.264 gm</td>
</tr>
<tr>
<td>Main Fuel Valve</td>
<td>Electro-explosive</td>
<td></td>
<td>.264 gm</td>
</tr>
<tr>
<td>Bleed Air Valve</td>
<td>Electro-explosive</td>
<td></td>
<td>.264 gm</td>
</tr>
<tr>
<td>Inlet Duct Cover (2)</td>
<td>Electro-explosive</td>
<td></td>
<td>.53 gm</td>
</tr>
<tr>
<td>Engine Start System</td>
<td>Electro-explosive</td>
<td></td>
<td>.264 gm</td>
</tr>
<tr>
<td>Fuel</td>
<td>Electro-explosive</td>
<td></td>
<td>.264 gm</td>
</tr>
<tr>
<td>Engine Start System (less initiator)</td>
<td>Electro-explosive</td>
<td></td>
<td>610.97 gm</td>
</tr>
<tr>
<td>Fuel</td>
<td>Combustible liquid</td>
<td></td>
<td>49 kg/ 1.8 kg (128 lb/ 4 lb) fuel</td>
</tr>
<tr>
<td>Missile Battery (Silver/Zinc)</td>
<td>Electro-explosive, electrical, corrosive</td>
<td></td>
<td>1/missile</td>
</tr>
<tr>
<td><strong>CONTROL SECTION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Link Antenna</td>
<td>RF Radiation</td>
<td></td>
<td>1 mW-Hr/cm² @ 2.2 ft.</td>
</tr>
</tbody>
</table>
APPENDIX B

TEST CONDUCT DETAILS

B.1 CONCEPT OF MISSILE TESTING

In order to provide a logical framework for objective technical evaluation, to avoid duplication of effort, and to ensure that all technical and operational performance questions are answered, the SLAM test efforts are organized in three levels. The highest level items consist of those critical issues which are derived from governing US Navy documents which lay out, in qualitative and quantitative terms why the SLAM missile (as a weapon) is required by the Navy and what it must be capable of doing. These documents serve to describe the "customer's" requirements of the weapon system and how this weapon relates to national security. The test objectives which have been defined to evaluate the performance of the system are laid out in the second level. Here the customer requirements are broken down into specific objectives. Frequently, these objectives have quantitative thresholds. In an effort to evaluate the test objectives, test types have been identified to promote efficient test program management and provide a framework on which to organize testing.

Each test program consists of a series of tests which are executed in a standard build up process wherein tests are conducted on paper, by simulation (using hardware in a laboratory), then on actual aircraft on the ground and by captive carriage in the air, capped by free flight tests. This step-wise approach to verification of technical and operational objective thresholds required to meet the customer's requirements ensures that the safest, most efficient means are used and that costs and actual free flight requirements are minimized. For example, the following test types will be used to demonstrate SLAM capabilities:

- Simulation testing
- Control Platform Integration
- Ground Testing
- Captive Carry Testing
- Missile Free Flight.

A flight test plan is prepared to cover each missile free flight test. If the test procedures are the same for two flights, only one test plan is required. The flight test plan provides a structured approach to plan the execution of any flight test program. The flight test plan review process ensures that adequate planning, preparation, and notification have been accomplished. Individual flight test plans are written for each set of test flight procedures. Each flight test plan describes in detail the mission to be flown, the specific systems to be tested, the particular test to be conducted, support requirements, special precautions and safety concerns, and reporting requirements. Once the plan is approved by the Chief Test Pilot it is vested with the authority of NAWCWPNS and is the governing document for conducting a flight test. Events and test conditions that are not approved in the flight test plan may not be tested until such time as they are approved via the flight test plan review process (NAWCWPNS 1992).

B.2 TYPICAL MISSION EVENTS

- Meteorological survey. Prior to each operation, atmospheric conditions will be assessed to be sure Visual Meteorological Conditions requirements will be met. Weather information for the missile flight altitudes will be especially important to predict seeker performance. Cloud level on the launch day must be higher than the maximum terminal flight segment altitude to avoid cloud masking of the target. (Section 3.1.3.1 and Appendix C.3 describe the typical meteorological conditions.
around SNI.) In addition, target site environmental conditions may be measured by targets personnel. Inaccurate predicted temperatures at the target site can cause mission failures.

- **Download the missions into the missile.** The day of the firing, mission data (including GPS information) will be downloaded into a missile memory loader. The missile will be loaded onto the aircraft. Flight test engineers (FTEs) or aircrew will download the mission data into the SLAM just prior to aircraft man-up.

- **Ground check the weapon system (aircraft and missile) before takeoff to verify that it is operational.** This ground check will include running a missile telemetry test to verify proper SLAM operation. The NAWCWPNS PM Missile Flight Safety Officer has the responsibility for ensuring that SLAM missiles will not be launched until the FTS, all safety telemetry channels, and all communication channels specified for range safety are functioning properly.

- **Air and surface traffic will be controlled by Air Intercept Controllers and will be monitored during all test operations in real time in the control room.**

- **IR video camera displays target scene to FTEs.** If necessary, FTEs can request modifications of the target's IR signature.

- **Perform post op analysis.** Following target impact, a team will assess target damage.

Table B-1 lists in sequential order the major typical mission events.

<table>
<thead>
<tr>
<th>Time Prior to Operation</th>
<th>Action</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-3 weeks</td>
<td>Set up target buildings</td>
<td>Targets personnel</td>
</tr>
<tr>
<td>T-1 week</td>
<td>Schedule NAWCWPNS PM range assets</td>
<td>Navy Test Conductor (NTC)</td>
</tr>
<tr>
<td></td>
<td>Perform mission planning</td>
<td>SLAM aircrews, FTE, NTC</td>
</tr>
<tr>
<td></td>
<td>Enter missions into the Data Computer</td>
<td>SLAM aircrews, FTE, NTC</td>
</tr>
<tr>
<td>T-3 days</td>
<td>Notify all players of operation and brief times</td>
<td>NTC</td>
</tr>
<tr>
<td></td>
<td>Install all visual equipment, including cameras on site, check target heaters and generators</td>
<td>Targets personnel, Photo personnel</td>
</tr>
<tr>
<td>T-24 hours</td>
<td>Submit aircraft configurations</td>
<td>NTC</td>
</tr>
<tr>
<td></td>
<td>Verify aircrews and schedules</td>
<td>NTC</td>
</tr>
<tr>
<td>T-4 hours</td>
<td>Meteorological survey</td>
<td>Range/target personnel</td>
</tr>
<tr>
<td></td>
<td>Test and check out missile launcher, aircraft command launch system, upload SLAM on aircraft</td>
<td>Aircraft ground crew with aircrew</td>
</tr>
<tr>
<td></td>
<td>Verify data link function</td>
<td>Aircrew</td>
</tr>
<tr>
<td></td>
<td>Turn on generators and heaters</td>
<td>Target personnel</td>
</tr>
<tr>
<td>T-3 hours</td>
<td>Turn on target site IR video camera</td>
<td>Target personnel</td>
</tr>
<tr>
<td></td>
<td>Perform final go/no go assessment</td>
<td>DTD, NTC, FTE, SPO</td>
</tr>
<tr>
<td></td>
<td>Modify target IR signature, if necessary</td>
<td>SNI public works detachment</td>
</tr>
</tbody>
</table>

TABLE B-1. TYPICAL MISSION EVENTS.
<table>
<thead>
<tr>
<th>Time Prior to Operation</th>
<th>Action</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Load information into the NTC or FTE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perform pod/control aircraft checkout</td>
<td>Code 4KL200E</td>
</tr>
<tr>
<td></td>
<td>Perform aircraft instrumentation checkout and preparation</td>
<td>MDA field personnel</td>
</tr>
<tr>
<td></td>
<td>Conduct carriage aircraft checks</td>
<td>MDA field personnel</td>
</tr>
<tr>
<td></td>
<td>Conduct technical brief</td>
<td>FTE/NTC</td>
</tr>
<tr>
<td></td>
<td>Perform weapon upload</td>
<td>Ordnance</td>
</tr>
<tr>
<td></td>
<td>Perform mission load</td>
<td>Navy Test Conductor or FTE</td>
</tr>
<tr>
<td></td>
<td>Perform data link pod upload</td>
<td>Code 4KL400E</td>
</tr>
<tr>
<td></td>
<td>Man control room and aircraft</td>
<td>NTC, FTE, SOFT engineers, and SLAM aircrews</td>
</tr>
<tr>
<td>T-2 hours</td>
<td>Begin active surveillance to clear range of nonparticipants</td>
<td>Range clearance aircrew</td>
</tr>
<tr>
<td></td>
<td>Establish road blocks around target site</td>
<td>Range police</td>
</tr>
<tr>
<td>T-1 1/2 hours</td>
<td>Run TM verification tape</td>
<td>Telemetry Data Center</td>
</tr>
<tr>
<td>T-1 hour</td>
<td>Aircraft and missile ground checks</td>
<td>FTEs</td>
</tr>
<tr>
<td>T-30 minutes</td>
<td>Aircraft takeoff</td>
<td>Aircrew</td>
</tr>
<tr>
<td>T-15 minutes</td>
<td>Satellite acquisition maneuver</td>
<td>Aircrew</td>
</tr>
<tr>
<td>T-0 minutes</td>
<td>Launch</td>
<td>Aircrew</td>
</tr>
<tr>
<td>T+</td>
<td>Impact</td>
<td></td>
</tr>
<tr>
<td>T+30 minutes</td>
<td>Target site inspection, shutdown, and film recovery</td>
<td>Targets personnel, Photo personnel</td>
</tr>
<tr>
<td>T+1 - 3 days</td>
<td>Clean-up</td>
<td>Project personnel</td>
</tr>
</tbody>
</table>

### B.3 RANGE SUPPORT ACTIONS

The following paragraphs describe the actions of the range operations personnel which support the proposed action, are a part of most range operations, are not unique to the proposed action, and will not be evaluated for their environmental impacts. While range control operations are not the subject of this EA, they are included so that the reader will understand the close coordination that takes place between the aircraft launching and controlling the missiles and the flight test engineers who oversee the operation.

#### B.3.1 Range Event Recording

Range event recorders are located in the Range Surveillance Center at Point Mugu.

#### B.3.1.1 P-3 Telemetry Record/Relay and P-3A Video Record/Relay

For NAWCWPNS PM operations, this aircraft will receive and record telemetry from the SLAM during the operation, and if required, relay the telemetry to the ground receiving station. Typically, a single P-3 aircraft can be used for both range surveillance and telemetry relay functions.
B.3.1.2 Real Time Missile Video

The SLAM will radiate the imaging IR (IIR) seeker video at a pre-planned range from the target. This video will be received by a modified data link pod receiver located near the target site, and then relayed for display at the control room and the Telemetry Display Center. This video can be used by Range Safety personnel and SLAM engineers as an aid in viewing missile performance.

B.3.2 Range Control

All NAWCWPNS PM operations/firings are directed by a Navy Test Conductor from an Operations Control Room in the Range Operations Control Center. Communications are maintained between the Navy Test Conductor and all participants. The Navy Test Conductor will be assisted by the Range Operations Supervisor who controls the instrumentation scheduled for a particular range operation.

Voice and data communications networks interconnect the SNI resources with the control center to support range operations. Two independent computer systems merge telemetry and range instrumentation data, compute requested parameters, and transfer data to the Operations Control Room and the Telemetry Data Center. Data are displayed in real-time to insure that the objectives of the range user are achieved in a safe and efficient manner.

B.3.3 Missile Disposition

The waste streams generated at the SLAM target site include solids and gases. The solid waste stream consists of missile debris. Approximately 800 pounds of solid waste will be collected for each missile impact excluding lead ballasts which will be segregated for recycling by the NAWS Public Works Department. Limited quantities of silver-zinc batteries (attached to the exercise and sustainer sections) would be recovered with the remains of the sections. If found, the batteries may be segregated and could be subjected to silver recovery. The engine will be recovered as a part. The unexpended baseline SLAM FTS pyrotechnic device will be of such small size and likely to be so damaged by impact that it is not considered hazardous. SLAM ER does not and future model SLAMs are not expected to use a pyrotechnic device for fuel cutoff as part of the FTS. None of the missile debris will require any special protective equipment such as gloves or masks for handling or collection. Once the missile is recovered from the field the missile parts and pieces will be transported off base, destroyed and buried at a shared military ordnance disposal site.

B.4 RANGE SAFETY PROCEDURES

The following paragraphs provide more details on selected range safety procedures (see Section 3.1.14).

B.4.1 Missile Hazard Pattern

In order to insure safety during operations, an analysis is performed to determine the hazards associated with the proposed test. For example, if a missile firing is planned, a computer study is conducted to determine the maximum impact range for the weapon should it fail to perform as desired. From this study, a hazard area is developed. The boundaries of the hazard area are the impact limit lines. This hazard area is used to define the area around the actual test operation which must be cleared from any land mass and cleared of all nonparticipating aircraft and vessels. A missile hazard area boundary for each launch will be prepared by the Missile Flight Safety Officer (MFSO) in accordance with the NAWCWPNS PM Range Safety Operating Plan. The range requires a specific launch point for hazard pattern footprint calculation. This restriction limits the number of launch points which can be planned.

During the conduct of these tests, the MFSO has the responsibility for ensuring that the missile does not exceed the designated hazard area. Based upon telemetry and metric tracking data, the MFSO may command missile flight termination at his discretion.
8.4.2 Missle Mishap Procedures

A hangfire wait time will be established based on the pyrotechnics involved for a failure of the missile on the aircraft launch rail. During the hangfire wait time, the aircraft pilot will keep the missile pointed in a safe direction, and head toward SNI for recovery. EOD will determine the appropriate course of action depending upon the missile's condition and configuration.

After a successful launch, the MFSO has the responsibility of initiating flight termination in accordance with the RSOP safety criteria. Flight termination action is initiated by the MFSO when any of the following conditions exist:

- Impact Limit Line Violation. Valid data indicate that the predicted instantaneous impact point of the missile will violate the established impact limit line and impact outside the designated protected impact area.
- Missile Position Unknown. Present position of the missile is unknown due to loss of tracking data, the prescribed no-data time has elapsed, and the vehicle has the capability to violate range safety impact limit lines.
- Unsatisfactory Performance. Missile performance diminishes to the degree that continuation of flight creates a safety hazard and loss of range safety control.

In each case, the MFSO is expected to allow as much time as practical to regain real time data, but will not delay flight termination to the point where the missile can violate its impact limit lines.

8.4.3 Range Safety Operational Plan (RSOP)

The RSOP provides the operational procedures and safety criteria for the conduct of flight test operations of missiles which are capable of violating their hazard areas. This plan includes:

- Operational procedures and equipment through which a MFSO will monitor missile in-flight performance and exercise control over an astray missile.
- The location of the launch site and the conditions under which the launch will be made.
- The location of the missile air hazard area, impact limit lines, ground hazard area, surface hazard area, and impact areas.
- The definition of regions to be surveyed and cleared of air and surface contacts.
- The definition of that portion of the ground hazard areas to be cleared of personnel.
- A list of all essential personnel approved to be in any hazard area.
- Any waivers of criteria established by the handbook that were made for the particular operation involved and any pertinent instructions or stipulations.
- Specific requirements and guidelines for range and range safety briefings in directive format.

An RSOP is prepared for each significantly different program phase involving missile flight.

8.4.4 Hazardous Materials

The SLAM Project Office has the following range safety responsibilities in the program planning process:

- Provide a list of project materials, items, or test conditions that will present hazards to personnel or material through toxicity, combustion, blast acoustics, fragmentation, electromagnetic radiation, radioactivity, ionization, or other means.
• Describe any residual radiation, toxic, explosive, or ionization problems that could accumulate as a result of these tests, and

• Provide information, warhead data (if any), aerodynamic and flight control information, and destruct system parameters (PMTC 1989).

B.5 CONTINGENCY PLANNING

These paragraphs cover up-front planning to mitigate the potential environmental effects of a missile impacting SNI outside the Area of Potential Effect. If a missile hits outside the Area of Potential Effect, all firings will stop until further environmental and procedural analyses can be conducted to prevent a similar event in the future. Contingency plans will be made (and approved by the Point Mugu Environmental Division) before the recovery team and its equipment are allowed into a missile impact area outside the APE. This plan could entail waiting several months for a nesting season to end before entering a colony. These plans will include access routes and what equipment is permitted to be used. These mishaps are not expected, but the advance planning has been done.

B.5.1 Target Misses

Target misses may be due to missile weapon system malfunction, poor IR conditions which prevent the missile from locking onto its target, or weapon controller error. All misses that have occurred have impacted the surface under the missile’s planned flight heading. In the past weapon system malfunctions have caused missiles to fall into the ocean before reaching the island. Any future malfunctions would also be expected to show up in the missile behavior before reaching the island so that the missile will fall offshore in deep waters. If the missile were to deviate from its planned flight trajectory, the Missile Flight Safety Officer or Range Safety Officer has the ability to initiate the FTS (see Section 3.1.14 and Appendix B.1). The T&E team has learned from past firings that IR conditions at the target site can make it difficult for the missile seeker to lock on to the target. A captive carry seeker lock-on test is performed no more than three hours before any firing to be sure IR conditions are acceptable. The target buildings are being augmented both in size and IR signature to present a more “visible” aimpoint to the missile. As each firing is completed the missile’s operating parameters which lead to a target hit are better understood. Weapon controller errors have been minimized by forbidding certain missile operating modes. The new SLAM ER controller-missile interface has been significantly improved making it much harder to miss the target. Lessons learned are used to minimize the chances that errors will occur.

B.5.1.1 Means to Minimize Potential Adverse Effects to Biological Resources

A very minimal possibility exists that a missile might impact outside the Area of Potential Effect. Recovery of missile impact debris outside the APE (whether on the island or in a near shore area) shall not proceed prior to consultation with the NAWS Point Mugu Environmental Division, and their identification of protected resources in the debris recovery area.

Fiscal liability for unauthorized or accidental disturbance to natural resources shall be borne by the SLAM ER project sponsor.

B.5.1.2 Means to Minimize Potential Adverse Effects to Archaeological Sites

If a new archaeological artifact or site is discovered, or an existing archaeological site is accidentally damaged by a missile, missile debris, or recovery activities, all further actions will stop until the environmental effects of the actions can be re-evaluated and procedures developed to prevent a recurrence of a similar event.

Fiscal liability for unauthorized or accidental disturbance to archaeological resources shall be borne by the SLAM ER project sponsor.
B.5.2 Spills

The potential for spills is considered to be minimal due to safe management of materials. No petroleum, oils or lubricant storage facilities will be established at the target site. The fuel to run the generators will be transported to the site by truck and the tanks will be fueled from the access roadway. Drip pans will be placed under the generators inside the cargo vans to avoid spillage. Engine oils will not be changed in the field.

Inadvertent spills will be handled by the Environmental Division. Fuel and oil spills will be cleaned up immediately by scraping the soil and retrieving the materials for disposition in accordance with the Hazardous Waste Management Plan (Weston 1995), NAWS PM Hazardous Materials Control and Management Instruction (NAWS PM 1997), Oil and Hazardous Substance Spill Contingency Plans (Engineering Management Concepts 1992), and OPA (Oil Pollution Act) 90 Facility Response Plan (Kennedy/Jenks 1994). The hazardous waste coordinator on SNI will be contacted in the event of a spill.

Aborted missiles can impact the ocean and could break open releasing the small quantity of jet fuel that they contain [maximum of sixteen (16) gallons]. Because of the small quantity involved and its rapid evaporation, any jet fuel released into the ocean will have no significant impact on ocean water quality.

B.5.3 Fire

Impacts to sensitive vegetation and habitat due to accidental fires are considered a hazard of ordnance and weapons testing. However, the risk of a SLAM causing a fire is considered to be very minimal. The SLAM missile will contain an insignificant amount of live pyrotechnic material (less than 1 gram) when it impacts the target. The only fire hazard is the potential for the remaining missile jet fuel to ignite on impact. To date only one missile has burned and this occurred near the target site within the APE on open sand. Due to the scattered presence of vegetation in the vicinity of the SLAM target site on SNI and the potential for greater impact by fire equipment and fire fighting activities, any fire which did start in such vegetation may be allowed to burn itself out. The SNI fire department will be called as a first responder.

REFERENCES CITED


# APPENDIX C
## AIR QUALITY

### C.1 NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS

**TABLE C.1-1. AMBIENT AIR QUALITY STANDARDS (VCAPCD 1994).**

<table>
<thead>
<tr>
<th>AIR POLLUTANT</th>
<th>AVERAGING TIME</th>
<th>CALIFORNIA STANDARDS</th>
<th>NATIONAL STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PRIMARY</td>
<td>SECONDARY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.09 ppm (180 µg/m³)</td>
<td>0.12 ppm (235 µg/m³)</td>
</tr>
<tr>
<td>Ozone</td>
<td>1 Hour</td>
<td>0.09 ppm (180 µg/m³)</td>
<td>0.12 ppm (235 µg/m³)</td>
</tr>
<tr>
<td></td>
<td>8 Hour</td>
<td>9.0 ppm (10 mg/m³)</td>
<td>9.0 ppm (10 mg/m³)</td>
</tr>
<tr>
<td></td>
<td>1 Hour</td>
<td>20 ppm (23 mg/m³)</td>
<td>35 ppm (40 mg/m³)</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>Annual average</td>
<td>-</td>
<td>0.053 ppm (100 µg/m³)</td>
</tr>
<tr>
<td></td>
<td>1 Hour</td>
<td>0.25 ppm (470 µg/m³)</td>
<td>-</td>
</tr>
<tr>
<td>Nitrogen Dioxide</td>
<td>Annual average</td>
<td>-</td>
<td>0.03 ppm (80 µg/m³)</td>
</tr>
<tr>
<td></td>
<td>24 Hour average</td>
<td>0.04 ppm (105 µg/m³)</td>
<td>0.14 ppm (365 µg/m³)</td>
</tr>
<tr>
<td></td>
<td>3 Hour</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1 Hour</td>
<td>0.25 ppm (655 µg/m³)</td>
<td>-</td>
</tr>
<tr>
<td>Suspended Particulate Matter (PM₁₀)</td>
<td>Annual geometric mean</td>
<td>30 µg/m³</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>24 Hour</td>
<td>50 µg/m³</td>
<td>150 µg/m³</td>
</tr>
<tr>
<td></td>
<td>Annual arithmetic mean</td>
<td>-</td>
<td>50 µg/m³</td>
</tr>
<tr>
<td>Sulfates</td>
<td>24 Hour</td>
<td>25 µg/m³</td>
<td>-</td>
</tr>
<tr>
<td>Load</td>
<td>30 Day average</td>
<td>1.5 µg/m³</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Calendar quarter</td>
<td>-</td>
<td>1.5 µg/m³</td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>1 Hour</td>
<td>0.03 ppm (42 µg/m³)</td>
<td>-</td>
</tr>
<tr>
<td>Vinyl Chloride (chloroethene)</td>
<td>24 Hour</td>
<td>0.010 ppm (26 µg/m³)</td>
<td>-</td>
</tr>
<tr>
<td>Visibility Particles Reducing Particles</td>
<td>8 Hour average (10 am - 6 pm, PST)</td>
<td>In sufficient amount to produce an extinction coefficient of 0.23/km due to particles when the relative humidity is less than 70%</td>
<td>-</td>
</tr>
</tbody>
</table>

### C.2 CALIFORNIA STATE IMPLEMENTATION PLANS

The California Air Resources Board (ARB) and local or regional air pollution control districts and air quality management districts are responsible for controlling air pollution. The district boundaries are based on the meteorological and geographic conditions of each air basin. The ARB adopts state ambient air quality standards (SAAQSs) for each basin (Monahan et al. 1992, CEC 1993). Each air district that has been designated as a nonattainment area for one or more specific SAAQSs must develop a district attainment plan for attaining and
maintaining the state standards for these pollutants by the earliest practicable date, employing a cost-effective strategy. The area plan must contain air pollution control strategies and proposed rules (Monahan et al. 1992). The combination of all of these plans that implement the NAAQS is the State Implementation Plan. The latest SIP was adopted by the California ARB on November 15, 1994 (VCAPCD 1995).

The Legislature has authorized each air district, and required the SCAQMD, to establish a permit system requiring any person who plans to build, alter, replace or operate any article, machine or other contrivance capable of emitting air contaminants (stationary sources) to first obtain a permit from the district in which the source is located (Monahan et al. 1992).

C.3 SOUTHERN CALIFORNIA BIGHT METEOROLOGY

Weather conditions in the SCB are driven by interactions among the North Pacific High pressure system, a thermal ("Southwest Desert") Low pressure system, the cold California Current, and orographic and geostrophic characteristics. These systems and factors interact generating inversions of various heights and durations; eddies of various sizes, locations, and life spans; fog; and clouds.

The weather on SNI, as a whole, is cold and windy. The average wind speed during the year is about 16 miles per hour, and can reach 35 to 55 mph (SCS 1985) (Figure 3-1). The prevailing northwest winds sweep around both shores and over the summit of the island, especially in spring and when the Catalina Eddy is blowing (Fagan 1993). Weather also moves in and out at various rates; changing completely within one hour or remaining stable for days.

C.3.1 High and Low Pressure System

Weather conditions along the coast are radically affected by the locations and relative strengths of the North Pacific High which sits several hundreds of miles off the California coast and an interior "Southwest Desert" thermal Low which lies over southern Nevada and the California deserts. The pressure gradient between the Pacific High and the Southwest Desert Low ensures a prevailing northwest air stream which parallels most of California's coast line (Figure 3-1). The pressure gradient is determined to a great extent by the strength and relative positions of the Pacific High and Southwest Desert Low (DeMarrais et al. 1965, Lea 1995, Fagan 1993, VCAPCD 1989). The Pacific High is at its strongest during the summer which causes rapid large scale unidirectional movement of air (predominantly from the west or northwest) during daylight hours and a substantial part of the night and a relatively stable weather pattern. Almost all rainfall in Ventura County falls during the winter and early spring. Air transport is also low because of the reduced pressure gradient and reduced solar induced land and sea breeze conditions (VCAPCD 1989, DeMarrais et al. 1965).

C.3.2 Marine Layer

The "marine layer" is a relatively cool layer of air that dominates the SCB surface climate in the spring, summer, and fall and contrasts sharply with the mass of warmer air at higher altitudes. It is formed when the air of the Pacific High is blown over the ocean and especially over the cold water of the California Current which flows down along the western coast of North America from Alaska. This air is cooled and picks up moisture from the water becoming denser than air at higher altitudes. The moist air regularly forms fog and low, gray stratus clouds (Fagan 1993). This marine layer of air is frequently "trapped" in the SCB from spring into fall by a quasi-permanent inversion, and the mountain ranges (VCAPCD 1989).

C.3.3 Inversion Layer

Under normal circumstances the temperature of air decreases as altitude increases due to expansional cooling of a unit mass of air. A layer of air in which the temperature increases with height exhibits an inverted relationship and is called an inversion. Inversions are strengthened by heating above which causes air to become lighter, or cooling below which
causes air to become denser (VCAPCD 1989). The coolness of the marine layer reinforces the inversion from below. The denser air within the inversion (at its base) prevents air below the inversion from mixing with inversion layer air. The dewpoint, the temperature at which dew forms, is reached first at the coolest temperatures. These coolest temperatures occur at the base of the inversion and this is where fog and stratus clouds will begin to form. Inversion layers are broken up by low pressure troughs aloft which cause the top of the inversion to become less dense or by solar heating of the surface layer of air which decreases or reverses the temperature gradient within the inversion layer. The height of the base of the inversion is known as the "mixing height" (Petterssen 1958, DeMarrais et al. 1965, VCAPCD 1989).

The average height at Point Mugu of the inversion base is about 1000 feet and the average height of the inversion top is about 2000 feet (Rosenthal 1972 in Lea 1995). The diurnal rhythm of solar energy and the ever changing circulation patterns cause changes in the height and intensity of the inversion layer and its entrapped pollution as well as in the mixing layer below (Lea 1995).

C.3.4 Catalina Eddy

The Catalina Eddy is a counterclockwise swirl of air over the SCB. It is often centered near Santa Catalina Island and may cover the entire SCB, exceeding 100 miles in diameter. The Catalina Eddy occurs most frequently in the spring, summer, and early fall when the North Pacific High is well established (Fagan 1993, VCAPCD 1989). The eddy is believed to be caused by the deflection of northwesterly winds along the western side of the SCB in the lee of the San Rafael and Santa Ynez Mountains, north and east of Point Conception, spinning the air in the SCB cyclonically. The eddy characteristically has a heavy stratus cloud cover and a deepened marine layer. Cyclonic winds cause southerly to southeasterly winds along the entire SCB coast from San Diego to Point Conception. The actual location of the eddy varies according to the size, direction, and speed of the wind field (DeMarrais et al. 1965, VCAPCD 1989, Lea 1995).

C.3.5 Fog and Clouds

Cloud cover is a regular feature of the SCB. The dominance of the North Pacific High enhances the production of fog by creating subsidence inversions which trap colder layers of air near the surface. In calm weather, especially between spring and late summer (June and July are the foggiest months), heavy fog forms over the Channel Islands covering them for days. Often the mainland and the channels will be free of fog and visibility will be good, while the islands themselves are completely enveloped. Summer fog, or stratus clouds, may dissipate in the afternoon as solar heating increases vertical mixing of the surface layer of air and eliminates the temperature inversion. Then as the sun goes down the fog reforms (USFWS 1987). Low clouds and fog are fairly frequent in the winter, but the percentage of occurrence is less than in the summer months because of the increased winds associated with the passage of westerly disturbances (USFWS 1984, SCS unpub). Fog occurs most frequently on the western end of SNI where it may not be visible to weather observers at the air field.

The flying weather at SNI is above VFR minimums (1000 foot ceiling and 3 mile visibility) 80 percent of the time on a year round basis, with the best months being March and November (87 percent) and the worst month July (67 percent). Annually, the ceiling and visibility are below the lowest instrument landing minimums (100 feet or one half mile) 3 to 4 percent of the time. In summary, March and July are the best and worst months, respectively.

C.3.6 Precipitation

On the basis of precipitation, SNI could almost be called a desert, but the low summer temperatures, high relative humidity, and the high incidence of fog and low clouds make the small amount of rainfall unusually effective (USFWS 1984). The heavy fog adds to the amount and distribution of moisture that reaches the ground locally (Beauchamp and Radtke 1989). Annual precipitation averages about 8 inches (20 cm). The wettest months are November through March and the driest from June through September. Relative humidities are
fairly high all year and average about 70 to 80 percent at the island weather stations (USFWS 1984).

C.3.7 SLAM Firing Conditions

During the fall and winter, the best SLAM window is in the afternoon, usually 1200-1500 local time, or even after sunset. Spring and summer months are the most difficult to operate in. Early summer clearing usually occurs in the mid-afternoon, if at all, and only for a brief period. This provides little time for target solar heating and conduct of the mission. Usable SLAM windows grow larger later in the year. Unpredictable mid-day clearing usually starts to occur by July, providing some workable "foggy" days.

SLAM operations against the target on SNI must be carefully scheduled around prevailing weather conditions and for the best solar loading. An IR video camera will be set up south of Jackson Highway approximately under the missile's projected flight path overlooking the target site to provide FTEs with an early view of the IR scene. The pre-launch IR target acquisition aircraft will fly around the island once after performing its simulated run to check for the presence of clouds which might affect the IR view. Launches will be delayed until there are no clouds.

C.4 VENTURA AIR QUALITY

C.4.1 Current Air Quality

The south central valley area of Ventura County is a federal severe-15 and a California severe ozone nonattainment area (VCAPCD 1995). This area and the specific levels of nonattainment are described as follows:

The south half of Ventura County (south of the southern border of the Los Padres National Forest) as shown in Figure 4-1 has been designated nonattainment for the federal and state ozone standards. Nonattainment of the federal ozone standard occurs if the maximum hourly concentration exceeds the health-based standard of 0.12 part per million (ppm) at any monitoring station on more than three days in the past three years. In other words, an average of only one exceedance of the federal ozone standard per year is allowed. Particulate levels (PM10) also exceed state standards. However, the County is in attainment of the federal particulate standards. Concentrations of other pollutants do not violate state or federal standards. (VCAPCD 1989) [Figure 4-1 of VCAPCD (1989) does not cover or classify SNI.]

Poor pollutant dispersion conditions, caused by meteorological conditions, occur from late spring through early fall. During this "smog season" temperature inversions limit the vertical mixing of the atmosphere and the dilution of air pollutants. Winds during a typical summer day follow a land breeze pattern during morning hours and a sea breeze pattern during afternoon hours. This creates a "sloshing" effect which retains pollutants over the county for several days. Stable atmospheric conditions and high temperatures produce conditions conducive to ozone formation. Emissions left from previous days accumulate and react with the new emissions, increasing ozone concentrations (VCAPCD 1994, 1995).

Ventura County is classified as an "attainment" area for the following criteria pollutants: carbon monoxide, lead, nitrogen dioxide, and the federal particulate matter standards. The California ARB considers the county nonattainment for the state ambient PM10 standards of 50 micrograms per cubic meter for a 24 hour average and 30 micrograms per cubic meter for the annual geometric mean. Although ozone levels declined significantly in recent years the county still experiences frequent violations of the federal and state ozone standards. The county has been designated a severe nonattainment area for state ozone standards by the California Air Resources Board and the national standard by the EPA (VCAPCD 1994, 1995). The county is predicted to be in compliance with the CAA standards by 2005. While SNI is a part of Ventura County the EPA has determined that the air quality at SNI is unclassifiable/attainment (see Appendix C.7).
Lack of data for visibility reducing particles, hydrogen sulfide, and vinyl chloride has resulted in an "unclassified" attainment designation for these three California air contaminants (VCAPCD 1994).

C.4.2 Future Air Quality

Ozone and PM\textsubscript{10} are the air pollutants of greatest concern in Ventura County. Based on the emission control strategy proposed in the 1995 Air Quality Management Plan (AQMP) Revision, the District will be able to attain the federal ozone standard in 2005, as mandated by the federal CAA. However, the District will need to adopt and implement additional emission control strategies to attain California's more stringent health-based ambient ozone standard (VCAPCD 1995).

C.4.3 Ventura County Air Pollution Control District Air Quality Management Plan

Since the implementation of the 1979 AQMP, Ventura County's strategy for achieving the state and federal ozone standards has been to concurrently reduce ozone precursor Reactive Organic Compounds and NO\textsubscript{x} emissions from stationary and mobile sources (VCAPCD 1995).

The limit for inclusion of air pollution sources to the onshore area is 25 miles from the state's seaward boundary (VCAPCD 1995). Consequently, since SNI is located 60 miles offshore, it does not have to comply with the onshore requirements but as a standard operating procedure NAWS PM does comply with the VCAPCD AQMP.

C.5 SOUTH COAST AIR BASIN AIR QUALITY

In 1976 the California legislature adopted the Lewis Air Quality Management Act which created the SCAQMD from a voluntary association of air pollution control districts in Los Angeles, Orange, Riverside, and San Bernardino counties. The new agency was charged with developing uniform plans and programs for the region to attain federal standards by the dates specified by federal law. The agency was also mandated to meet state standards by the earliest date achievable (SCAQMD 1994). Foreseeing the need for inter-governmental cooperation in order to have a fully comprehensive plan, the Legislature required the Southern California Association of Governments to coordinate the efforts of the counties and cities in developing the AQMP (Monahan et al. 1992).

The South Coast Air Basin (which is comprised of these four counties) has consistently exceeded four of the six federally regulated air pollutants. In 1992 the South Coast Air Basin air exceeded federal standards more frequently than any other area of the United States. Significant progress has been made in reducing air pollutant levels in the district even though the district air still exceeds several standards. Currently, the South Coast Air Basin is the only area in the United States designated as "extreme" nonattainment for ozone and is a nonattainment area for CO, NO\textsubscript{2} (1 hour), and PM\textsubscript{10}. The area is in attainment for SO\textsubscript{2}, sulfates (SO\textsubscript{x}), and lead (SCAQMD 1994).

C.6 SAN DIEGO AIR BASIN AIR QUALITY

The San Diego air basin slopes up from the coast eastward into the foothills of Cuyamaca Peak and Otay Mountain. When temperature inversion layers are present they trap pollutants against the ground below them. The location of the highest pollutant concentrations, because of on-shore breezes, is then dependent upon the height of the inversion layer. Lower inversions keep the higher concentrations near the coast, while an inversion at 2000 feet would concentrate the pollutants in the foothills. The inversion layers are present most often from May through October (SDAPCD 1995).

San Diego is subject to air pollution transported from the. Relatively mild "Santa Ana" winds carry South Coast air out over the bight to the southwest. Then sea breezes carry
these pollutants into San Diego County where they add to local pollution and raise local air pollution levels (SDAPCD 1995).

In 1994 San Diego County met the federal air quality standards for carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. Ozone was the only standard which was exceeded. By definition, the county was in attainment of the PM10 standard because it had only one violation in 1994. San Diego County also meets California standards for carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead; but not for ozone or inhalable particulates. Ozone is San Diego's primary air pollution problem and motor vehicles account for 64 percent of the smog forming emissions (SDAPCD 1995).

Air quality modeling performed by the San Diego County Air Pollution Control District (SDAPCD) staff demonstrated to the US EPA that local emissions will not cause exceedances of the federal ozone standard even when ozone and ozone precursor emissions transported from the South Coast Air Basin are added in. The modeling demonstrated that the federal standards would be met by 1999, the attainment deadline for "serious" areas. The US EPA reclassified the attainment status of San Diego's air quality from "severe" to "serious" in 1994 at San Diego's request (SDAPCD 1995). [San Diego is not required to over control its emissions to compensate for pollutants transported into the county from sources outside the county (SDAPCD 1992).]

Wind streamlines in Figure 3-1 indicate that air passing over SNI may eventually be blown into the SDAPCD. The Navy is working with the SDAPCD to monitor the quality of air at SCI (McGriffin 1995).

REFERENCES CITED


McGriffin, Michael. 3 October 1995. Summary of SCI/SDAPCD air monitoring data. Environmental Department, Navy Public Works Center, San Diego, California.


VCAPCD (Ventura County Air Pollution Control District). 24 October 1989. Guidelines for the preparation of air quality impact analyses. Air Quality Planning and Evaluation Section, Ventura, California.

VCAPCD (Ventura County Air Pollution Control District). 8 November 1994. Ventura County 1994 air quality management plan. Ventura, California.

C.7 ATTAINMENT STATUS OF SAN NICOLAS ISLAND
December 5, 1996

Richard H. Baldwin  
Air Pollution Control Officer  
Ventura County Air Pollution Control District  
669 County Square Drive  
Ventura, CA 93003

Dear Mr. Baldwin:

Per a request from the U.S. Navy, I am writing to clarify the attainment classification status of San Nicolas and Anacapa Islands. We understand that the District’s Air Pollution Control Board specifically exempted San Nicolas Island from the Air Quality Management Plan requirements, pending a formal determination from EPA that San Nicolas Island is not part of the Ventura County federal ozone nonattainment area.

As you know, Anacapa and San Nicolas Islands are part of Ventura County. However, the Ventura County ozone nonattainment area comprises all of Ventura County except for the Channel Islands, which are designated as unclassifiable/attainment in the South Central Air Basin. Therefore, although part of Ventura County, the Anacapa and San Nicolas Islands are not part of the Ventura nonattainment area. If you have any additional questions or comments, please contact Julia Barrow, Chief of the Planning Office, at (415) 744-1230.

Sincerely,

David P. Howeckamp  
Director  
Air Division

cc: Lynn Terry, ARB  
Scott Johnson, VCAPCD  
Henry Hogo, SCAQMD  
C.8 NALF SAN CLEMENTE ISLAND RECORD OF NON-APPLICABILITY AND SUPPORTING DOCUMENTS
RECORD OF NON-APPLICABILITY FOR STANDOFF LAND ATTACK MISSILE (SLAM) AND FUTURE MODEL SLAM MISSILE FIRINGS PROGRAM

The US Navy proposes to test or train with inert SLAM missiles at the Naval Auxiliary Landing Field San Clemente Island, California. An average of four firings per year might be conducted through 2018. Missiles would be launched from aircraft and impact at the Missile Impact Range near the center of San Clemente Island. These launches would be from aircraft in the Naval Air Warfare Center, Weapons Division (NAWCWPNS) Sea Range or Fleet Area Control and Surveillance Facility (FACSFAC) San Diego (W-291).

Launches near San Nicolas Island in NAWCWPNS Sea Range would occur in areas which are classified as unclassifiable/attainment. The flight corridor would carry the missile from this attainment area into the South Coast Air Basin (SCAB) (Los Angeles County) which is a nonattainment area. Aircraft would take off from Naval Air Weapons Station Point Mugu in Ventura County which is classified as a severe – 15 nonattainment area for ozone precursors. Because test flights would generate emissions within nonattainment areas, this proposed Navy action has been evaluated for compliance with Section 176(c) of the Clean Air Act (42 USC 7506) and with the US Environmental Protection Agency (EPA) rule promulgated at 40 CFR Part 51.

As discussed in the Environmental Assessment, Nonwarhead Standoff Land Attack Missile (SLAM) and Future Model SLAM Firings, annual emissions associated with the SLAM test and training program (missiles plus associated aircraft, ground vehicles, and portable generators) are below the de minimis thresholds for any pollutant in the SCAB nonattainment area during as many as four firings in one year.

The SCAB has nonattainment designations for ozone precursors, nitrogen oxides, PM10, and carbon monoxide. Maximum annual emissions from four missile firings per year would be 0.5 ton or less per year for each of these pollutants. These emissions are well below the de minimis threshold of 10, 70, 100 and 100 tons per year, respectively.

Pursuant to 40 CFR 51.853(c)(1), I find that the requirements of the EPA General Conformity Rule are not applicable to the proposed Navy action.

Date 9/8/98

Signature: 

A. J. Benn, CAPT, USN
Program Manager
Standoff Missile Systems
PEO(CU), PMA-258
**APPLICABILITY DETERMINATION FOR CONFORMITY**

This appendix follows the step-by-step process outlined in CNO (1994).

**Step 1.** Is the action located in an air quality nonattainment or maintenance area?  
Yes. San Clemente Island is located in Los Angeles County which is a part of the South Coast Air Basin. The SCAB is designated extreme nonattainment for ozone, serious nonattainment for PM$_{10}$, nonattainment for nitrogen oxide, serious nonattainment for carbon monoxide, and unclassifiable/attainment for sulfur dioxide. Aircraft will take off from Naval Air Weapons Station (NAWS) Point Mugu in Ventura County. Ventura County is a severe – 15 nonattainment area for ozone precursors.

**Step 2.** Does the action result in the emission of criteria pollutants?  
Yes.

**Step 3.** Is the action (or portion of the action) exempt from conformity requirements?  
Yes. Calculations are provided which show that the proposed action will not cause emissions that equal or exceed the de minimis levels.

**Step 4.** Is the action presumed to conform?  
No.

**Step 5.** Are the direct emissions associated with the action reasonably foreseeable?  
Yes.

**Step 6.** Are the indirect emissions associated with the action reasonably foreseeable?  
Yes. Emissions will be required from supporting vehicles and portable generators.

**Step 7.** Can the indirect emissions associated with the action be practicably controlled due to continuing program responsibility?  
Yes.

**Step 8.** Determination of total emissions (direct and indirect from all non-exempt sources).  

Total estimated emissions resulting from this action are as follows:

Missile and aircraft emissions resulting from an estimated four test firings per year (occurring on a total of two days) are as follows:

<table>
<thead>
<tr>
<th>Emission Type</th>
<th>Emission Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volatile organic compounds</td>
<td>0.15 tons per year</td>
</tr>
<tr>
<td>Nitrogen oxides</td>
<td>0.19 tons per year</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>0.32 tons per year</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>0.07 tons per year</td>
</tr>
</tbody>
</table>

(Project runs through 2018)

Generator, truck, and crane and forklift emissions from an estimated two firing operations per year (which will support four missile firings) are as follows:

<table>
<thead>
<tr>
<th>Emission Type</th>
<th>Emission Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ozone precursors (Volatile organic compounds)</td>
<td>0.03 tons per year</td>
</tr>
<tr>
<td>Nitrogen oxide</td>
<td>0.30 tons per year</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>0.10 tons per year</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>0.06 tons per year</td>
</tr>
</tbody>
</table>
See attachments for calculations.

Step 9. Are the total emissions resulting from the action below \textit{de minimis} levels?

Yes. \textit{De minimis} levels are given in the following table for Ventura County and the South Coast Air Basin which includes San Clemente Island.

<table>
<thead>
<tr>
<th>Criteria Pollutant</th>
<th>Total Emissions</th>
<th>Estimated (Tons per Year)</th>
<th>Attainment Status</th>
<th>De Minimis Level (Tons per Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventura County</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ozone precursors</td>
<td>0.14</td>
<td>Severe - 15</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Nitrogen Oxides</td>
<td>N/A</td>
<td>Unclassified/Attainment</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>N/A</td>
<td>Unclassified/Attainment</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>N/A</td>
<td>Unclassified/Attainment</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>San Clemente Island</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ozone precursors</td>
<td>0.03</td>
<td>Nonattainment (extreme)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Nitrogen Oxides</td>
<td>0.39</td>
<td>Nonattainment</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>0.10</td>
<td>Nonattainment (serious)</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>0.07</td>
<td>Nonattainment (serious)</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Step 10. Is the action regionally significant?

No. An action is considered regionally significant if all its emissions will represent 10 percent or more of a nonattainment or maintenance area’s total emission budget for that pollutant. The planning emissions inventory for 2005 under the best alternative for Ventura County for volatile organic compounds (equivalent to ROC) is 41.85 tons per day, or 15275 tons per year (1994 Ventura County Air Quality Management Plan, Table 9-2). The proposed firings would represent much less than 1 percent of this quantity. The planning emissions inventory for 2005 for an average annual day in the South Coast Air Basin is 990 tons for VOCs, 989 tons for NO$_x$, 3,881 tons for CO, and 1,018 tons for PM$_{10}$ (Table 3-7A, Final 1994 Air Quality Management Plan, Meeting the Clean Air Challenge, South Coast Air Quality Management District and Southern California Association of Governments). The proposed actions would generate much less than 1 percent of each of these pollutants in the year 2005. Since the emissions from this action are below the de minimis level, and the action is not considered regionally significant, it is exempt from any further requirements under the Conformity Rule [40 CFR 51.853(c)(1)].
### TABLE C.8-1. AIRCRAFT AND MISSILE EMISSION RATE DATA

<table>
<thead>
<tr>
<th>AIRCRAFT (engine used for emission factors)</th>
<th>NUMBER OF ENGINES</th>
<th>FLIGHT MODE</th>
<th>ENGINE POWER SETTING</th>
<th>TIME IN LTO (minutes)</th>
<th>TOTAL FUEL FLOW RATE (pounds/minute)</th>
<th>ROC RATES (Hydrocarbons) (pounds/1000 lbs of fuel)</th>
<th>NOX RATES (pounds/1000 lbs of fuel)</th>
<th>CO RATES (pounds/1000 lbs of fuel)</th>
<th>PM (_{10}) RATES (pounds/1000 lbs of fuel)</th>
<th>ROC (pounds)</th>
<th>NOX (pounds)</th>
<th>CO (pounds)</th>
<th>PM (_{10}) (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F/A 18 (F404-GE-400)</td>
<td>2</td>
<td>taxi out</td>
<td>ground idle</td>
<td>6.5</td>
<td>10.4</td>
<td>58.18</td>
<td>1.16</td>
<td>137.34</td>
<td>15.73</td>
<td>15.95</td>
<td>12.57</td>
<td>46.42</td>
<td>9.88</td>
</tr>
<tr>
<td></td>
<td></td>
<td>takeoff</td>
<td>Max A/B</td>
<td>0.4</td>
<td>473.3</td>
<td>0.13</td>
<td>9.22</td>
<td>23.12</td>
<td>4.43</td>
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<tr>
<td></td>
<td></td>
<td>climbout</td>
<td>IRP</td>
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<td>143.1</td>
<td>0.31</td>
<td>25.16</td>
<td>1.05</td>
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<td>76% rpm</td>
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<tr>
<td></td>
<td></td>
<td>taxi in</td>
<td>ground idle</td>
<td>6.5</td>
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<td>military</td>
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<td>climbout</td>
<td>100% rpm</td>
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<tr>
<td></td>
<td></td>
<td>taxi in</td>
<td>low gr. Idle</td>
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<tr>
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<td>in-flight</td>
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<td>1.20</td>
<td>2.21</td>
<td>0.05</td>
<td>1.27</td>
<td>0.16</td>
<td>0.29</td>
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</tr>
</tbody>
</table>

**Notes:**
- ROC - reactive organic compounds
- NO\(_x\) - nitrogen oxides
- CO - carbon monoxide
- PM\(_{10}\) - inhalable particulate matter

Engine models used for P-3 emissions rate data are matched as closely as possible to engine models in aircraft according to Taylor (1993) and US EPA (1993). F/A-18 aircraft emission rate data are from AESO file data. When two engine models are listed, the second one is used for PM\(_{10}\) emission rates. PM\(_{10}\) emission factors are based on available data for generally similar aircraft engines when aircraft specific data are not available.

**Data Sources:**
### TABLE C.8-2. AIRCRAFT AND MISSILE EMISSION ESTIMATES FOR A TWO MISSILE FIRING EVENT

<table>
<thead>
<tr>
<th>Aircraft Type</th>
<th>Number of Aircraft</th>
<th>Area with Flight Activity Under 3,000 FT AGL</th>
<th>Average Speed</th>
<th>Low Altitude Flight Mileage</th>
<th>Average Time on Segment (min)</th>
<th>Estimated Emissions (Pounds) from Low Altitude Flight Activity</th>
<th>Emissions per Takeoff and Landing Cycle (Pounds)</th>
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<td></td>
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<td></td>
<td></td>
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<td>NOx</td>
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<td>F/A-18</td>
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<td>Ventura County</td>
<td>500</td>
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<tr>
<td></td>
<td></td>
<td>(Launch) Offshore Areas</td>
<td>500</td>
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<td>0.00</td>
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<td>0.00</td>
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<tr>
<td></td>
<td></td>
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<td>0.00</td>
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<td>F/A-18</td>
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<td>Ventura County</td>
<td>500</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<td></td>
<td></td>
<td>(Chase) Offshore Areas</td>
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<td>0.00</td>
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<td>2</td>
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<td>0%</td>
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<td></td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Offshore Areas</td>
<td>50%</td>
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<td></td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>South Coast Air Basin</td>
<td>50%</td>
<td></td>
<td></td>
<td>0.05</td>
<td>1.27</td>
</tr>
<tr>
<td>Combined</td>
<td></td>
<td>Ventura County</td>
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<td></td>
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<td>0.00</td>
</tr>
<tr>
<td>Aircraft &amp;</td>
<td></td>
<td>Offshore Areas</td>
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<td></td>
<td></td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>Missiles</td>
<td></td>
<td>South Coast Air Basin</td>
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<td></td>
<td></td>
<td>1.11</td>
<td>87.69</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Totals:</td>
<td>1.11</td>
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</tbody>
</table>

**Notes:**
- ROC – reactive organic compounds
- NOx – nitrogen oxides
- CO – carbon monoxide
- PM10 – inhalable particulate matter
Flight activity between the offshore launch area and the impact site is estimated since the actual launch locations and flight paths will vary from one firing to the next. Chase planes must fly to the launch area and move into proper position prior to the missile launch.

For emission analysis purposes, flight activity within 3,000 feet of the ground level is considered low altitude activity. EPA emission inventory guidance indicates that emissions released more than 3,000 feet above ground level are generally excluded from consideration in State Implementation Plans.

Data Sources:
TABLE C.8-3. ESTIMATED EMISSIONS FROM EQUIPMENT USE AT THE MISSILE IMPACT RANGE ON SAN CLEMENTE ISLAND.

<table>
<thead>
<tr>
<th>Equipment Item</th>
<th>Size</th>
<th>Number of Items</th>
<th>Set-up</th>
<th>Checks</th>
<th>Event</th>
<th>Clean-up</th>
<th>Total</th>
<th>Emission Rates (lbs/1000 KW-hrs or /1000 hrs)</th>
<th>Emissions per Firing Event (pounds/event)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generators</td>
<td>60</td>
<td>12</td>
<td>2</td>
<td>8</td>
<td>10</td>
<td></td>
<td></td>
<td>3.07</td>
<td>41.45</td>
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<tr>
<td>Medium Trucks</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>73.30</td>
<td>84.33</td>
</tr>
<tr>
<td>Light Trucks</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>49.16</td>
<td>46.30</td>
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<tr>
<td>Fork Lift</td>
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<td></td>
<td>3.53</td>
<td>30.86</td>
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<td>Crane</td>
<td>1</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>2.84</td>
<td>22.71</td>
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</table>

Notes:
- ROC - reactive organic compounds
- NOx - nitrogen oxides
- CO - carbon monoxide
- PM10 - inhalable particulate matter
- Generators are operated under current individual permits issued by the South Coast Air Quality Management District. Generator emission rates based on Section 3.3 of AP-42 (October 1995 version), assuming ROG = 91% of total organics.
- Vehicle emission rates calculated with the EMFAC7F emission rate model for calendar year 1999 assuming summer temperature patterns; an average speed of 25 mph was assumed.

Data Sources:
C.9 NAWS CHINA LAKE RECORD OF NON-APPLICABILITY AND SUPPORTING DOCUMENTS
MEMORANDUM TO FILE

From: Head, Environmental Project Office (Code 8G0000D)

Subj: RECORD OF NON-APPLICABILITY FOR STANDOFF LAND ATTACK MISSILE (SLAM) AND FUTURE MODEL SLAM MISSILE FIRINGS PROGRAM

1. Pursuant to Section 176(c) of the Clean Air Act, as amended by the 1990 amendments; the General Conformity Rule at 40 CFR 51 subpart W; and the draft Chief of Naval Operations Interim Guidance on Compliance with the Clean Air Act General Conformity Rule, the Department of the Navy (DON) conducted a conformity applicability analysis of the air emissions associated with the proposed action involving the “Standoff Land Attack Missile (SLAM) and Future Model SLAM Missile Firings” Program to be conducted at the Naval Air Weapons Station, China Lake.

2. DON's conformity analysis establishes that the air emissions associated with the proposed action are below the de minimis levels and are not "regionally significant". Consequently, the proposed action is exempt from the conformity determination requirements of the Environmental Protection Agency's General Conformity Rule (40 CFR 51.853(c)(1)).

3. To the best of my knowledge, the information contained in the DON's applicability analysis is correct and accurate and I concur in the finding that air emissions associated with the proposed action are below de minimis levels, are not regionally significant, and therefore do not require a conformity determination.

CAROLYN A. SHEPHERD
APPENDIX D:
APPLICABILITY DETERMINATION FOR CONFORMITY

This Appendix follows the step-by-step process outlined in CNO (1994).

Step 1: Is the action located in a federal air quality nonattainment or maintenance area?

Yes. Searles Valley Planning Area designated Moderate nonattainment for PM10. Vehicular traffic associated with the project will also pass through Kern County, which is designated Serious nonattainment for ozone. (Inyo County is designated attainment for ozone.)

Step 2: Does the action result in the emission of criteria pollutants for which the area is designated nonattainment?

Yes.

Step 3: Is the action in a category considered exempt from Conformity requirements by EPA?

No.

Step 4: Is the action presumed to conform?

No.

Step 5: Are the direct emissions associated with the action reasonably foreseeable?

Yes.

Step 6: Are the indirect emissions associated with the action reasonably foreseeable?

Yes.

Step 7: Can the indirect emissions associated with the action be practicably controlled due to continuing program responsibility?

Yes.
Step 8: Determination of Total Emissions (direct and indirect from all non-exempt sources).

Total estimated emissions resulting from this action are as follows:

PM10 (Inyo and Kern counties):
- 1996: 7.50 tons per year
- 1997: 7.23 tons per year
- 2000: 8.45 tons per year
- Other Years: 5.57 tons per year
(The Project runs through 2007)

Vehicle operations (for year 2000 - Worst Case)
- NOx (Kern County only): 0.08 tons/year
- VOC (Kern County only): 0.03 tons/year

See attachments for calculations.

Step 9: Are the emissions resulting from the action below the de minimis level?

Yes. De minimis level for moderate PM10 nonattainment areas is 100 tons per year. The de minimis level for serious ozone nonattainment areas is 50 tons each for NOx and VOCs.

Step 10: Is the action regionally significant?

No. An action is considered regionally significant if its emissions will represent 10 percent or more of a nonattainment or maintenance area's total emission budget for that pollutant. The PM10 Planning Emissions Inventory for the Searles Valley Planning Area (Inyo County Portion) is 5.806 tons per day, or 2119 tons per year (Searles Valley PM10 Plan, Table 111-1, 1991. The worst year estimate for this action is equal to 0.40% of that total for the year 2000. The year 2000 is approximately double a normal test year.

The NOx Planning Emissions Inventory for 1996 for Kern County is 38.99 tons per day or 14,231 tons per year. The estimated NOx emissions from this action equal only a negligible fraction of that amount.
The VOC Planning Emissions Inventory for 1996 for Kern County is 13.64 tons per day or 4,978 tons per year. The estimated VOC emissions from this action equal only a negligible fraction of that amount.

Since the emissions from this action are below the de minimis level, and the action is not considered regionally significant, it is exempt from any further requirements under the Conformity rule (40 CFR 93.153(c)(1)).
Calculations of Air Quality (PM10) Conformity Decision

The following calculations are performed to provide an estimate of PM10 emissions from actions related to JSOW programmatic needs so that a determination of Compliance with the Clean Air Act Conformity Rule may be made. Summary total will include both a test set-up and a test component. The test set-up will consist of off-road travel to the test sites, the arraigning of any equipment or targets for the test, plowing of the sites as required and general preparation work associated with the specific test objectives. Testing components will consist of off-road travel to the sites, estimates of test vehicle impacts, and emissions from aircraft involved in the test.

The JSOW program extends from 1996 through the year 2007. For the purpose of determining the emissions for specific years a schedule was established using the data provided by the JSOW Project Office, and contained in the JSOW EA - January 19, 1996 document on page 2-9, listed as Table 2 and Table 3. Table B1 provides the preliminary JSOW Test Matrix and is included below. All calculations use this matrix to provide the total emissions per year for calculations. Data from the JSOW Project Office indicates that in a typical year the total number of tests will not exceed 20. However, in the development years of 1996, 1997, and 2000, these test numbers go up to 26, 21, and 38 respectfully. These are very aggressive schedules and significantly above the typical or planned average. These numbers have been used, however the typical year is carried along to provide the reader with what is expected in a normal year. It should also be noted that additional testing is listed in Table 4 of the JSOW EA, however it is planned for Eglin Air Force Base, and is not included in the calculations provided here in.

B.1 Test Set-up

B.1.1 Test Set-up - Off Road Travel

The formula for \( \text{lb./Vehicle Mile Traveled (VMT) = E from EPA AP-42 (1985)} \)

\[
E = k \times (s) \times (S) \times (W)^{0.7} \times (w)^{0.5} \times (365 - p) \times (\text{lb./VMT}) \quad (\text{eq. 1})
\]

Where:
- \( E = \) Emission Factor
- \( k = \) Particle Size Multiplier (dimensionless) (2.1)
- \( s = \) Silt Content of Surface Soil (%)
- \( S = \) Mean Vehicle Speed, (mph)
- \( W = \) Mean Vehicle Weight, (ton)
- \( w = \) Mean Number of Wheels
- \( p = \) Number of Days with at least 0.01 in. of precipitation/year

Four basic types of vehicles are planned to be used. These include a six-wheeled water truck, a six wheeled hauling truck, a pickup truck and a Scraper (Tractor Machine). The water truck and the hauling truck are basically the same engine-wheel and weight configuration and are assumed to produce the same emissions and PM10. Basic data for these vehicles is contained in Table B1-1 below.
# JSOW Test Matrix Schedule

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<td>Total per Year</td>
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<td>15</td>
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Table B: Preliminary JSOW Flight Test Schedule
Table B1-1: Emissions per Mile per Vehicle for Off Road Travel

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<th>Data</th>
<th>Truck-Haul</th>
<th>Truck</th>
<th>Scraper</th>
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<td>(Tractor)</td>
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<td>p</td>
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<td>21.5</td>
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E = 5.1 1.7 2.1

Where E is in lb/VMT

The distance to each site is listed in Table B1-2 below. Also included is a breakdown of the number of unpaved miles and the distribution by County.

Table B1-2: Number of Miles to Test Sites

<table>
<thead>
<tr>
<th>Test Site</th>
<th>FAE</th>
<th>Sam Site</th>
<th>Coles Flat</th>
<th>Airport Lake</th>
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</tr>
<tr>
<td>Miles in Kern County, Paved</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Miles in Kern County, Unpaved</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Miles in Inyo County, Paved</td>
<td>8</td>
<td>8</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>Miles in Inyo County, Unpaved</td>
<td>2</td>
<td>7</td>
<td>16</td>
<td>7</td>
</tr>
</tbody>
</table>

| Total Miles to Each Site | 18 | 23 | 54 | 25 |

The start point is the Instrumentation Operations Building (IOB)

Included in Table B1-3 below are the number of trips to each site by each vehicle type for the test set up operations required for each test.
Table B1-3: Average Number of Vehicles per Day to Test Site for Test Set-up

<table>
<thead>
<tr>
<th>Test Site &gt; &gt; &gt; &gt;</th>
<th>FAE</th>
<th>Sam Site</th>
<th>Coles Flat</th>
<th>Airport Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Truck-Haul (Water)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Truck-Haul</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Truck-Pickup</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Scraper (Tractor)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total Number of Vehicle to Site</td>
<td>9</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

Based upon current operations, it is estimated that only one day will be required for each test set up for each site. Therefore the total mileage for each vehicle would be one round trip to the test site. Thus for PM10 from fugitive dust we have the following equation.

\[
\text{Emissions/Vehicle Type} = \text{lb/mi of vehicle emissions} \times \text{number of Vehicles of type} \times \text{number of trips/vehicle} \times \text{number of days/set-up} \times \text{round trip distance on unpaved roads} \quad (\text{eq. 2})
\]

A summary of total vehicle emission for each site for a typical test set-up is listed in Table B-4 below.

Table B1-4: Off-road Vehicle PM10 Emissions for JSOW Test Set-up per Site per Test

<table>
<thead>
<tr>
<th>Test Site &gt; &gt; &gt; &gt;</th>
<th>FAE</th>
<th>Sam Site</th>
<th>Coles Flat</th>
<th>Airport Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Truck-Haul (Water)</td>
<td>41</td>
<td>143</td>
<td>326</td>
<td>143</td>
</tr>
<tr>
<td>Truck-Haul</td>
<td>0</td>
<td>214</td>
<td>490</td>
<td>214</td>
</tr>
<tr>
<td>Truck-Pickup</td>
<td>41</td>
<td>428</td>
<td>979</td>
<td>428</td>
</tr>
<tr>
<td>Scraper (Tractor)</td>
<td>8</td>
<td>71</td>
<td>163</td>
<td>71</td>
</tr>
<tr>
<td>Total Vehicle Emissions PM10</td>
<td>90</td>
<td>857</td>
<td>1,958</td>
<td>857</td>
</tr>
</tbody>
</table>

Emissions of PM10 are in lbs. Emission per Test Set-up per Site from Off Road Travel

**B.1.2 Test Set-up - Construction - Tilling of Soil**

Actual tilling (scraping) will be performed at the FAE, and the SAM sites to prepare a level area to assess submunition dispersal patterns. This activity is essentially identical to agricultural tilling, therefore the formula for Agricultural Tilling (lb./acre) from EPA-42 (1985) will be used.

\[
E, \text{ or lb./acre} = k \times (4.8)^s \times (s)^{0.6} \quad (\text{eq. 3})
\]
Where:

\[ E = \text{Emission Factor} \]
\[ k = \text{Particle Size Multiplier (dimensionless) = 2.1 for particles } \leq 10 \mu \]
\[ s = \text{Silt Content of Surface Soil (\%) = 20\%} \]

Because the target areas are generally of the same surface material as the roads in the area we have used the silt contact factor equal to what was used on the roads, \((s)\), see equation (1) above.

\[ E = 2.1 \times (4.8) \times (s^{0.6}) = (12) \]

The JSOW Program have selected existing target sites which have been used before and already have significant clear areas, see Table 1: Proposed Target Site Characteristics and Surface Disturbance on page 2-3 of JSOW EA - January 19. Some sites will require additional expansion and clearing to meet the JSOW requirements. These are listed in Table B1-5 below including the additional areas to be cleared, the emissions per acre, per equation (3), and the total pounds of PM10 emission per site for clearing. It is noted that this clearing action is a one time operation. Also it has been assumed that this clearing will take place in 1996.

<table>
<thead>
<tr>
<th>Test Site</th>
<th>FAE</th>
<th>Sam Site</th>
<th>Coles Flat</th>
<th>Airport Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acres to Clear*</td>
<td>113</td>
<td>24</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Emissions/Acre</td>
<td>13.4</td>
<td>13.4</td>
<td>None Required</td>
<td>None Required</td>
</tr>
<tr>
<td>Emissions/Site</td>
<td>1,515</td>
<td>322</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* See Table 1: Proposed Target Site Characteristics and Surface Disturbance on page 2-3.

B.1.3: Summary for Test Set-up & Site Clearing

The total amount PM10 for test set-up will be the off road travel and a one time site clearing. Therefore if we take the maximum number of tests in one year and compare this to the results of the tests of the first year where the additional emissions were produced as a result of the construction we will have the largest emission year for the test set up phase. The test set-up phase has the greatest number of trucks and equipment required for a test operation. Therefore we have the following equation.

\[
\text{Emissions per site per test set-up site} = (\text{road emissions per site} \times \text{number of tests per year per site}) + \text{test site clearing (required only in first year)} = \text{Total emissions per year for test set-up per site. (eq. 4)}
\]
These are then summed by year to provide the total emissions for JSOW test set up per year. Data provided by the Project Office indicates the maximum number of tests per year is not expected to exceed 20 except in the start up phase of each new R&D JSOW Model. This occurs in years 1996, 1997 and 2000. In the year 2000 a total of 37 tests + FLT/WING training for Navy and Airforce tactical units are planned. It should be noted however, that in those years where extensive development testing is in progress, FLT/WING requirements are combined with development and OPEVAL testing to reduce the total number of assets and tests required. Therefore it is assumed that the maximum number of baseline units will consist of a total of 26 test to be conducted in 1996. For the Unitary Variant the maximum number of tests will consist of a total of 38 tests to be conducted in the year 2000. An analysis was conducted for both years to determine if the increased number of sets resulted in greater emissions than the lesser number of test in 1996 when combined with the construction of the two sites. Results of this analysis, are listed in Tables B1-6, B1-7, B1-8, and B1-9 below. From a test set-up standpoint clearly the year 2000 represents the greater amount of PM10 emissions.

Table B1-6: Total Emissions of PM10 in Pounds per Site Set-up and Preparation for 1996

<table>
<thead>
<tr>
<th>Test Site &gt; &gt; &gt; &gt; &gt;</th>
<th>FAE</th>
<th>Sam Site</th>
<th>Coles Flat</th>
<th>Airport Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Live W/H Tests</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Number of Inert Tests</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Max # of Test Set-ups 1996</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Vehicle Emissions/Site per Test</td>
<td>90</td>
<td>857</td>
<td>1,958</td>
<td>857</td>
</tr>
<tr>
<td>Emissions/Site, 1996 for Set-up</td>
<td>358</td>
<td>3,427</td>
<td>7,834</td>
<td>11,995</td>
</tr>
<tr>
<td>Construction/Tilling Emissions</td>
<td>1,515</td>
<td>322</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Emissions per Site for Site Set-up 1996</td>
<td>1,873</td>
<td>3,749</td>
<td>7,834</td>
<td>11,995</td>
</tr>
</tbody>
</table>

Total Pounds Emissions from all Sites for Test Set-up Operations in 1996 25,451
Table B1-7: Total Emissions of PM10 in Pounds per Site Set-up and Preparation for 2000

<table>
<thead>
<tr>
<th>Test Site</th>
<th>FAE</th>
<th>Sam Site</th>
<th>Coles Flat</th>
<th>Airport Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Live W/H Tests</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Number of Inert Tests</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Max # of Test Set-ups 2000</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Vehicle Emissions/Site per Test</td>
<td>90</td>
<td>857</td>
<td>1,958</td>
<td>857</td>
</tr>
<tr>
<td>Emissions/Site, 2000 for Set-up</td>
<td>717</td>
<td>6,854</td>
<td>15,667</td>
<td>11,995</td>
</tr>
<tr>
<td>Construction/Tilling Emissions</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Emissions per Site for Site Set-up 2000</td>
<td>717</td>
<td>6,854</td>
<td>15,667</td>
<td>11,995</td>
</tr>
</tbody>
</table>

Total Pounds Emissions from all Sites for Test Set-up Operations in 2000 35,234

Table B1-8: Total Emissions of PM10 in Pounds per Site Set-up and Preparation for 1997

<table>
<thead>
<tr>
<th>Test Site</th>
<th>FAE</th>
<th>Sam Site</th>
<th>Coles Flat</th>
<th>Airport Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Live W/H Tests</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Number of Inert Tests</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Max # of Test Set-ups 1997</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Vehicle Emissions/Site per Test</td>
<td>90</td>
<td>857</td>
<td>1,958</td>
<td>857</td>
</tr>
<tr>
<td>Emissions/Site, 1997 for Set-up</td>
<td>358</td>
<td>3,427</td>
<td>7,834</td>
<td>12,852</td>
</tr>
<tr>
<td>Construction/Tilling Emissions,1996 only</td>
<td>NA</td>
<td>NA</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Emissions per Site for Site Set-up 1997</td>
<td>358</td>
<td>3,427</td>
<td>7,834</td>
<td>12,852</td>
</tr>
</tbody>
</table>

Total Pounds Emissions from all Sites for Test Set-up Operations in 1997 24,471

Table B1-9: Lists a Comparison of the 3 Highest Years from a Test Set-up Standpoint.

Total Pounds Emissions from all Sites for Test Set-up Operations in 1996 25,451
Total Pounds Emissions from all Sites for Test Set-up Operations in 1997 24,471
Total Pounds Emissions from all Sites for Test Set-up Operations in 2000 35,234
The highest year for PM10 emissions for test set up is the year 2000 with a total emission release of 35,234 pounds, or 17.6 tons. This is a worst case year as it nearly double the predicted maximum number of tests expected for a single year. Additionally, it is noted that these are initial planning numbers and representative a very aggressive schedule with almost no time between shots for analysis or change of hardware if required. A more reasonable number would be the maximum of 20 tests per year based upon the FLT/Wing training requirements which are expected to continue to the year 2007. This is listed in Table B1.10, amounts to 9.2 tons per year for the test set-up phase.

### Table B1-10: Total Emissions of PM10 in Pounds per Site Set-up for a Typical Test Year.

<table>
<thead>
<tr>
<th>Test Site &gt; &gt; &gt; &gt;</th>
<th>FAE</th>
<th>Sam Site</th>
<th>Coles Flat</th>
<th>Airport Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Live W/H Tests</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Number of Inert Tests</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Max # of Test Set-ups</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Vehicle Emissions/Site per Test</td>
<td>90</td>
<td>857</td>
<td>1,958</td>
<td>857</td>
</tr>
<tr>
<td>Emissions/Site, Typical Year for Set-up</td>
<td>358</td>
<td>3,427</td>
<td>7,834</td>
<td>6,854</td>
</tr>
<tr>
<td>Total Pounds PM10 from all Sites for Test Set-up operations in a Typical Year</td>
<td>18,474</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### B.2 Test Operations

For test operations, the parameters to be considered for PM10 emissions include the following.

- Off Road Travel for Test Operations Personnel
- Emissions from the Impacting Vehicle
  - Inert Vehicle
    - Destruction of inert vehicle after impact (for Security)
  - Warhead Vehicle Emissions
    - Baseline Variant
    - Unitary Variant
- Aircraft Operations

#### B.2.1 Operations - Off Road Travel

Off road travel is similar to that produced in Table B1-3, however only pickup trucks are used, and the number is increased to 10 trips per test because of the operations and instrumentation load. Other factors remain the same. Using the emissions for pickups and site travel as generated in section B.1 the total amounts of PM10 generated for tests for years 1996, 1997, 2000 and for a typical test year with 20 tests are shown in figures B2-1, B2-2, B2-3 and B2-4 respectfully. The worst case is the year 2000, with a total of 14.6 tons. A typical test year is listed in Table B2-4 and shows a total of 7.7 tons of PM10 for vehicle travel supporting JSOW test operations.
### Table B2-1: Off-road Vehicle PM10 Emissions for JSOW Test Operations for Year 1996

<table>
<thead>
<tr>
<th>Test Site</th>
<th>FAE</th>
<th>Sam Site</th>
<th>Coles Flat</th>
<th>Airport Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Type</td>
<td>Truck-Pickup, Emissions/Trip</td>
<td>7</td>
<td>71</td>
<td>163</td>
</tr>
<tr>
<td>Number of Vehicles per Test</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Number of Tests 1996</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Total Vehicle Emissions PM10</td>
<td>272</td>
<td>2,856</td>
<td>6,528</td>
<td>9,996</td>
</tr>
<tr>
<td>Total Emissions from Vehicle Travel for Test Operations in 1996</td>
<td>19,652</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Emissions of PM10 are in lbs. Emission per Test Operation per Site from Off Road Travel

### Table B2-2: Off-road Vehicle PM10 Emissions for JSOW Test Operations for Year 1997

<table>
<thead>
<tr>
<th>Test Site</th>
<th>FAE</th>
<th>Sam Site</th>
<th>Coles Flat</th>
<th>Airport Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Type</td>
<td>Truck-Pickup, Emissions/Trip</td>
<td>7</td>
<td>71</td>
<td>163</td>
</tr>
<tr>
<td>Number of Vehicles per Test</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Number of Tests 1997</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Total Vehicle Emissions PM10</td>
<td>272</td>
<td>2,856</td>
<td>6,528</td>
<td>10,710</td>
</tr>
<tr>
<td>Total Emissions from Vehicle Travel for Test Operations in 1997</td>
<td>20,366</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Emissions of PM10 are in lbs. Emission per Test Operation per Site from Off Road Travel
Table B2-3: Off-road Vehicle PM10 Emissions for JSOW Test Operations for Year 2000

<table>
<thead>
<tr>
<th>Test Site &gt; &gt; &gt; &gt;</th>
<th>FAE</th>
<th>Sam Site</th>
<th>Coles Flat</th>
<th>Airport Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Truck-Pickup, Emissions/Trip</td>
<td>7</td>
<td>71</td>
<td>163</td>
<td>71</td>
</tr>
<tr>
<td>Number of Vehicles per Test</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Number of Tests 2000</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Total Vehicle Emissions PM10</td>
<td>544</td>
<td>5,712</td>
<td>13,056</td>
<td>9,996</td>
</tr>
</tbody>
</table>

Total Emissions from Vehicle Travel for Test Operations in 2000 29,308

Emissions of PM10 are in lbs. Emission per Test Operation per Site from Off Road Travel

Table B2-4: Off-road Vehicle PM10 Emissions for a Typical JSOW Test Operations Year

<table>
<thead>
<tr>
<th>Test Site &gt; &gt; &gt; &gt;</th>
<th>FAE</th>
<th>Sam Site</th>
<th>Coles Flat</th>
<th>Airport Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Truck-Pickup, Emissions/Trip</td>
<td>7</td>
<td>71</td>
<td>163</td>
<td>71</td>
</tr>
<tr>
<td>Number of Vehicles per Test</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Number of Tests/Typical year</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Total Vehicle Emissions PM10</td>
<td>272</td>
<td>2,856</td>
<td>6,528</td>
<td>5,712</td>
</tr>
</tbody>
</table>

Total Emissions from Vehicle Travel for Test Operations in a Typical Year 15,368

Emissions of PM10 are in lbs. Emission per Test Operation per Site from Off Road Travel

B.2.1 Operations - Emissions from Impacting Air Test Vehicles & Warheads

The JSOW consists of a basic guided truck air vehicle with various payloads. It is planned to test two of the payload (Warheads) types at China Lake. These are typically called the “JSOW Baseline”, consisting of the BLU-97 A/B combined effects bomblet (CEB), and the Unitary Variant, consisting of the 500 pound BLU-111 unitary warhead. This
warhead is a variant of the time tested MK-82 500 pound bomb. In addition to the warheads impacting there are about 50% of the tests planned with inert warheads. These are called Inert Vehicles and represent the bulk of the previous JSOW testing.

B.2.1.1 Operations - Emissions from the Impacting Air Test Vehicles

Emissions from the impacting air test vehicles was analyzed in the first phase of the JSOW program, and was accepted. It is therefore repeated here and combined with the total number of tests per year and with the other emissions to provide for total JSOW test emissions.

Assumes:
Single impact of intact JSOW vehicle as worst case.

Energy, and subsequent PM10 emission, released from impact will be dependent on speed of vehicle, angle of impact, soil composition and moisture level, and potential for secondary explosions from flight termination or submunitions-related material. As a potential substitute, given the projected submunition dispersal pattern area of 21,000 sq. ft. (0.5 acre), we will use the Heavy Construction rate for 1 acre for 1 day.

Therefore, emissions (lb. of fugitive dust) from the JSOW impact:

\[(1,200)^*(1/30) = 80 \text{ lb.} \quad \text{(eq. 5)}\]

In addition to the fugitive dust) from the JSOW impact, the remains of each test vehicle, and the remains of the bomblets are collected into a pile and further destructed by placing an explosive charge of 150 pounds of explosive on top of the vehicle and bomblet remains, and then detonating the explosive. The primary reason is to ensure destruction of all parts for security reasons. The size of the crater caused by this is approximately 5 feet in diameter and 3 feet deep, and is conical shaped. The volume is given by equation (6).

\[V = \frac{1}{3} \pi r^2 h = \frac{3.14 \times (2.5)^2 \times 3}{3} = 19.65 \text{ ft}^3 = 0.73 \text{ cu yds} \quad \text{(eq. 6)}\]

This equals 0.73 cubic yards. Since a typical weight for dirt is about one ton per cubic yard, we have a total amount of dirt displaced of 0.73 tons. Based upon the “Draft” report “Burro Canyon Open Burn/Open Detonation Health Risk, Volume I: Text”, by RADIAN, of August 1994, about 1% of the volume displaced goes to PM10. Therefore we have a total amount of PM10 released for each event of 14.5 pounds of PM10 for each test of an inert round, or a warhead round containing baseline BLU 97 A/B warhead.

The two years with the most tests are 1996 and 1997. These are listed below.

For 1996, 26 tests results in a total of 377.8 lb. PM10, which equals 0.19 tons
For 1997, 21 tests results in a total of 305.1 lb. PM10, which equals 0.15 tons
For the year 2000 where the testing consists of the Unitary Variant, only the inert rounds are destroyed by a placement charge. Therefore only the inert tests are counted in the calculation.

For 2000, 23 tests results in a total of 334.2 lb. PM10, which equals 0.17 tons

For a typical year of 20 rounds, it is estimated that 15 tests would be inert or baseline warheads and required destruction. Therefore a total of 15 tests results in a total of 218.0 lb. PM10, which equals 0.11 tons of PM10 released for a typical year.

Additionally there is a component of the explosive propellant that goes to PM10 when burned. Some estimates provide for as much as 54% of the total propellant weight may go to PM10. To provide for a conservative estimate we have assumed that 55% of the weight of the explosive charge may be converted. Also there is an additional amount of propellant used for burning the inert vehicle remains. This is 150 pounds. It is noted that even the baseline warhead rounds piece parts are collected after a warhead firing and burned in an identical manner. Therefore for baseline warhead tests twice the amount of PM10 is estimated. For the BLU-111 variant, the propellant weight for the Mk-82 of 196 pounds is used. This provides the following emission for the various types of tests.

For all inert test vehicles.
Potential PM10 = 0.55 * 150 = 82.5 lb.

For all Baseline warhead test vehicles.
Potential PM10 = 0.55 * 150 * 2 = 165 lb.

For all BLU-111 warhead test vehicles.
Potential PM10 = 0.55 * 196 = 107.8 lb.

The totals by year are shown in Table 2-5.

Table 2-5: Emissions from propellant burning for selected years

<table>
<thead>
<tr>
<th>JSOW Test Vehicle</th>
<th>Emissions lb Per Test</th>
<th>Number of tests per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1996</td>
<td>1997</td>
</tr>
<tr>
<td>Baseline, Inert</td>
<td>82.5</td>
<td>16</td>
</tr>
<tr>
<td>Baseline, Warhead</td>
<td>165.0</td>
<td>10</td>
</tr>
<tr>
<td>Unitary, Inert</td>
<td>82.5</td>
<td>0</td>
</tr>
<tr>
<td>Unitary, Warhead</td>
<td>107.0</td>
<td>0</td>
</tr>
</tbody>
</table>

The totals by year are shown in Table 2-5.

<table>
<thead>
<tr>
<th></th>
<th>1996</th>
<th>1997</th>
<th>2000</th>
<th>Typical</th>
</tr>
</thead>
<tbody>
<tr>
<td>lbs Propellant Emissions by Year</td>
<td>2,970</td>
<td>2,558</td>
<td>3,503</td>
<td>2,243</td>
</tr>
<tr>
<td>Emissions by Year in Tons</td>
<td>1.49</td>
<td>1.28</td>
<td>1.75</td>
<td>1.12</td>
</tr>
</tbody>
</table>

B.2.1.2 Operations - Emissions from JSOW Warhead Impacts

The baseline Variant utilizes the BLU-97 A/B combined effects bomblet warhead (CEB). This carries 145 individual bomblets that are dispersed over an area of 200 by 200 square feet, approximately 0.9 acres. Each of these bomblet impacts result in a conical shaped crater four feet in diameter and about six inches deep when impacting on Airport
Lake. Airport Lake is the only site where live tests of this warhead will be conducted, see Table B2-6.

The Unitary Variant utilizes the BLU-111 unitary warhead. The BLU-111 is basically the same as the MK 82 500 pound general purpose bomb containing a steel case and approximately 196 pounds of explosive. In normal earth or sandy loam soils common to all sites except Airport Lake the BLU-111 will produce a crater about 15 feet in Diameter and about 7.5 feet deep. At the Airport Lake site the crater is about half the diameter and about half as deep (8 feet in Diameter and 4 feet deep) and produces significantly less soil and associated PM10 dispersed into the air. This is due to the compacted clay soils in the lake bed. Table B2-6. shows the size and volumes of the different craters.

The crater volumes are then combined with the number of warhead tests per year and with the methodology for defining the releases of PM10 from blast craters defined in paragraph B.2.1.1 above, and calculations produced for the years 1996, 1997, 2000, and for a typical test year with 20 JSOW tests. These are listed in Tables B2-7 through B2-10 below.

Table B2-6: Crater Shapes and Volumes for JSOW Warheads

<table>
<thead>
<tr>
<th>Type of Warhead</th>
<th>No. in Vehicle</th>
<th>Crater shape</th>
<th>Diameter in feet</th>
<th>Depth in feet</th>
<th>Crater Total Vol. Cu ft</th>
<th>Total Vol.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Bomblet</td>
<td>145</td>
<td>Conical</td>
<td>4</td>
<td>0.5</td>
<td>2.09</td>
<td>303.5</td>
</tr>
<tr>
<td>Unitary, Clay</td>
<td>1</td>
<td>Conical</td>
<td>8</td>
<td>4</td>
<td>67.0</td>
<td>67.0</td>
</tr>
<tr>
<td>Unitary, Soil</td>
<td>1</td>
<td>Spherical</td>
<td>15</td>
<td>7.5</td>
<td>883.13</td>
<td>883.1</td>
</tr>
</tbody>
</table>

Table B2-7: Amount of PM10 from Warhead Tests for the Year 1996

<table>
<thead>
<tr>
<th>JSOW Vehicle Type</th>
<th>Crater Volume cu. ft.</th>
<th>Crater* Volume cu. yds.</th>
<th>No. of Tests in 1996</th>
<th>Tons of Emissions</th>
<th>Tons of PM10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Bomblet</td>
<td>303.5</td>
<td>11.2</td>
<td>10</td>
<td>112.4</td>
<td>1.12</td>
</tr>
<tr>
<td>Unitary, Clay</td>
<td>67.0</td>
<td>2.5</td>
<td>0</td>
<td>0.0</td>
<td>0.00</td>
</tr>
<tr>
<td>Unitary, Soil</td>
<td>883.1</td>
<td>32.7</td>
<td>0</td>
<td>0.0</td>
<td>0.00</td>
</tr>
</tbody>
</table>

*Note: One cu. yd. of soil weighs approx. 1 ton

Total PM10 = 1.12
### Table B2-8: Amount of PM10 from Warhead Tests for the Year 1997

<table>
<thead>
<tr>
<th>JSOW Vehicle Type</th>
<th>JSOW Crater Volume (cu. ft.)</th>
<th>JSOW Crater Volume (cu. yds.)</th>
<th>No. of Tests in 1997</th>
<th>PM10 Emissions of</th>
<th>Tons of PM10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Bomblet</td>
<td>303.5</td>
<td>11.2</td>
<td>11</td>
<td>123.7</td>
<td>1.24</td>
</tr>
<tr>
<td>Unitary, Clay</td>
<td>67.0</td>
<td>2.5</td>
<td>0</td>
<td>0.0</td>
<td>0.00</td>
</tr>
<tr>
<td>Unitary, Soil</td>
<td>883.1</td>
<td>32.7</td>
<td>0</td>
<td>0.0</td>
<td>0.00</td>
</tr>
</tbody>
</table>

*Note: One cu. yd. of soil weighs approx. 1 ton

Total PM10 = 1.24

### Table B2-9: Amount of PM10 from Warhead Tests for the Year 2000

<table>
<thead>
<tr>
<th>JSOW Vehicle Type</th>
<th>JSOW Crater Volume (cu. ft.)</th>
<th>JSOW Crater Volume (cu. yds.)</th>
<th>No. of Tests in 2000</th>
<th>PM10 Emissions of</th>
<th>Tons of PM10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Bomblet</td>
<td>303.5</td>
<td>11.2</td>
<td>0</td>
<td>0.0</td>
<td>0.00</td>
</tr>
<tr>
<td>Unitary, Clay</td>
<td>67.0</td>
<td>2.5</td>
<td>9</td>
<td>22.3</td>
<td>0.22</td>
</tr>
<tr>
<td>Unitary, Soil</td>
<td>883.1</td>
<td>32.7</td>
<td>6</td>
<td>196.3</td>
<td>1.96</td>
</tr>
</tbody>
</table>

*Note: One cu. yd. of soil weighs approx. 1 ton

Total PM10 = 2.19

### Table B2-10: Amount of PM10 from Warhead Tests for a Typical Test Year

<table>
<thead>
<tr>
<th>JSOW Vehicle Type</th>
<th>JSOW Crater Volume (cu. ft.)</th>
<th>JSOW Crater Volume (cu. yds.)</th>
<th>No. of Tests in Typical Yr.</th>
<th>PM10 Emissions of</th>
<th>Tons of PM10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Bomblet</td>
<td>303.5</td>
<td>11.2</td>
<td>10</td>
<td>112.4</td>
<td>1.12</td>
</tr>
<tr>
<td>Unitary, Clay</td>
<td>67.0</td>
<td>2.5</td>
<td>5</td>
<td>12.4</td>
<td>0.12</td>
</tr>
<tr>
<td>Unitary, Soil</td>
<td>883.1</td>
<td>32.7</td>
<td>5</td>
<td>163.5</td>
<td>1.64</td>
</tr>
</tbody>
</table>

*Note: One cu. yd. of soil weighs approx. 1 ton

Total PM10 = 2.88

### B.3.1. Operations Aircraft Emissions

Particulate emissions from aircraft are to be considered below 3000 feet above ground level (AGL). Flight patterns projected for JSWO will generally be above this level, therefore, emission factors/values given in EPA AP-42 (1985) for aircraft during the Landing/Takeoff (LTO) cycle will be used.

Data for total particulates is taken from EPA AP-42 Table II-10 "Emissions for Military Landing/Takeoff cycles." Data for the F/A-18 is not available, therefore, a worst-case scenario is the substitution of emissions from an F-14 Tomcat (a substantially heavier aircraft, with two engines) will be substituted.
Total Particulates (lb.) per LTO: 24.24
Total Particulates (lb.) per test: 48.48
(Two aircraft are used per test)

Using the total numbers of tests from Table B1, and multiplying these times the emissions per test of 48.48 pounds provides the totals per year. The totals are listed for the primary years of interest below.

1996 1260 lb.
1997 1018 lb.
2000 1842 lb.
Typical Year 970 lb.

B.4 Calculations for VOC, CO, NOx, and PM10 Vehicle Emissions.

B.4.1 Calculations for Kern County.

Calculations are provided for vehicle operation in Kern County for the emissions of VOC, CO, NOx, and PM10. Table B4-1 lists the emissions emitted from the vehicles utilized in the JSOW program. A scraper (tractor) is also used but since it remains on site in Inyo County it is not required for calculated emissions in Kern County. It is required to calculate the emissions for the scraper in Inyo County.

Table B4-1: Vehicle Emissions per 1000 Miles Traveled

<table>
<thead>
<tr>
<th>Vehicles Type</th>
<th>Emissions in lbs/1000 VMT*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VOCs</td>
</tr>
<tr>
<td>Pickup, Gasoline</td>
<td>4.71</td>
</tr>
<tr>
<td>Truck, Heavy duty Diesel</td>
<td>4.48</td>
</tr>
<tr>
<td>Scraper</td>
<td>Not Driven in Kern County</td>
</tr>
</tbody>
</table>

*Reference (1)
NAWS China Lake Internal Memo 5090;
823EOOD(C8305)/209
dated 13 July 1995

The number of miles traveled in Kern County is based upon the number of tests and the number of vehicles driven to the site for each test. The maximum number of tests in any year occurs in the year 2000, with the total number of tests being 38. Since all tests start at Range operations building and end there, and the round trip distance to the Kern county line is 16 miles, this is the number used for each vehicle traveling to each test. The total number of vehicles is the combined number for test set-up and for test operations. Thus the total number of Kern County miles traveled for each vehicle type for the year 2000 is listed in Table B4-2. The total emissions for the two vehicle types are listed in table B4-3. The number is also converted to tons for easy comparison with the totals allowable.
Table B4-2: Vehicle Miles Traveled Kern County

<table>
<thead>
<tr>
<th>Vehicles Type</th>
<th>No. of Trucks</th>
<th>Miles in Test per Test</th>
<th>Miles in Kern</th>
<th>Total VMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickup, (Gas)</td>
<td>38</td>
<td>16</td>
<td>16</td>
<td>9,728</td>
</tr>
<tr>
<td>Truck, HD Diesel</td>
<td>38</td>
<td>5</td>
<td>16</td>
<td>3,040</td>
</tr>
</tbody>
</table>

Table B4-3: Vehicle Emissions per Miles Traveled in Kern County

<table>
<thead>
<tr>
<th>Vehicles Type</th>
<th>Emissions in lbs</th>
<th>CO</th>
<th>NOx</th>
<th>PM10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickup, Gasoline</td>
<td>45.82</td>
<td>383.38</td>
<td>38.13</td>
<td>4.47</td>
</tr>
<tr>
<td>Truck, Heavy Duty Diesel</td>
<td>13.62</td>
<td>55.88</td>
<td>117.22</td>
<td>23.29</td>
</tr>
</tbody>
</table>

| Total lb. Emissions, Kern | 59.44            | 439.26 | 155.36 | 27.76 |
| Emissions in Tons         | 0.03             | 0.22   | 0.08   | 0.01  |

B.4.2 Calculations for Inyo County.

Inyo County requires that only the PM10 of the Vehicle Emissions be calculated. By combining the total number of vehicles required for each test, the miles to each test site, and the number of tests conducted at each test site for the year 2000, the total number of vehicle miles traveled (VMT) by type in Inyo County is obtained. This is listed in Table B4-4. The vehicle emission for PM10 for Inyo County is listed in Table B4-5.
### B4-4: Vehicle Miles Traveled Inyo County

#### For Tests Conducted at FAE

<table>
<thead>
<tr>
<th>Vehicles</th>
<th>No. of Trucks</th>
<th>Miles in FAE VMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickup, (Gas)</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Truck, HD Diesel</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Scraper</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

#### For Tests Conducted at Sam Site

<table>
<thead>
<tr>
<th>Vehicles</th>
<th>No. of Trucks</th>
<th>Miles in S/S VMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickup, (Gas)</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Truck, HD Diesel</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Scraper</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

#### For Tests Conducted at Coles Flat

<table>
<thead>
<tr>
<th>Vehicles</th>
<th>No. of Trucks</th>
<th>Miles in C/F VMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickup, (Gas)</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Truck, HD Diesel</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Scraper</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

#### For Tests Conducted at Airport Lake

<table>
<thead>
<tr>
<th>Vehicles</th>
<th>No. of Trucks</th>
<th>Miles in Ap/L VMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickup, (Gas)</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>Truck, HD Diesel</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>Scraper</td>
<td>14</td>
<td>1</td>
</tr>
</tbody>
</table>

Total VMT by Vehicle Type in Inyo County:

- **Pickup, (Gas)**: 25,792 miles
- **Truck, Heavy Duty (Diesel)**: 8,060 miles
- **Scraper (Same engine as in Heavy Duty Truck)**: 596 miles

### Table B4-5: Vehicle Emissions per Miles Traveled in Inyo County

<table>
<thead>
<tr>
<th>Vehicles</th>
<th>Emissions in lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>PM10</td>
</tr>
<tr>
<td>Pickup, Gasoline</td>
<td>11.86</td>
</tr>
<tr>
<td>Truck, Heavy Duty Diesel</td>
<td>61.74</td>
</tr>
<tr>
<td>Scraper, (Diesel)</td>
<td>0.75</td>
</tr>
</tbody>
</table>

Total Emissions, Inyo County:

- **Emissions in lbs**: 73.60
- **Emissions in Tons**: 0.04
B.5 Summary Calculations of Total PM10 Emissions.

The total number of test per year by warhead variant is listed in Table B1. It is noted that the FLT/WING training is planned for China Lake and that no specific number of tests per year has been established for this function. Information to date indicates that a maximum number of 20 tests per year will be conducted for training. For the years with heavy testing, such as 2000, it is assumed that, as done in the past development programs, the training will be combined with the R&D and OPEVAL firings and that no additional firings above the number 20, or the number required for R&D and OPEVAL will be required.

The following Tables show the PM10 for the three worst years, 1996, 1997 and 2000. Also a typical test year showing 20 test firings is included. This is believed to be the most realistic schedule. This typical Test year has been included as being a normal year for the JSOW program.

Normal operations for JSOW testing require that all roads be watered, see main JSOW EA January 19, 1996. To meet this requirement two water trucks have been planned for each test. For the PM10 calculations we have calculated the non-treated case and carried it through to the final tables. Here we have added in the factor of 85% emission reduction for the use of water. This factor has been added for only the road travel emissions, however since the sites are also watered, it would clearly have a significant effect on the emissions from the various impacts. Therefore we consider the follow PM10 emissions to be a truly worst case level, and we believe the actual amount will be well within these maximum case levels. Again we have carried forward the three largest testing years and a fourth year of what is considered a “Typical JSOW Operations Year”

<table>
<thead>
<tr>
<th>Table B5-1: Summary of JSOW PM10 Emissions for Year 1996</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
</tr>
<tr>
<td>Test Set-up</td>
</tr>
<tr>
<td>Off Road Travel</td>
</tr>
<tr>
<td>Test Operations</td>
</tr>
<tr>
<td>Off Road Travel</td>
</tr>
<tr>
<td>Inert Vehicle Impacts</td>
</tr>
<tr>
<td>Post Test Vehicle Destruction</td>
</tr>
<tr>
<td>Emissions from Propellants</td>
</tr>
<tr>
<td>Warhead Vehicle Impacts</td>
</tr>
<tr>
<td>Aircraft Operations</td>
</tr>
<tr>
<td>Vehicle Emissions Kern*</td>
</tr>
<tr>
<td>Vehicle Emissions Inyo*</td>
</tr>
<tr>
<td>Total 1996 for all operations</td>
</tr>
</tbody>
</table>

* The vehicle emissions provided were calculated for the worst case year only, year 2000.
Table B5-2: Summary of JSOW PM10 Emissions for Year 1997

<table>
<thead>
<tr>
<th>Function</th>
<th>Reference Table or Paragraph Number</th>
<th>Emissions PM10 in Tons Worst case (No Water on Roads)</th>
<th>Emissions PM10 in Tons Normal Operations Water on Roads</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Set-up</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off Road Travel</td>
<td>B1-8</td>
<td>12.24</td>
<td>1.84</td>
</tr>
<tr>
<td><strong>Test Operations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off Road Travel</td>
<td>B2-2</td>
<td>10.18</td>
<td>1.53</td>
</tr>
<tr>
<td>Inert Vehicle Impacts</td>
<td>B.2.1.1</td>
<td>0.64</td>
<td>0.64</td>
</tr>
<tr>
<td>Post Test Vehicle Destruction</td>
<td>B.2.1.1</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>Emissions from Propellants</td>
<td>B2-5</td>
<td>1.28</td>
<td>1.28</td>
</tr>
<tr>
<td>Warhead Vehicle Impacts</td>
<td>B2-8</td>
<td>1.24</td>
<td>1.24</td>
</tr>
<tr>
<td>Aircraft Operations</td>
<td>B.3.1.</td>
<td>0.51</td>
<td>0.51</td>
</tr>
<tr>
<td>Vehicle Emissions Kern*</td>
<td>B4-3</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Vehicle Emissions Inyo*</td>
<td>B4-5</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td><strong>Total 1997 for all operations</strong></td>
<td></td>
<td><strong>26.29</strong></td>
<td><strong>7.23</strong></td>
</tr>
</tbody>
</table>

* The vehicle emissions provided were calculated for the worst case year only, year 2000.

Table B5-3: Summary of JSOW PM10 Emissions for Year 2000

<table>
<thead>
<tr>
<th>Function</th>
<th>Reference Table or Paragraph Number</th>
<th>Emissions PM10 in Tons Worst case (No Water on Roads)</th>
<th>Emissions PM10 in Tons Normal Operations Water on Roads</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Set-up</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off Road Travel</td>
<td>B1-7</td>
<td>14.65</td>
<td>2.20</td>
</tr>
<tr>
<td><strong>Test Operations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off Road Travel</td>
<td>B2-3</td>
<td>14.65</td>
<td>2.20</td>
</tr>
<tr>
<td>Inert Vehicle Impacts</td>
<td>B.2.1.1</td>
<td>0.64</td>
<td>0.64</td>
</tr>
<tr>
<td>Post Test Vehicle Destruction</td>
<td>B.2.1.1</td>
<td>0.17</td>
<td>0.17</td>
</tr>
<tr>
<td>Emissions from Propellants</td>
<td>B2-5</td>
<td>1.75</td>
<td>1.75</td>
</tr>
<tr>
<td>Warhead Vehicle Impacts</td>
<td>B2-9</td>
<td>0.52</td>
<td>0.52</td>
</tr>
<tr>
<td>Aircraft Operations</td>
<td>B.3.1.</td>
<td>0.92</td>
<td>0.92</td>
</tr>
<tr>
<td>Vehicle Emissions Kern*</td>
<td>B4-3</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Vehicle Emissions Inyo*</td>
<td>B4-5</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td><strong>Total 2000 for all operations</strong></td>
<td></td>
<td><strong>33.36</strong></td>
<td><strong>8.45</strong></td>
</tr>
</tbody>
</table>

* The vehicle emissions provided were calculated for the worst case year only, year 2000.
Table B5-4: Summary of JSOW PM10 Emissions for a Typical Year

<table>
<thead>
<tr>
<th>Function</th>
<th>Reference Table or Paragraph Number</th>
<th>Emissions PM10 in Tons</th>
<th>Emissions PM10 in Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Worst case (No Water on Roads)</td>
<td>Normal Operations Water on Roads</td>
<td></td>
</tr>
<tr>
<td>Test Set-up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off Road Travel</td>
<td>B1-9</td>
<td>3.43</td>
<td>0.51</td>
</tr>
<tr>
<td>Test Operations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off Road Travel</td>
<td>B2-4</td>
<td>7.68</td>
<td>1.15</td>
</tr>
<tr>
<td>Inert Vehicle Impacts</td>
<td>B.2.1.1</td>
<td>0.64</td>
<td>0.64</td>
</tr>
<tr>
<td>Post Test Vehicle Destruction</td>
<td>B.2.1.1</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td>Emissions from Propellants</td>
<td>B2-5</td>
<td>1.12</td>
<td>1.12</td>
</tr>
<tr>
<td>Warhead Vehicle Impacts</td>
<td>B2-10</td>
<td>1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>Aircraft Operations</td>
<td>B.3.1.1</td>
<td>0.48</td>
<td>0.48</td>
</tr>
<tr>
<td>Vehicle Emissions Kern*</td>
<td>B4-3</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Vehicle Emissions Inyo*</td>
<td>B4-5</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>Total for all Operations for a Typical Year</td>
<td>15.02</td>
<td>5.57</td>
<td></td>
</tr>
</tbody>
</table>

* The vehicle emissions provided were calculated for the worst case year only, year 2000.
Figure D-1. Estimated J402 Engine Noise Characteristics (Teledyne CAE 1985).
Figure D-2. Measured Sound Performance of the 275 DFBF 60 Hz Generator (Cummins CAL Pacific 1996).
D.3 FA-18 AIRCRAFT NOISE LEVELS

SOUND EXPOSURE LEVEL AS A FUNCTION OF SLANT DISTANCE
(air to ground) (AESO 1984)

F-18
Traffic pattern (68% rpm)
200 Knots air speed
Code 007131

Slant distance | Sound exposure level (feet) | decibels
--- | --- | ---
200 | 107.8 |  
250 | 106.2 |  
315 | 104.5 |  
400 | 102.9 |  
500 | 101.1 |  
630 | 99.3 |  
800 | 97.4 |  
1000 | 95.5 |  
1250 | 93.4 |  
1600 | 91.3 |  
2000 | 89.0 |  
2500 | 86.7 |  
3150 | 84.2 |  
4000 | 81.6 |  
5000 | 78.8 |  
6300 | 75.9 |  
8000 | 72.8 |  
10000 | 69.6 |  
12500 | 66.1 |  
16000 | 62.5 |  
20000 | 58.6 |  
25000 | 54.5 |  

D.4 DESCRIBING SOUND

Sound is the variation of air pressure about a mean atmospheric pressure. A whisper at 2 meters causes a pressure variation of about 0.0006 Pascals (Pa) where 100,000 Pa is equated to the standard atmospheric pressure of 14.7 psi. Firing an M16 rifle causes a pressure change of about 1,000 Pa at the firer's ear (EHA 1992, Appendix B). The range of pressures that the ear can hear (1:100,000,000,000,000) is so large that a logarithmic scale is used to express them. In the logarithmic scale a unit of pressure is called a decibel (dB). In the decibel scale, the source being measured is expressed as a ratio to a standard reference pressure. For airborne sounds this is generally taken to be 20 micro Pascals (0.00002 µPa which is roughly the minimum pressure detectable by the human ear (Jones and Broadbent 1987). Thus, the sound pressure level in decibels is defined to be equal to 20 times the log to the base 10 of the source sound pressure divided by the reference pressure.

Since decibels are logarithmic, they cannot be added directly but must be converted. Sixty-five decibels plus 60 decibels does not equal 125 decibels. In adding decibels, the sound levels must be converted to acoustic energy by dividing the decibels by 10 and computing the inverse logarithm. For example, 60 decibels is equal to 1,000,000 and 65 decibels is equal to 3,162,278. Then the common logarithm is taken of the sum (4,162,278) yielding 6.6. This number is multiplied by 10 to give a sum of 66 dB (EHA 1992).

Several relationships exist among decibels. In human hearing an increase of sound pressure of 10 dB is perceived as a doubling in the loudness of the sound. Doubling sound...
energy corresponds to an increase of 3 dB. Multiplying sound energy by 10 increases the sound by 10 dB. A doubling of sound pressure corresponds to an increase of 6 dB. Multiplication of sound pressure by a factor of 10 increases the sound pressure level by 20 dB.

Sound is defined by two physical characteristics: its intensity or pressure and its audio frequency. Frequency is expressed as cycles per second or Hertz (Hz). The relationship of sound pressure to frequency of a noise defines the noise's frequency spectrum. This spectrum is important in determining the noise's physical and physiological effects since hearing depends upon both frequency and intensity for interpretation. For example, the human ear is more sensitive to sounds of 1000 Hz and above than 125 Hz and below (EHA 1992). Several weighting networks can be used to approximate the apparent loudness of a noise to the human ear. Three networks were developed: A, B, and C. Historically, these were supposed to simulate the sensitivity of the ear to low (A), medium (B), and high (C) intensities. The A-weighting more closely matches the frequency spectrum heard by people. Sound pressure levels that use the A-weighting are expressed as dBA. The C-weighting network gives essentially equal weight to all frequencies (Jones and Broadbent 1987). Awbrey (1980) states that animal hearing curves do not necessarily match human curves and, therefore, sounds that affect animals should be measured without acoustic frequency weighting (flat). This is probably the same as linear weighting wherein the sound energy contained in all frequencies is weighted equally. This weighting is commonly used to measure the peak sound level from impulsive events such as small arms fire (EHA 1992).

The highest noise level that permits relaxed conversation with 100 percent intelligibility throughout a room is 45 dBA, and people tend to raise their voices when the background noise exceeds 45 to 50 dBA (U.S. Environmental Protection Agency 1971). A typical building can reduce noise levels by 15 dBA with the windows open and 25 dBA with the windows closed. Therefore, if the exterior ambient noise level at a building is 60 dBA, the interior ambient noise level would be approximately 45 dBA with the windows open and 35 dBA with the windows closed.

The sound exposure level (SEL) is used as a single number to express noise annoyance. Three important determinants of noise annoyance are intensity of the noise event, duration of the event, and the number of times the noise event takes place (EHA 1992). The SEL is equal to 10 times the logarithm of the ratio of the time integral A-weighted squared sound pressure to the product of the squared reference sound pressure level (20 µPa) and the reference duration of 1 second (Jehl and Cooper 1980). The SEL is the sound level which would produce the same A-weighted sound energy as the actual event if this sound lasted for one second (AESO 1984). The SEL is especially useful in describing short events such as thunderclaps and aircraft flyovers (Jehl and Cooper 1980). For aircraft over flights, the SEL would typically be 5 to 10 dB higher than the maximum measured sound level during the event (NAVFAC 1993).

SEls given in the following two tables use a threshold level of 10 dBs below the maximum level. In other words, the noise energy from sounds more than 10 dB below the peak sound are not included in the SEL.

Table D-1 lists sound pressure and sound-pressure levels of some common sounds.

<table>
<thead>
<tr>
<th>SOUND SOURCE</th>
<th>SOUND PRESSURE (Pa)</th>
<th>SOUND PRESSURE LEVEL (Decibels, A-weighted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturn rocket</td>
<td>100.000. (one atmosphere)</td>
<td>194</td>
</tr>
<tr>
<td>Ram jet</td>
<td>2.000</td>
<td>160</td>
</tr>
<tr>
<td>Propeller aircraft</td>
<td>200</td>
<td>140</td>
</tr>
<tr>
<td>Threshold of pain</td>
<td>20</td>
<td>135</td>
</tr>
<tr>
<td>Riveter</td>
<td>2</td>
<td>120</td>
</tr>
<tr>
<td>Heavy truck</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>
### D.5 NOISE IMPACTS ON WILDLIFE

Adverse effects of noise on a wildlife species, include an adverse reaction such as stampeding, preventing a necessary reaction, causing a change in the hearing ability, or causing physical damage to the species.

To elicit an adverse reaction a noise would have to be both above the hearing threshold of the species and be recognized as representative of a threat to the animal. A noise can also be so loud that normal hearing to communicate with a pup or others of the same species, find prey, or avoid predators is prevented.

The absolute or detection threshold is that level of sound at which the animal can first detect its presence. The sound pressure level at which this occurs for a pure tone is dependent upon the frequency of the tone, its loudness, and the species under consideration. Usually noises at this level are too soft to recognize, classify and respond to. The animal might orient itself to hear the sound better or for potential flight (Gales 1982).

At the next level up of sound pressure the animal is able to recognize the source of the noise because it is above its auditory threshold, can be heard above the background noise (favorable signal-to-noise ratio or critical ratio), and can be classified as threatening or non-threatening. Classification of the sound may require signal-to-noise ratios of 10 to 20 dB. The noise may elicit a startle response from the animal where it picks up its head, listens, and looks around. If the animal does not recognize the noise source or considers the source a threat it may move away from the source. The particular response depends upon the learning ability of the animal, its life stage, ecological niche (whether hearing is used to avoid predators, communicate, or find food), current phase of its reproductive cycle, and population density. Major vertebrates can learn to ignore loud noises; horses and sea lions have been trained to ignore explosion noises (Gales 1982, Fletcher and Busnel 1978).

Jehl and Cooper (1980) reported that when jets flew over marine mammals on San Miguel Island more than 1,000 feet AGL they produced no effect. Jets flying below 1,000 feet usually produced some effect (usually some movement). They concluded that jet overflights were only a minor source of disturbance. This study did not report any noises of sufficient loudness to cause communication problems, interfere with normal predator or prey relations, cause a change in hearing ability, or cause any physical damage to the hearing organs.

The NAWS Point Mugu Environmental Division conducted a study of the effects of FA-18C/D aircraft overflights on migratory birds and marine mammals at SNI. Animals were observed by field personnel and through video. Effects on the animals were seen at only the primary site (Twin Beaches, directly south of the target site) among three. The maximum effect on the mammals was that a few sat up momentarily but none made any movement toward the water. Cormorants and pelicans did not respond, even when the aircraft flew directly over them. These animals were not breeding or nesting, and their responses to the same sounds during such activities may be different. Results to a low altitude (e.g., 500 feet AGL) overflight might be different if the animals had not previously been exposed to a series of progressively lower and
louder overflights with progressively shorter durations and more rapid onsets of sound (Greene 1998).

REFERENCES CITED


Cummins CAL Pacific, Inc., Irvine, California. 10 June 1996. Personal communication.


APPENDIX E

BIOLOGICAL RESOURCES

E.1 OLF SAN NICOLAS ISLAND

TABLE E.1-1. ENDANGERED AND THREATENED MARINE SPECIES.

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Endangered/Threatened Status</th>
<th>Status in SCB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SEA TURTLES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chelonia mydas</em> (including agassizi)</td>
<td>Green sea turtle</td>
<td>FT; FE: Pacific coast of Mexico breeding colony population.</td>
<td>Suggested northernmost population located in San Diego Bay (20 to 30 individuals); most commonly observed hard shell sea turtle on west coast of US(^1)</td>
</tr>
<tr>
<td><em>Dermochelys coriacea</em></td>
<td>Leatherback sea turtle</td>
<td>FE</td>
<td>Most common sea turtle north of Mexico(^1), essentially pelagic</td>
</tr>
<tr>
<td><em>Caretta caretta</em></td>
<td>Loggerhead sea turtle</td>
<td>FT</td>
<td>Juveniles reported off California; concentrations of 1-5/km(^2) at peak of sightings(^1)</td>
</tr>
<tr>
<td><em>Lepidochelys olivacea</em></td>
<td>Olive (Pacific) ridley sea turtle</td>
<td>FT; FE: Pacific coast of Mexico breeding colony population.</td>
<td>Most populous of north Pacific sea turtles(^1)</td>
</tr>
<tr>
<td><strong>MARINE MAMMALS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Physeter macrocephalus</em> (=catodon)*</td>
<td>Sperm whale</td>
<td>FE</td>
<td>823(^2)</td>
</tr>
<tr>
<td><em>Balaena glacialis</em> (including australis)</td>
<td>Right whale</td>
<td>FE</td>
<td>16(^2)</td>
</tr>
<tr>
<td><em>Balaena mysticetus</em></td>
<td>Bowhead whale*</td>
<td>FE</td>
<td>Not listed in NMFS (1993)</td>
</tr>
<tr>
<td><em>Balaenoptera musculus</em></td>
<td>Blue whale*</td>
<td>FE</td>
<td>183(^2)</td>
</tr>
<tr>
<td><em>Balaenoptera physalus</em></td>
<td>Finback whale</td>
<td>FE</td>
<td>77(^2)</td>
</tr>
<tr>
<td><em>Balaenoptera borealis</em></td>
<td>Sei whale*</td>
<td>FE</td>
<td>6(^2)</td>
</tr>
<tr>
<td><em>Megaptera novaeangliae</em></td>
<td>Humpback whale*</td>
<td>FE</td>
<td>63(^2)</td>
</tr>
<tr>
<td><em>Calorhinus ursinus</em></td>
<td>Northern fur seal</td>
<td>Depleted</td>
<td>4,000(^3)</td>
</tr>
<tr>
<td><em>Arctocephalus townsendi</em></td>
<td>Guadalupe fur seal</td>
<td>FT, ST</td>
<td>1 to 5(^3)</td>
</tr>
<tr>
<td><em>Eumetopias jubatus</em></td>
<td>Steller (Northern) sea lion</td>
<td>FT</td>
<td>100(^3)</td>
</tr>
</tbody>
</table>

\(^*\)Located in the SCB. Other endangered and threatened whales also appear occasionally.

<table>
<thead>
<tr>
<th>Federal</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>FE:</td>
<td>Federally listed endangered</td>
</tr>
<tr>
<td>FT:</td>
<td>Federally listed threatened</td>
</tr>
<tr>
<td>SE:</td>
<td>State listed endangered</td>
</tr>
<tr>
<td>ST:</td>
<td>State listed threatened (Smith 1995).</td>
</tr>
</tbody>
</table>

**Notes:**

1. Eckert (1993). She did not give population estimates in terms of numbers.
## E.2 NAWS CHINA LAKE

### E.2.1 Sensitive Plant Species

**TABLE E.2-1. SENSITIVE PLANT SPECIES KNOWN OR SUSPECTED TO EXIST AT NAWS CHINA LAKE.**

<table>
<thead>
<tr>
<th>Species Common Name Scientific Name</th>
<th>North or South Range Complex</th>
<th>Elevation (feet above MSL)</th>
<th>Associated Plant Community at NA WCWPNS China Lake</th>
<th>Status Federal/State/CNPS Or Reason for NA WCWPNS-Sensitive Species</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plants Confirmed at NA WCWPNS China Lake</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pinyon rock cress <em>Arabis dispar</em></td>
<td>North</td>
<td>4,000-8,000</td>
<td>Pinyon woodland, Great Basin mixed scrub, sagebrush scrub, Joshua tree woodland, blackbush scrub</td>
<td>/-/-2</td>
</tr>
<tr>
<td>Darwin mesa milk-vetch <em>Astragalus atratus</em> var. <em>mensanus</em></td>
<td>North</td>
<td>5,800-7,800</td>
<td>Pinyon woodland, Great Basin mixed scrub, sagebrush scrub, Joshua tree woodland, blackbush scrub</td>
<td>/-/-1B</td>
</tr>
<tr>
<td>Desert bird’s beak <em>Cordylanthus emeritus</em> ssp. <em>eremicus</em></td>
<td>North</td>
<td>4,900-8,400</td>
<td>Pinyon woodland, Great Basin mixed scrub, sagebrush scrub, Joshua tree woodland, blackbush scrub, desert transition scrub</td>
<td>/-/-4</td>
</tr>
<tr>
<td>Yerba desierta <em>Fendlerella utahensis</em></td>
<td>North</td>
<td>4,900-8,400</td>
<td>Pinyon woodland, Great Basin mixed scrub, desert transition scrub</td>
<td>/-/-4</td>
</tr>
<tr>
<td>Creosote clones <em>Larrea tridentata</em></td>
<td>North</td>
<td>2,000-3,000</td>
<td>Mojave sand field</td>
<td>Scientific value (extreme age)</td>
</tr>
<tr>
<td>Coso Mountains lupine <em>Lupinus magnificus</em> var. <em>glareola</em></td>
<td>North</td>
<td>5,000-8,000</td>
<td>Pinyon woodland, Great Basin mixed scrub, sagebrush scrub, Joshua tree woodland, blackbush scrub</td>
<td>/-/-4</td>
</tr>
<tr>
<td>Crowned mulla <em>Muilla coronata</em></td>
<td>North</td>
<td>3,000-5,700</td>
<td>Joshua tree woodland, blackbush scrub, desert transition scrub, Mojave mixed scrub, hopsage scrub, shadscale scrub, creosote bush scrub</td>
<td>/-/-4</td>
</tr>
<tr>
<td>Death Valley round-leaved phacelia <em>Phacelia mustelina</em></td>
<td>South</td>
<td>300-6,000</td>
<td>Joshua tree woodland, blackbush scrub, Mojave mixed scrub</td>
<td>/-/-1B</td>
</tr>
<tr>
<td>Charlotte's phacelia <em>Phacelia nashiana</em></td>
<td>North</td>
<td>2,000-7,200</td>
<td>Joshua tree woodland, Mojave mixed scrub, hopsage scrub, shadscale scrub, creosote bush scrub</td>
<td>FSC/-/-1B</td>
</tr>
<tr>
<td>Mohave Indigobush <em>Psorothamnus arborescens</em> var. <em>arborescens</em></td>
<td>South</td>
<td>Above 2,500</td>
<td>Joshua tree woodland, blackbush scrub, Mojave mixed scrub, hopsage scrub</td>
<td>/-/-4</td>
</tr>
<tr>
<td>Mojave fish-hook cactus <em>Sclerocactus polyacanthus</em></td>
<td>Both</td>
<td>2,000-7,000</td>
<td>Great Basin mixed scrub, Joshua tree woodland, blackbush scrub, desert transition scrub, Mojave mixed scrub, shadscale scrub, creosote bush scrub</td>
<td>/-/-4</td>
</tr>
<tr>
<td>DeDecker’s clover <em>Trifolium macientum</em> var. <em>dedeckeriae</em></td>
<td>North</td>
<td>6,900-11,500</td>
<td>Pinyon woodland</td>
<td>/-/-1B</td>
</tr>
</tbody>
</table>

<p>| <strong>Plants with unconfirmed records at NA WCWPNS China Lake</strong> | | | | |
| Darwin rock cress <em>Arabis pulchra</em> | North | 3,500-6,500 | NA | /-/-2 |</p>
<table>
<thead>
<tr>
<th>Species</th>
<th>Habitat</th>
<th>Altitude Range</th>
<th>Federal Status</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shining milk-vetch (Astragalus lentiginosus var. micans)</td>
<td>North</td>
<td>2,000-3,500</td>
<td>FPT/-/1B</td>
<td></td>
</tr>
<tr>
<td>Naked milk-vetch (Astragalus serroii var. shockleyi)</td>
<td>North</td>
<td>4,000-7,000</td>
<td>--/-2</td>
<td></td>
</tr>
<tr>
<td>Panamint mariposa lily (Calochortus panamintensis)</td>
<td>North</td>
<td>6,500-8,100</td>
<td>--/-4</td>
<td></td>
</tr>
<tr>
<td>Booth’s evening-primrose (Camissonia boothii ssp. boothii)</td>
<td>North</td>
<td>2,500-4,500</td>
<td>--/-4</td>
<td></td>
</tr>
<tr>
<td>Winged cryptantha (Cryptantha holopetra)</td>
<td>South</td>
<td>300-4,000</td>
<td>--/-4</td>
<td></td>
</tr>
<tr>
<td>Mount Pinos larkspur (Delphinium parryi ssp. purpureum)</td>
<td>North</td>
<td>3,000-8,500</td>
<td>--/-4</td>
<td></td>
</tr>
<tr>
<td>Panamint dudleya (Dudleya saxosa ssp. saxosa)</td>
<td>South</td>
<td>3,000-7,100</td>
<td>FSC/-/4</td>
<td></td>
</tr>
<tr>
<td>Clark mountain buckwheat (Eriogonum heermannii var. floccosum)</td>
<td>North</td>
<td>5,000-6,000</td>
<td>--/-4</td>
<td></td>
</tr>
<tr>
<td>Inyo hulsea (Huisea vestita ssp. inyoensis)</td>
<td>North</td>
<td>4,600-7,800</td>
<td>--/-2</td>
<td></td>
</tr>
<tr>
<td>Caespitose evening-primrose (Oenothera caespitosa ssp. crinita)</td>
<td>North</td>
<td>3,800-11,000</td>
<td>--/-4</td>
<td></td>
</tr>
<tr>
<td>Plants with habitat at NAWCWPNS China Lake</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lane Mountain milk-vetch (Astragalus jagerianus)</td>
<td>South</td>
<td>3,000-4,000</td>
<td>FPE/-/1B</td>
<td></td>
</tr>
<tr>
<td>Pygmy poppy (Camisia candida)</td>
<td>North</td>
<td>2,000-4,000</td>
<td>--/-1B</td>
<td></td>
</tr>
</tbody>
</table>


Notes: NA = information not available

State Status
- = No status definition
1B = List 1B, Plants rare and endangered in California and elsewhere
2 = List 2, Plants rare, threatened, or endangered in California, but more common elsewhere
4 = Plants of limited distribution - a watch list
### E.2.2 Sensitive Wildlife Species

#### TABLE E.2-2. SENSITIVE WILDLIFE SPECIES KNOWN OR SUSPECTED TO EXIST AT NAWS CHINA LAKE.

<table>
<thead>
<tr>
<th>Species Common Name</th>
<th>Scientific Name</th>
<th>North or South Range</th>
<th>Habitat on NAWS China Lake</th>
<th>Legal Status Federal/State</th>
<th>Reason for NAWS CWPSNS-Sensitive Species Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invertebrates:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Giant Fairy shrimp</td>
<td>Branchinecta gigas.</td>
<td>North</td>
<td>Playas</td>
<td>--/--</td>
<td>Species occurs in a protected habitat</td>
</tr>
<tr>
<td>Jerusalem Crickets</td>
<td>Stenopelmatus spp</td>
<td>North</td>
<td>Creosote bush scrub, sandy areas</td>
<td>--/--</td>
<td>May be an endemic species of limited distribution</td>
</tr>
<tr>
<td>Dune Cockroach</td>
<td>Arrenurus sp.</td>
<td>North</td>
<td>Sand dunes</td>
<td>--/--</td>
<td>May be an endemic species or subspecies</td>
</tr>
<tr>
<td>Darwin Tiemann's beetle</td>
<td>Megacheuma brevipennis tiemanni</td>
<td>North</td>
<td>Associated with Parry saltbush, which occurs near playas</td>
<td>--/--</td>
<td>Has a limited distribution</td>
</tr>
<tr>
<td>Argus land snail</td>
<td>Eremariontoides argus</td>
<td>Both</td>
<td>Revenue Canyon, Homewood Canyon, Slate Range, Mountain Springs Canyon Sand dunes</td>
<td>--/--</td>
<td>Species of limited distribution</td>
</tr>
<tr>
<td>Dune weevils</td>
<td>Trigonoscuta sp.</td>
<td>North</td>
<td>Sand dunes</td>
<td>--/--</td>
<td>Species of limited distribution</td>
</tr>
<tr>
<td>Butterfly (No common name)</td>
<td>Plebejulina emigodonis</td>
<td>North</td>
<td>Near the El Conejo Gate</td>
<td>--/--</td>
<td>Species of limited distribution</td>
</tr>
<tr>
<td>Butterfly (No common name)</td>
<td>Euphilotes baueri vemalis</td>
<td>North</td>
<td>Argus Range, Coso Range, Etcheron Valley</td>
<td>--/--</td>
<td>Species of limited distribution</td>
</tr>
<tr>
<td>Cercyonis sibenele</td>
<td>Amphibians:</td>
<td>North</td>
<td>Haly Spring</td>
<td>--/--</td>
<td>BLM indicator species</td>
</tr>
<tr>
<td>Western toad</td>
<td>Bufo boreas</td>
<td>North</td>
<td>Haly Spring</td>
<td>--/--</td>
<td>BLM indicator species</td>
</tr>
<tr>
<td>Reptiles:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chuckwalla</td>
<td>Sauromalus obesus</td>
<td>Both</td>
<td>Argus Range, Coso Range, rocky areas to 6,000 feet above MSL</td>
<td>--/--</td>
<td>BLM indicator species</td>
</tr>
<tr>
<td>Panamint alligator lizard</td>
<td>Gerrhonotus panamintina</td>
<td>North</td>
<td>Argus Range, Coso Range, Margaret Ann Spring, Haly Spring</td>
<td>FSC/CSC</td>
<td>Legal status</td>
</tr>
<tr>
<td>Gilbert's skink</td>
<td>Eumeces giberti</td>
<td>North</td>
<td>North Range springs and riparian habitat</td>
<td>--/--</td>
<td>BLM indicator species</td>
</tr>
<tr>
<td>Birds:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neotropical migrant birds</td>
<td></td>
<td>Both</td>
<td>Riparian areas</td>
<td>Variable</td>
<td>Species may include migrant threatened or endangered species.</td>
</tr>
<tr>
<td>Raptors</td>
<td></td>
<td>Both</td>
<td>Throughout</td>
<td>Variable</td>
<td>Federally-endangered and California-listed species are migrants</td>
</tr>
<tr>
<td>Wetlands Birds</td>
<td></td>
<td>Both</td>
<td>Playas, riparian areas</td>
<td>Variable</td>
<td>Birds use wetlands resources</td>
</tr>
<tr>
<td>Species</td>
<td>Common Name</td>
<td>Scientific Name</td>
<td>North or South Range</td>
<td>Habitat on NAWCWPNS China Lake</td>
<td>Legal Status/ Federal/State</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>------------------------------</td>
<td>-------------------------------</td>
<td>----------------------</td>
<td>--------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td><strong>Mammals:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mohave ground squirrel</td>
<td>Spermophilus mohavensis</td>
<td>Both</td>
<td>Brown Mountain, Pilot Knob Valley, Superior Valley, Coso geothermal area</td>
<td></td>
<td>FE*/SE*</td>
</tr>
<tr>
<td>Vole</td>
<td>unknown species</td>
<td>Both</td>
<td>Lark Seep, Paxton Ranch, Margaret Ann Spring, Eagle Crags</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nelson’s bighorn sheep</td>
<td>Ovis canadensis nelsoni</td>
<td>Both</td>
<td>Transient in the Argus Mountains and Eagle Crags</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argus Mountains</td>
<td></td>
<td>North</td>
<td>Upper Cactus Flat, Darwin Wash</td>
<td></td>
<td>-/-</td>
</tr>
<tr>
<td>Kangaroo rat</td>
<td>Dipodomys panamintinus</td>
<td>Both</td>
<td>Water sources and roosting places, such as old buildings and mines</td>
<td></td>
<td>FSC/CSC</td>
</tr>
<tr>
<td>Pallid bat</td>
<td>Antrozous pallidus</td>
<td>Both</td>
<td>Water sources and roosting places, such as old buildings and mines</td>
<td></td>
<td>FSC/CSC</td>
</tr>
<tr>
<td>Townsend’s big-eared bat</td>
<td>Corynorhinus townsendii</td>
<td>Both</td>
<td>Water sources and roosting places, such as old buildings and mines</td>
<td></td>
<td>FSC/CSC</td>
</tr>
<tr>
<td>Spotted bat</td>
<td>Euderma maculatum</td>
<td>Both</td>
<td>Water sources and roosting places, such as old buildings and mines</td>
<td></td>
<td>FSC/CSC</td>
</tr>
<tr>
<td>Western mastiff bat</td>
<td>Eumops perotis</td>
<td>Both</td>
<td>Water sources and roosting places, such as old buildings and mines</td>
<td></td>
<td>FSC/CSC</td>
</tr>
<tr>
<td>Ringtail</td>
<td>Bassariscus astutus</td>
<td>North</td>
<td>Argus Range, Coso Range</td>
<td></td>
<td>-/-</td>
</tr>
<tr>
<td>American badger</td>
<td>Taxidea taxus</td>
<td>Both</td>
<td>All slopes on the North and South Ranges</td>
<td></td>
<td>-/-</td>
</tr>
<tr>
<td>Mountain lion</td>
<td>Felis concolor</td>
<td>North</td>
<td>Argus Range, Coso Range</td>
<td></td>
<td>-/-</td>
</tr>
</tbody>
</table>


**Notes:** NA = information not available

**State Status**

Fe - Endangered
SC = California species of special concern
FSC = Species of Concern (formerly C2)
- = No status definition

**REFERENCES**


E-5
OPNAV (Office of the Chief of Naval Operations). 1 June 1993. Request for a letter of authorization for the incidental take of marine mammals associated with Navy projects involving underwater detonations in the outer Sea Test Range of the Naval Air Warfare Center, Weapons Division Pt. Mugu, California. Request submitted by the Chief of Naval Operations for the Commander, Naval Air Warfare Center (Weapons Division), Pt. Mugu, California.
APPENDIX F
CULTURAL RESOURCES

F.1 OLF SAN NICOLAS ISLAND

F.1.1 CA-SNI-168 Site Study Results

CA-SNI-168 is a large, 255,000 meter square, heavily eroded, shell and lithic scatter. The site is located in an area of unstable, longitudinal dunes. The shifting sands are exposing and covering cultural resources. An occasional shellfish, animal or fish bone, or stone artifact lies on the surface of the gently sloping leeward sides of the dunes. On windward sides, vertical erosion cuts reveal both exposed and buried deposits which are being undercut and destroyed by wind action. Below such exposures, heavy scatters of shellfish, bone, and artifacts can be seen; many are very wind worn. Wind rows of ubiquitous land snail shells, buried land snail shell strata, and empty shells intermixed with archaeological deposits exist throughout the site. Although the relationship between aboriginal human activity and land snails is unclear, the shells do indicate vegetation once covered the site sufficiently to support land snail communities. No snail communities appear to live at the site today (Rosenthal and Padon 1996).

The data recovery program indicates that CA-SNI-168 is a camp site where final tool manufacture, food processing, and general domestic production and maintenance activities were occurring throughout the year (Rosenthal et al. 1997).

F.1.1.1 Surface Resources

The surface deposits represent eroded middens where wind and possibly water action have removed organic material, light-weight fragmentary shell and bone resources, and generally caused disintegration of all but the sturdiest shell and stone. Numerous once shallow midden pockets are just surface scatters of shell and stone today. The cultural resource of CA-SNI-168 consists of six spatially separate artifact and midden concentrations. The six loci vary from each other in their degree of deflation, the extent of dune and remnant middens, their vegetative cover, and presence of scattered single and grouped artifacts. Based on surface inspection, however, they do not appear to differ in the general quantity or condition of cultural resources. The initial assessment did indicate that variation in shellfish taxa and stone materials existed. Petra, therefore, decided to test each locus within and outside the target zone, though necessarily concentrating their efforts on the area affected by SLAM activities (Rosenthal and Padon 1996).

The initial field work either mapped or collected numerous ground stone tools (such as manos, mortars, net sinkers and weights) as well as a ubiquitous tool, a "pitted stone." A lot of evidence of flaked stone tool preparation was found. Evidence also indicated the use of a large chert biface. Several ornamental items (stone and shell beads, and pendants) and whale bone tools and shell fishhook blanks were recorded. The variety of artifacts found indicated that this was the site of a major camp where food procurement and processing and tool maintenance activities occurred (Rosenthal and Padon 1996).

Within the SLAM project's 300 foot impact area, portions of four loci with concentrated artifact and faunal resources, are present. One locus, termed B, lies entirely within the impact area, while parts of Locus A, Locus C, and a major part of Locus D are also within the impact area. Only Loci E and F are entirely outside the SLAM project's direct impact area (Rosenthal and Padon 1996).

Locus F, several hundred meters from the targets, displays intact middens with artifacts, dense shellfish remains, and varied vertebrate fauna. Loci B and C have small deflating or remnant middens where wind erosion and dune collapse have condensed the
archaeological layers and deteriorated the faunal remains, yet considerable resources still exist.
Only surface resources remain at Loci A, D and E (Rosenthal and Padon 1996).

F.1.1.2 Subsurface Resources

Although a wide variety of artifacts were both observed and collected during the field assessment far fewer artifacts actually appeared subsurface. Petra's subsurface investigations demonstrated that only limited intact middens remained in the vicinity of the target area. Two midden subsurface concentrations were found which consist primarily of shellfish associated with some stone artifact and vertebrate faunal remains. Both of these produced radiocarbon samples indicating a Middle Period occupation dating to approximately 1000 BC. Neither midden is extensive nor deep (Rosenthal and Padon 1996).

F.1.2 CA-SNI-169 Survey and Index Unit Results

CA-SNI-169 is a dispersed midden area which consists of at least three deflating midden remnants. The densest cultural material in the index unit was encountered in the 30 to 40 centimeter level. CA-SNI-169 is contemporary with CA-SNI-168 and is probably part of the extensive CA-SNI-168 camp which spread and moved across the landscape over the centuries (Rosenthal et al. 1997).

F.1.3 CA-SNI-170 Survey and Index Unit Results

CA-SNI-170 is a large midden area which has been heavily impacted by wind and water erosion and past military activities. Even though there are widely dispersed surface stone artifacts and shellfish, little intact midden remains (Rosenthal et al. 1997).

F.1.4 Evaluation of Significance

The test investigation's objective was to comply with Section 106 of the NHPA which requires the project proponent to gather sufficient information to determine if an archaeological site may be eligible for inclusion on the National Register. Significance of prehistoric sites is generally based on how an archaeological resource can contribute to the knowledge of history or prehistory, and of how its data can address specific or general research questions. Determination of significance can not be made for an individual cultural resource in isolation, but must be considered within local or regional contexts, requiring good comparability among data across a region.

Burial or exposure of the artifacts by wind (eolian action) can alter or destroy a cultural association's context and compromise the scientific value of the site. In eolian contexts artifacts and ecofacts may be buried, in or beneath dunes, occur on the surface, or within deflated dune areas. Artifacts generally move laterally with the prevailing wind direction, but can move against the wind if a bedrock depression gets scoured out from below the midden causing the midden to fall backwards into the windward direction. Small scale dune slumping can also displace artifacts. Rapid artifact burial can increase site preservation while long-term exposure destroys contexts. Exposure also oxidizes resources, damaging faunal and microbotanical (pollen) remains. Constant sand movement breaks more fragile bone and shell ecofacts and artifacts into fragments. This fragmentation may be differential, affecting some classes of material or taxa more than others. A dune site may vary from retaining most associations because of rapid burial, to having no patterning at all because of deflation and dune movement. The best preserved eolian environments are where buried remains are observed either within a dune stabilized by vegetation or sealed by a paleosol (Rosenthal and Padon 1996).

Petra's review of the test investigation results indicate that CA-SNI-168 contains important scientific data of considerable antiquity. This 3000 year old site has diagnostic (temporally and ethnically distinct) ornaments, and a varied tool kit suggesting shellfish collecting, fishing and food processing activities. Among the site's resources are extensive shellfish remains, along with limited but important fish and bird fauna. The associated lizard
and mouse bones document the island's past habitats and the change they have undergone. Petra Resources found no indication of any burial sites or human remains within CA-SNI-168 and none are expected (Rosenthal and Padon 1996).

The site's resources have the capacity to increase the understanding of several important research questions. The site possesses a configuration of artifacts and faunal remains that make it possible to answer questions about maritime subsistence strategies, inter-island exchange, past environments, and the evolution of ritual and ornamental traditions. All these questions are of current concern to archaeologists, anthropologists, evolutionary and resource biologists. Petra's testing program demonstrated that the site can corroborate Howard and Raab's ideas about southern Channel Island trade, and Schwartz and Martz's model of long-term maritime adaptive strategies. Further, the site can help construct a picture of stable Channel Island ethnic and cultural traditions that is slowly emerging as research continues. The site's faunal resources can help biologists and botanists directly and indirectly reconstruct the island's paleoenvironment. CA-SNI-168 presents mainly a single archaeological component with tools, ornaments, and fauna apparently unaltered by subsequent habitation. Though not extensive, the midden deposits, when combined with surface material that is apparently contemporaneous, give the opportunity to develop a picture of past subsistence, trade and ritual behavior without the confusing admixture of more recent cultural activities. The resources because of their scientific importance, qualify under Criterion "d" because they "have yielded, or may be likely to yield, information important to prehistory or history" [36 CFR 60.4 (d)] for listing as a National Register eligible property (Rosenthal and Padon 1996). This site is only eligible for the prehistory information which it contains.

CA-SNI-169 appears to have scientific value and may be potentially eligible for listing in the National Register. CA-SNI-169 has compacted deposits of 40 centimeters depth with considerable faunal and artifactual diversity. Although the site is modest in size, its early dates of 3370 BP and 3260 BP, and varied tool assemblage suggest it contains valuable scientific information concerning San Nicolas' Middle Phase occupation (Rosenthal et al. 1997).

CA-SNI-170 has few remaining resources and appears to lack both integrity and scientific research value (Rosenthal et al. 1997).

**F.1.5 Data Recovery Findings**

Petra Resources undertook data recovery field investigations in late July and August 1996. Petra personnel concentrated their efforts on excavating additional one meter square sample units. Thirty-three units, estimated as 5 to 10 percent of the site's remaining resources, were excavated in controlled 10 centimeter levels.

The team discovered a previously unknown area of buried midden within Locus B. Here mixed abalone, limpets, marine snails, fish, marine mammal, stone tools, and stone waste flake refuse was buried beneath 20 to 30 centimeters of nearly sterile dune sand. Burial under sand protected the midden from wind erosion and SLAM activities. Three units were excavated in Locus F which is near the target site's storage and staging area south of Jackson Highway. These units were extremely productive, having almost 50 centimeters of material. The recovery effort's units' average depth of excavation was 40 centimeters; however, several units exceeding 70 centimeters depth were excavated.

Nearly 54 kilograms of invertebrate remains, representing 20 major taxa, were collected. Several new fish species including at least two sharks were preliminarily identified from 1100 grams of fish, mammal, and marine mammal bone collected. Stone, bone, and shell artifacts were recovered. The stone artifact inventory produced many more tools than previously found, including a stone bowl fragment, several large serrated and notched tools, and smaller retouched cutting or butchering tools. More than 25 samples were collected for radiocarbon dating. These artifacts and ecofacts are being curated in NAWS Point Mugu's environmental facility on SNI in accordance with 36 CFR 79, Curation of Federally Owned and Administered Archaeological Collections.
The data recovery program has retrieved a representative sample of the archaeological deposits at site CA-SNI-168. Data was collected until redundancy was reached. Since CA-SNI-168 is only eligible for its data potential, and that data potential has been realized, there will be no adverse effect from use of this area as the target site for SLAMs.

Some cultural materials still exist within the boundaries of CA-SNI-168 and -169. Due to the nature of shifting sand dunes on this area of the island, it is possible that additional deposits containing data not collected in the data recovery program may become exposed through time. As such, the NAWS Point Mugu archaeologist will monitor this area and will assess the research potential of any newly exposed deposits.

F.1.6 Archaeological Sites Bordering the Area of Potential Effect

Petra Resources performed index unit studies of sites around the Western and Northern edges of the APE and had previously studied site CA-SNI-171 which lies just east of the APE. These studies were undertaken to provide the SLAM T&E office with a quick look assessment of the richness of the sites' resources and their potential scientific value. These sites will not be affected under the proposed action. Petra’s research efforts focused on broad domains of chronology, maritime subsistence activities, and stone tool technology. The field and laboratory methods included excavation and analyses of artifacts and vertebrate and invertebrate ecofacts. Laboratory procedures included sorting, washing, and cataloging the artifacts and ecofacts by the material and item. These sites were found to be potentially significant and, therefore, eligible for listing on the National Register.

F.1.7 CA-SNI-160 Index Unit Results

The CA-SNI-160 index unit provided the most complex depositional record of any unit excavated within and around the APE. The 120 centimeters of deposits revealed episodic, fragmented shell dumping; whole shell and urchin processing; abalone processing and cutting; fish filleting; and fire ash dumping. This site has an extraordinarily dense fauna deposit. Several thousand pieces of stone debris from manufacture and tool repair were recovered. A twined basket, apparently constructed from sea grass, was found within the index unit. The basket appears to be a carrying or storage basket which contained the tools and material necessary to produce fish hooks from abalone and Norris’ top snail shells; to make olivella shell beads; to prepare sea grass cordage; and to weave or knot nets and basketry. This tool kit contained most of the instruments a fisherman would need to maintain equipment. Because these tool kits are often made from perishable organics like sea grass, these are unusual and valuable discoveries. Primary deposits, such as this one, can directly link a tool (a drill for example) with an activity (abalone perforating) and a product (a shell fish hook). The scientific values of these resources, therefore, are more important than if they just represented materials resulting from shell fish hook making that had been put in a basket with last night’s dinner and dumped some distance from the family’s house (a secondary deposit) (Rosenthal and Jertberg 1998).

When large quantities of vertebrate and invertebrate remains are collected we have opportunities to explore issues of the past faunal abundance and availability. We can look at specific species of fish, birds, marine mammals, and shellfish and derive ideas about the difference between past and present habitats and resource availability. Such information becomes important baseline data for modern resource managers trying to understand the effects of commercial fishing and protection activities on current fish stocks (Rosenthal and Jertberg 1998).

F.1.8 CA-SNI-171 Survey and Index Unit Results

CA-SNI-171 is a large archaeological site which has extensive, widely dispersed stone artifacts and intact midden. It has considerable faunal and artifactual diversity, structural remains, and burials. Numerous stone bowels, perforated stones, bone awls, and fish hooks were observed on the surface. A burnt storage basket made of sagebrush was partially excavated. Its midden produced evidence of intensive abalone and mussel processing, diverse sea mammal exploitation, and more selective fishing. Artifact and shellfish density decreased
considerably in the 20 to 30 centimeter level. CA-SNI-171 is nearly 1000 years more recent than CA-SNI-168 or -169. The index unit confirmed the availability of valuable scientific information concerning San Nicolas' late Middle Phase occupation (2240 BP). Rosenthal et al. (1997) conclude that this site is eligible for listing on the National Register.

REFERENCES


APPENDIX G

FEDERAL AND STATE AGENCY COORDINATION

The following correspondence is included in this appendix:

CALIFORNIA STATE HISTORIC PRESERVATION OFFICER

Letter to: Ms. Cherilyn Widell, State Historic Preservation Officer, dated 12 July 1994. From: J. K. Osgood, Head, Environmental Project Office, Naval Air Weapons Station China Lake. Proposed finding that no historic property will be affected by operating a target area in the Cole's Flat region of the China Lake Test Complex.


Letter to: Ms. Cherilyn Widell, State Historic Preservation Officer, dated 11 September 1996. From: Captain A. M. Parisi, Public Works Officer, Naval Air Weapons Station Point Mugu. Proposed finding of no adverse effect for data recovery efforts at archaeological site CA-SNI-168.


CALIFORNIA COASTAL COMMISSION

Letter to: Mr. Peter Douglas, Executive Director, California Coastal Commission, dated 17 February 1998. From: Ms. Vivian Goo, Deputy Public Works Officer, Naval Air Weapons Station Point Mugu. Negative Determination for SLAM activities at San Nicolas Island.

Letter to: Ms. Vivian Goo, Deputy Public Works Officer, Attn: Jim Danza, Naval Air Weapons Station Point Mugu, dated 23 March 1998. From: Mr. Peter Douglas, Executive Director, California Coastal Commission. RE: CD-19-98, Negative Determination, Navy Standoff Land Attack Missile Program (SLAM), San Nicolas Island, Ventura County.

U. S. FISH AND WILDLIFE SERVICE


NATIONAL MARINE FISHERIES SERVICE


US ARMY, WHITE SANDS MISSILE RANGE

Ms. Cherilyn Widell, State Historic Preservation Officer
Office of Historic Preservation
P. O. Box 942896
Sacramento, CA 94296-0001

Dear Ms. Widell:

The Naval Air Weapons Station (NAVAIRWPNSTA), under its weapons research, development and test and evaluation mission, has identified a requirement to prepare and operate a target area in the Cole's Flat region of the China Lake Test Complex, as shown in enclosure (1). This undertaking is in support of program testing for the Joint Stand-Off Weapon. Pursuant to the National Historic Preservation Act (and 36 CFR 800), NAVAIRWPNSTA initiated an inventory of the affected acreage, the results provided herein as enclosure (2). Based on these findings, NAVAIRWPNSTA has determined that no historic property will be affected by this proposed undertaking. Your concurrence with this determination is requested.

If you have questions or require additional detail, please contact Mr. William Eckhardt. He may be reached by telephone at (619) 927-1528. Thank you for your attention to this matter.

Enclosures:
(1) Location of proposed JSOW Target Area on the China Lake Test Complex.
   NAVAIRWPNSTA China Lake
(2) NAVAIRWPNSTA memo 5090 C8305/128 of 7 Jul 94

Blind copy to:
C003
C3207 (Weiss)
C3205 (Mendenhall)
C8442
C8305 (Cooper, Eckhardt, Shepherd)
C8305S
C831M (2)

Writer: W. Eckhardt, C8305, 927-1528
Typist: M. Millsap, C8305, 939-2893
133
MEMORANDUM

From: Historic Preservation Officer, NAVAIRWPNSTA, China Lake (C8305)
To: Head, Resources Management (C8305)

Subj: REPORT OF HARP INVENTORY FOR PROPOSED JSOW TARGET AT COLE'S FLAT (NEPA #940021)

Ref: (a) NAVAIRWPNSTA memo 5090 C8305/009 of 21 Mar 94
Encl: (1) Portions of Coso Peak and China Gardens USGS 7.5 minute Quadrangles showing location of proposed Cole's Flat JSOW target area

1. Acreage selected for a proposed Joint Stand Off Weapons (JSOW) target area at Cole's Flat has been examined for historic and archaeological resources. This examination has resulted in a finding that no Historic Properties are present within the proposed target area. These findings are detailed below.

2. Cole's Flat is situated in the northern-central portion of the China Lake Test Complex, in Inyo County, California. This portion of the China Lake Test Complex has long been employed for targeting, overflight and test safety footprints in numerous test events during the past 50 years. The Area of Potential Effect (APE) for the proposed JSOW target area is situated at the northern end of Cole's Flat. An area 1,000 feet on a side (22.95 acres) has been identified for JSOW use, as shown in enclosure (1). A portion of the APE, roughly six acres, bears previous targeting impacts; soil pad development and the remains of a large wooden target structure are present on the surface. The remainder of the acreage within the APE is unscared and shows no impact of previous use.

3. JSOW project activities within the APE will include the following: (1) construction, use and maintenance of a target center, (2) locations and operations for all test instrumentation, and (3) other test support generated activity by assigned range personnel. Transportation routes for vehicle ingress and egress will employ existing secondary and tertiary roads. No new routes or roadways are proposed. No road improvement projects or additional road maintenance activities have been specified.

4. For the proposed APE, reference (a) literature review and records search disclosed that no previous archaeological survey has been reported, and no archaeological sites have previously been recorded. Intensive, on-foot survey of this acreage was conducted by the undersigned on 27 June 1994. No archaeological sites were encountered during this inventory.

5. Based on these findings, a determination that the proposed JSOW target area at Cole's Flat will have no effect on Historic Property is warranted.

WILLIAM T. ECKHARDT

Copy to:
C3207 (C. Weiss)
C8305 (4, Shepherd, Cooper, Eckhardt, C8305S)
Writer: W. Eckhardt, C8305, 927-1528. Typist: E. Marquez, C8305S, 939-2790. 7 Jul 94
Portions of Coso Peak and China Gardens Spring 7.5 minute USGS Quadrangles showing the location of the proposed Cole's Flat JSOW target area (southwest corner at UTM 11/ 443491 E, 4001360 N)
August 10, 1994

Reply to: USN940715A

J.K. Osgood, Head
Environmental Project Office
Naval Air Weapons Station
CHINA LAKE CA 93555-6001

Subject: Coles Flat Target Area, Kern County

Dear Mr. Osgood:

In accordance with 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act (NHPA), you have requested my review of the undertaking noted above and the documentation supporting your decision. Thank you for consulting me.

The Navy proposes to prepare and operate a target area in the Cole's Flat region of the China Lake Test Complex. The Navy has determined that no historic properties are located within the undertaking's Area of Potential Effect. The inventory methods used appear consistent with the Secretary of the Interior's Standards for Identification and I am satisfied that the requirements of 36 CFR 800.4(a and b) were fulfilled.

Consequently, I do not object to your finding of no effect for the undertaking as it is currently designed. Accordingly, you have fulfilled the Navy's responsibilities pursuant to 36 CFR 800.

Be advised, however, that the Navy may have additional responsibilities under 36 CFR 800 during the following circumstances: (1) If any person requests that the Advisory Council on Historic Preservation review your findings in accordance with 36 CFR 800.6(e); (2) if this undertaking changes in ways that could affect historic properties (36 CFR 800.5(c)); (3) if previously undocumented properties are discovered during the implementation of this undertaking or if a known historic property will be affected in an unanticipated manner (36 CFR 800.11); (4) If a property that was to be avoided has been inadvertently or otherwise affected (36 CFR 800.4(c); 800.5); (5) If any condition of the undertaking, such as a delay in implementation or implementation in phases over time, may justify reconsideration of the current National Register status of properties within the undertaking's Area of Potential Effects (36 CFR 800).
Ms. Cherilyn Widell
State Historic Preservation Officer
Office of Historic Preservation
P.O. Box 942896
Sacramento, CA 94296-0001

Dear Ms. Widell:

The Naval Air Warfare Center (NAWC), Point Mugu has a target area located on San Nicolas Island. The target site is used for testing of the Standoff Land Attack Missile (SLAM). The SLAM program is proposing to modify the target site by rearranging the existing roads and temporary structures that comprise the target. The proposed work will affect one prehistoric archaeological site which has been determined to be eligible for inclusion in the National Register of Historic Places. As this site is eligible only for its research potential and the Navy proposes to recover this significant information, the Navy proposes a finding of No Adverse Effect and requests your concurrence with this finding.

The proposed project is located on the west end of San Nicolas Island. San Nicolas Island is located within the political jurisdiction of Ventura County. The work involves the following elements (see Enclosure (1) for details): 1) filling over existing sand dune areas to create new road surfaces, 2) possible excavation of a hillside which abuts the target site, and 3) installation of several temporary structures.

The Area of Potential Effects (APE) includes the target site area as well as an impact area which surrounds the target site (Enclosure (2)). The target site is located within the confines of an archaeological site (CA-SNI-168) which was located during an island-wide archaeological survey conducted in 1984. In order to fully inventory historic properties within the APE an archaeological survey was performed by Petra Resources Inc. This study fully inventoried the archaeological resources within the APE. This survey did not reveal any additional archaeological resources, but did more precisely define the boundaries of the known site.

Based upon the fact that CA-SNI-168 would be affected by the proposed undertaking, the Navy commissioned Petra Resources, Inc. (Petra) to conduct test excavations at this site to determine the National Register eligibility of this resource.
These excavations were performed in accordance with the Department of the Interior's Standards. Petra's research indicates that there is a substantial, yet shallow, archaeological deposit at CA-SNI-168. This deposit has yielded important information on local prehistory and is likely to yield further such information. The site is dated to approximately 3000 years ago. It has yielded important information on maritime subsistence strategies, inter-island trade, and past environments.

Based upon this work, the Navy has determined that archaeological site CA-SNI-168 is eligible for listing in the National Register of Historic Places under Criteria D (36 CFR 60.4) and sought your concurrence with this determination by letter dated 27 June 1996 (Enclosure (3)). As we have not received a response to this request we assume that you concur with our determination of eligibility for this site.

The site could be affected in a number of ways. The actual construction of the new target configuration will disturb intact archaeological deposits directly. The site material is no more than 40 cm in depth, therefore this activity is assumed to completely disturb the cultural materials within the footprint of the new target site. Secondly, when the SLAM missiles impact the target they penetrate the target structure and impact on the ground behind the intended target. Although the missiles do not have an explosive warhead, they would also affect cultural deposits located there. Upon impact, small metal fragments are strewn over the area and efforts to recover these small pieces have the potential to directly impact cultural materials. Lastly, on occasion, if a missile misses the intended target it may impact and disturb cultural materials. Site CA-SNI-168 is located in unstable sand dunes which are already subjected to significant wind and rain caused erosion. Therefore, it is assumed that through time, either natural processes, or the use of the target would result in the direct or indirect degradation of the entire site.

The Navy proposes to conduct a data recovery program to offset these impacts, thus meeting the criteria for a No Adverse Effect determination. The site is only eligible for the information contained within, and the proposed program will recover this information. We propose to perform all data recovery prior to start of construction on the new target configuration. A formal research design has been prepared and is included for your review (Enclosure (4)). The final product is expected to be a technical archaeological report directed at the professional audience.

Based upon the fact that this National Register property is only eligible for the prehistory information and as identified in Criteria D, the Navy has committed to recovering this important information, the proposed SLAM Target Site qualifies for a determination of No Adverse Effect. By this letter we request your review and concurrence of this determination of effects.
If you have not responded within 30 days, we shall assume your concurrence with this determination. If you should have any questions, or suggested revisions to our proposal, please contact Steven Schwartz, staff archaeologist, at (805) 989-7412.

Sincerely,

[Signature]

A.M. Parisi
CAPT, CEC, USN
Public Works Officer
By Direction Of The Commanding Officer

Encl:
(1) Project drawing
(2) Project Area and Area of Potential Affect
(3) Letter concerning eligibility for National Register
(4) Research Plan for data recovery

Copy to:
Ms. Carol Gleichman
Advisory Council on Historic Preservation
Western Office of Review
730 Simms Street, Room 401
Golden, CO 80401
SLAM SNI Target Configuration Proposal

Version 3/23/96

1. Electric Power Plant
2. Boiler Housing
   - Hexagon
   - Dimensions: 3' x 8'
3. Turbine Generator Housing
   - Hexagon
   - Dimensions: 3' x 8'
4. Personnel Barracks
   - Hexagon
   - Dimensions: 3' x 8'
5. (2) Storage Bunkers
   - Dimensions: 16' x 20' x 16'
6. Added road and pad
   - Packed and graded fill
7. Added side road and pad
   - Packed and graded fill
8. u-Wave Relay and Communications Tower
   - Base of 4 stucco covered C-Vans
   - Dimensions: 30' antenna tower with dishes
9. Stand-Along Airconditioning Unit
   - Dimensions: 3 x 6 x 20'
10. (2) Independent Diesel Generators with
    - C-Van Enclosures
    - Dimensions: 16' x 8' x 20'
11. Generator Screens
    - Dimensions: 8' x 8' x 20'
12. Roof-Top Airconditioning Units
    - Dimensions: 4 x 8 x 4'
13. Command and Communications Building
    - Dimensions: 40 x 20 x 20

The diagram illustrates the various components and structures proposed for the SLAM SNI Target Configuration.
Area of Potential Effect

Area of Minor Disturbance

Figure 3
Project Area and Area of Potential Effect
Ms. Cherilyn Widell
State Historic Preservation Officer
Office of Historic Preservation
P.O. Box 942896
Sacramento, CA 94296-0001

Dear Ms. Widell:

The Naval Air Weapons Station (NAWS), Point Mugu proposes to establish a missile target site on San Nicolas Island. The target site will affect archaeological site CA-SNI-168. CA-SNI-168 is a prehistoric archaeological site originally recorded in the early 1980s. In order to assess the significance of this site, the Navy commissioned Petra Resources, Inc. to conduct test excavations at this site directed toward determining the National Register eligibility of this resource. These excavations were performed in accordance with the Secretary of the Interior’s Standards. Their research (enclosure 1) indicates that there is a substantial archaeological deposit at CA-SNI-168 and that it does represent a deposit that has yielded important information on local prehistory and is likely to yield further such information. The site is dated to approximately 3000 years ago. It has yielded important information on maritime subsistence strategies, inter-island trade, and past environments.

Based upon this work, the NAWS, Point Mugu has determined that archaeological site CA-SNI-168 is eligible for listing in the National Register of Historic Places and seeks your concurrence with this determination in accordance with 36 CFR 800.8(c). If you have any questions regarding this determination please contact Mr. Steven Schwartz at (805) 989-7412.

Sincerely,

[Signature]

A.M. Patrie
CAPT, CEC, USN
Public Works Officer
By Direction Of The Commanding Officer

Encl:
(1) Archaeological Testing Report
CA-SNI-168 is a prehistoric site within the San Nicolas SLAM target area (Reinman 1983). In 1995 Petra tested CA-SNI-168 and determined that it met National Register of Historic PlacesCriterion of eligibility standards (Rosenthal and Padon 1995). Both NAWS Pt. Mugu and the State Office of Historic Preservation (SHPO) concurred. Site preservation through avoidance is not possible because both ongoing SLAM target use and wind erosion are impacting the resources.

Petra's primary research goals are to recover a representative sample of CA-SNI-168's archaeological resources, and to place index units in three nearby sites. The project's objective is to complete compliance with Section 106 of the National Historic Preservation Act (NHPA). The research plan is a methodology for recovering and interpreting the resources. CA-SNI-168 was considered to be eligible for the National Register because of its scientific values. These values include the site's ability to address research issues identified in Martz's (1994) *A Research Design for Prehistoric Archaeological Sites San Nicolas Island, California*.

CA-SNI-168 is a three thousand year-old site that has a varied tool kit suggesting shellfish collecting, fishing, and food processing activities were being conducted. Among the site's resources are extensive shellfish remains, along with limited but important fish and bird fauna. The associated lizard and mouse bones document the Island's past habitats and the change they have undergone. Diagnostic ornaments both pendants and shell beads are present. The site possesses a configuration of artifacts and fauna that make it possible to answer questions about maritime subsistence strategies, inter-Island exchange, past environments, and the evolution of ritual and ornamental traditions.

*Maritime Subsistence Strategies*

Southern California prehistory is the story of fairly successful hunting and gathering subsistence practices. Recently, coastal and Channel island research has suggested that this broad subsistence pattern conceals major adaptive differences and successes (Schwartz and Martz 1992; Erlandson 1993). Raab and Yatsko (1990) have argued that the Channel Islands had a mixed maritime economy distinct from mainland foraging and collecting systems. They propose that this maritime orientation began during the initial colonization of the Channel Islands. The early subsistence practices emphasized shellfish collecting and sea mammal hunting. By the Middle Period, fishing began replacing sea mammal hunting as a major task (Glassaw et al. 1988).

It is not clear, however, that the model is correct in all instances. Several studies have concluded that intensification did not come about until the later Holocene (Landberg 1965, 1975; Salls 1988, 1992; Orr 1968; Tartaglia 1976) when fishing assumed major economic importance between 1000 and 4000 years B.P. (Glassaw 1980; Orr 1968; Reinman 1964; Salls 1988; Tartaglia 1976).

In contrast, Roger Colten's Santa Cruz Island data (1991) indicates fish numbers can be constant throughout time (99% of vertebrates), but fluctuate by weight. He reports a relative increases in bird and sea mammal weights during the Middle Period (78% Middle Period; 64% Late Period) and remarks that overtime there are increasing fauna densities within middens. The relative proportion of fish, shellfish, and sea mammals fluctuate, as do the body parts represented. Colten concludes that...
Fish are important throughout the sequence, but shellfish are a primary contributor to the diet later in time.

Raab et al. (in press) using Eel Point faunal data, combined with technological and chronological information, point to long-term processes of maritime economic intensification reflected in the density of fish bones within the site's cultural strata. Reviewing Middle Holocene (Early and Middle Period) faunal data from Eel Point, San Clemente, and Little Harbor, Santa Catalina, in the southern Channel Islands, Porcasi (in press) comments:

"about 3300 BP, when circular fishhooks begin appearing in the archaeological record, there is a dramatic and continuous increase in fish remains (with some minor cyclic fluctuations) while the marine mammal constituent of the diet retains its constrained, repetitive pattern. As the primary meat sources were either being used up or were naturally limited by their own species' life histories, it is possible that only fishing was amenable to immediate intensification through additional energy input and technological advancement. Thus, the people were able to sustain themselves through increased fishing regardless of constrained and cyclic availability of the more productive marine mammals."

Which model fits San Nicolas data? Does San Nicolas' situation differ? Overtime the harvesting of the seas around San Nicolas may change, departing from patterns seen at Santa Catalina, San Clemente, or Santa Cruz. Intensive harvesting of nearshore fish may have expanded to deepsea exploitation. Shellfish and fish may have been used and sea mammals excluded.

What is characteristic of CA-SNI-168 subsistence base? We know from the test investigations several types of animals were captured or collected. However, the small sample was not conducive to modeling the procurement frequency or dietary value for anything but shellfish. What specific fish, shellfish, and sea mammals constitute the typical third millennium diet? Does the CA-SNI-168 differ from previously investigated sites? Does the site reflect general or specific subsistence-related tasks?

To address subsistence issues additional well-preserved, vertebrate and invertebrate fauna must be collected. When CA-SNI-168 was tested it became the first data set from a site in the dunes; no directly comparable site information was available. We could not suggest if the activities we identified were typical or distinct. Its Middle Period occupation further compounded comparative analysis. Nearby sites such as CA-SNI-161 and CA-SNI-11 were either earlier or later. By completing index units at nearby sites -169, -170, -171, we will be able to obtain new comparative data.

We therefore pose several specific subsistence questions to be addressed during data recovery -

Does the relative density of CA-SNI-168 faunal remains appear different from early and later occupations on the Island?
  • Compilation and comparison of resource quantities from the index units data from the -168, -169, -170, -171.

Does the relative proportion of faunal remains appear different from early and later occupations on the Island?
  • Comparison of quantity and weight of individual taxa.
Does the use of various vertebrate body parts differ?
- Comparison of element quantity and distribution.
- Comparison of quantity and distribution of burnt or butchered elements.

Some subsistence models which indicate procurement changes, have been based upon stratigraphic differences from just one or two column samples from units within a site (see Glassow 1988 on shellfish use in the Santa Barbara Channel). Our data recovery and index unit program will excavate multiple units from distinct deposits at CA-SNI-168 and single units nearby. We can test to see if apparent changes may simply result from sampling error.

Can some identified subsistence changes be attributable to sampling error that result from limited unit quantities? The issue is how to measure and interpret diversity (Jones and Leonard 1989:2). Does species diversity (evenness) alter as the sample number increases? Does species diversity (richness) alter as the sample number increases?
- Comparison of key species quantities within units as percentage of total.
- Comparison of overall identified species within units.

Trade and Exchange

Regional cultural patterns that distinguish social organization and ethnicity are partly discernible from trading networks. The source and distribution of trade items can document village contacts across space through time. Was CA-SNI-168 participating in the Channel island-Chumash interaction sphere where status objects were produced and exchanged (Arnold 1992; King 1990)? Were the Nicolelos at CA-SNI-168 linked with the even earlier proposed southern Channel Islands network (Vellanoweth in press; Raab et al. 1995)? Are materials from non-local sources arriving as finished products or being worked nearby and redistributed? Are animal products being distributed?

What imported materials are appearing at the sites?
- Comparison of the non-local material in index units from CA-SNI-168, -169, -170, -171.

Do larger terrestrial vertebrate fauna appear at the sites?
- Identify non-Island taxa among the tools or fauna.

Are ornaments and certain tools arriving as finished products?
- Identify manufacturing detritus at the sites.

To define the regional relationships all artifacts must be carefully analyzed. Stone artifact sourcing is particularly critical to understanding what commodities represent local or distant origins. Were local items manufactured for regional exchange? When manufacturing, repair, and recycling evidence is present, we can learn about resource scarcity and value.

Past Environments

The reasons for investigating paleoclimatic issues are twofold. The first reason is man's economic practices shift in response to both minor and major climatic and ecosystem changes. The number of people who can survive, their technology, social organization, and even ritual system responds to
environmental conditions. A second reason for paleoclimatic investigation is to provide baseline data for other disciplines that are currently researching extinction, species survival, habitat restoration, economic potential, and other questions.

Evidence from several sources suggests changes occurred in both the land and sea environments of sufficient magnitude to impact aboriginal cultural adaptations in coastal southern California (Arnold 1992; Raab et al. 1994, 1995). Sea temperature changes and drought are two identified factors which altered species distribution and quantity. Man also affects the environment by over exploiting readily available and desirable species. Archaeological resources provide several types of information about past environments which help identify community changes, species extinction, and predation shifts. Pollen, carbonized plant materials, charcoal, vertebrate, and invertebrate remains provide data that reflect past environments.

Several known paleoenvironmental changes have already been documented. Bleitz-Sanburg (1987) and Porcasi (in press) have both theorized, as a result of their work at Thousand Springs and Eel Point, respectively, that around 5000 years ago albatross nested on the Channel Islands. As the bird currently nests no further east that Hawaii, this situation suggests climatic or behavioral changes.

What evidence for differing habitat distributions is present?
  • Identify bird, fish, and sea mammal having specific habitat constraints.
  • Identify non-resident species?

What evidence for human over-predation is present?
  • Identifying bird, fish, and sea mammal present at the site but uncommon at earlier or later sites.

Climatological changes, like a lowering of Holocene water temperature in the Santa Barbara Channel, have been modeled by Pisias (1978, 1979). These climatic changes may have affected the Nicoleño. Cooler water may have encouraged the growth of large kelp forests, the natural habitat of the sheephead and sea otter. These animals' abundance may have depended on expanding kelp forests. Similarly earlier, Post-Pleistocene warmer water trends may have limited the extent of kelp forests and their associated species.

What evidence for changing climatic conditions is present?
  • Identify cool or warm water preferring bird, fish, shellfish, and sea mammal taxa.
  • Compare bird, fish, shellfish, and sea mammal taxa from contemporary sites.

Ornament and Ritual Item Manufacture

Several bead, pendant, and effigy forms were found at CA-SNI-168. Beads function in both decorative and ritual contexts. Particularly in the Late Prehistoric Period, they may have been a status symbol and medium of exchange.

Some beads such as Olivella Grooved Rectangular (OGR), spire-removed, barrel callus, and cap varieties, are likely made on San Nicolas. Small, bleached whole Olivella shells and bead making detritus have also been found at sites like CA-SNI-161. Manufacture may date as early as 5000 years ago. The availability of Olivella shells influences bead production as does the abundance and
accessibility of a suitable lithic source for beadmaking tools. In the northern Channel Islands, Santa Cruz was a major Chumash bead production area. Bead production was especially intensive where Monterey chert and Olivella co-occur.

San Nicolas Island has Olivella habitat. It also has fossil Olivella deposits. Metasedimentary and quartzite drilling tools could be easily made. San Nicolas may have been a bead-making center, possibly for the southern Channel Islands (Vellanoweth in press), and northern Channel Islands.

San Nicolas Island appears to have been a source for the tu`cent, or magic stones found in sites along the Santa Barbara coast. These stones are Marcasite (iron sulfide) which occurs in sandstones along the north shore near Thousand Springs. Chumash shamans used the magic stones; they spark when struck.

Other artifacts suggest the Nicoleño ritual orientation may have been more Shoshonean or southern Channel Islands. The OGR beads unite San Nicolas with Santa Catalina and San Clemente as well as the Orange County coast, ritually. Similarly chlorite, fuchsite, and steatite beads, pendants, and effigies establish connections with their source island, Santa Catalina.

- Compare materials among units, loci, and sites.
- Compare ritual items recovered with Chumash and southern Channel Islands artifacts.

FIELD AND LABORATORY METHODS AND ANALYSES

The methods to be used during the Data Recovery and Mitigation Program are outlined below. These methods will include site survey, mapping, collecting, and describing diagnostic artifacts, excavating on-site sample units (1x1 m) and index units (1.5x1.5 m) nearby, comparative surface collecting, and specialized analyses.

Field Methods

Intersite Survey
We will conduct intensive surface survey in five meter interval transects to locate the extent of surface remains, identify diagnostic artifacts, and determine nearby site boundaries. Several datum will be established using an electronic total station (laser transit). Then diagnostic artifacts will be flagged, identified with a number and tag, mapped, and collected. Natural dune features, artifact concentrations, and buried midden deposits will be mapped. The surface artifacts, site boundaries, areas of disturbance, and midden will be transit mapped and will be drawn on a site map of at least 1:200 scale. A field diary and photographic record of activities and key artifacts will be maintained.

Excavation Units
We will undertake all field activities necessary to recover a statistical sample of remaining intact midden materials through controlled excavation. We will place approximately 32 1x1 m units to complete the sample; this is 8% of the estimated intact CA-SNI-168 midden. We will excavate in 10 centimeter, arbitrary levels unless a clear geologic or cultural strata appears. The field team will complete level forms for each 10 centimeter level. The excavated material will be screened through 1/8 inch hardware mesh, and all artifacts and vertebrate fauna materials found will be bagged and
labeled. Any features or distinctive aspect of the unit will be mapped on the appropriate form and excavated separately. Charcoal will be collected. Column samples of 25x25 cm will be taken to determine the shellfish quantity and type.

Surface Sampling
Judgmental sampling units will be placed at the discretion of the archaeology field supervisor (Nance 1981). These units serve as control units and also can be used to interpret overall material distribution and variability. Petra will collect artifacts from at least ten 4x4 m units among Loci A, B, C, and D. The crew will complete forms recording shellfish within the sample units and will collect artifact and vertebrate fauna types.

We will use non-collecting sampling methods for shellfish analysis, recording the quantities of 10 key taxa: Acmea, Chiton, CalliBase, Crepidula, Haliotus, Limpets (Key-hole and Giant), Mytilus, Septifer, Strongylocentrotus, and Tegula. This non-collecting approach for shellfish description assumes expertise in identifying major taxa. Petra’s team has been selected because they are familiar with San Nicolas Island shellfish.

While fieldwork is being conducted we will complete a photographic record showing artifact and feature relationships to targets, diagnostic artifacts, and fieldwork activities.

Laboratory Methods

Our laboratory procedures will include sorting, washing, and cataloging the diagnostic artifacts. We will sort by the type of material, identify the item, label and catalog the finds.

We will analyze the stone materials by first, separating the chipped stone artifacts from the ground stone tools, then describing each, and finally comparing the CA-SNI-168 artifacts with other Island and mainland finds. The tools and cores will be set aside for further analysis; recording size, platform edge shaping, reduction, and retouch or use damage location attributes (Whittaker 1994). Each tool’s dimensions will be taken from the oriented striking platform, if present, or alternatively as maxima (length, width, and thickness). The remaining flaked stone material will be reviewed, using a 30 power binocular microscope, for evidence of extensive crushing or microscarring along edges. When these attributes are present the artifacts will be further categorized into tool types. Each shaped or “utilized” stone artifact, and core will be assigned a separate catalog number.

The remaining flaked stone artifacts will be placed in one of three categories: flake, debitage, or shatter. The debitage and shatter, will be classified by material and size, in 50 mm ranges, their cortex and other distinctive features recorded, and they will be assigned a “lot” catalog number (Rosenthal 1993).
The faunal material will be sorted into bone and shellfish classes. We will submit sea mammal, bird, fish, and small land mammal remains for additional study to the Zooarchaeology Laboratory, University of California, Los Angeles. They will identify taxa and element, quantify the vertebrates, (MNI and NISP) and review the specimens for butchering, burning, and use.

Petra personnel will analyze invertebrate remains. After the shellfish is recovered all whole specimens larger than 1/4 inch will be saved. The remaining fragmentary shells will then simply be weighed. Whole shell will be counted and weighed by taxa, and the minimum numbers (MNI) calculated.

Charcoal samples from units and index units will be selected based on association, size and weight. Then shellfish from units having a sufficient charcoal sample will be paired and sent to Beta Analytic Inc., Coral Gable, Florida for assay.

Sediment samples will be removed from dense midden within at least five units, and from each index unit. These will be preliminarily reviewed to see if pollen is present. If pollen is present samples will be forwarded for slide preparation.

**Report Preparation**

Petra will prepare a draft and a final report addressing findings. The report will meet the SHPO Guidelines for Report Preparation as well as the Department of Interior's Format Standards for Final Reports of Data Recovery Program 42 FR 5377-5379.

**Curation and Accessioning**

All material will be prepared for curation at the Environmental Facility on San Nicolas Island. These will include all activity records, level and mapping sheets, photologs, and special studies reports. If appropriate accessioning software can be selected the material will also be accessioned.

**REFERENCES CITED**

Arnold, J.  

Bleitz-Sanburg, D.E.  

Colten, R. H.  
1991 Fishing During the Millingstone Horizon? New Data from the Glen Annie Canyon Site, Santa Barbara County. In *Hunter-gatherers of Early Holocene Coastal California*. J. Erlandson and R. H.
Colten pp. 81-88. Perspectives in California Archaeology 1. Institute of Archaeology, University of California, Los Angeles.

Erlandson, J.

Glassow, M. A.

Glassow, M. A., and L. R. Wilcoxon

Glassow, M. A., L. R. Wilcoxon and J. M. Erlandson

Jones, G. T. and R. D. Leonard

King, C. D.

Landberg, L. C. W.

Martz, P.

Orr, P. C.
1968 Prehistory of Santa Rosa Island. Santa Barbara, California. Santa Barbara Museum of Natural History.

Pisias, N.G.

1979 Model for Paleoeceanographic Reconstruction of the California Current for the Last 8,000 Years. Quaternary Research 11:373-386.
Porcasi, J. F.

Raab, L. M., K. Bradford, J. F. Porcasi and W. J. Howard


Raab, M. L. and A. Yatsko

Raab, L. M. and A. Yatsko

Redman, C. L.

Reinman, F. M.

Reinman, F. M. and Associates
1983 Site Form SNI-168. On file Environmental Division, Pt. Mugu NAWS and UCLA Archaeological Information Center.

Rosenthal, J.

Rosenthal, J. and B. Padon

Schwartz, S. J. and P. Martz

SNI Data Recovery, July 19, 1996
Salls, R. A.

Schwartz, S. J. and P. Martz

Tartaglia, L. J.

Whittaker, J. C.
Vivian Goo, Deputy Public Works Officer
Department of the Navy
Naval Air Weapons Station
521 9th Street
Point Mugu, CA 93042-5001

Project: Expansion of the SLAM Missile Target Site, San Nicolas Island

Dear Ms. Goo:

Thank you for consulting me pursuant to 36 CFR 800, implementing regulations for Section 106 of the National Historic Preservation Act. The Naval Air Weapons Station proposes to expand the Standoff Land Attack Missile (SLAM) Target Site on the Naval Outlying Landing Field on San Nicolas Island. The Navy previously conducted Section 106 consultation with me for the original target site, and recently had the expanded missile target site surveyed for the presence of historic properties. The Navy has now made the following findings concerning the undertaking cited above and has asked for my comments on these findings:

(1) The expanded missile target site was found to contain two additional prehistoric archaeological sites, CA-SNI-169 and CA-SNI-170.

(2) Archaeological testing and analysis by Petra Resources, Inc., under contract to the Navy, indicated that site CA-SNI-169 is eligible for inclusion in the National Register of Historic Places (NRHP) under Criterion D, while site CA-SNI-170 is not eligible for inclusion in the NRHP due to a lack of integrity.

(3) In accordance with 36 CFR 800.9(b)(1), the Navy has acknowledged that, although the actual missile target is located in the original APE, if a missile were to overfly the target, it could impact the ground within the expanded APE and thus would be very likely to seriously damage an NRHP-eligible site (CA-SNI-169), and thus constitute an Adverse Effect.
(4) The Navy proposes to conduct a data recovery program to offset these potential impacts, thus meeting Exception 1 of the Criteria of Adverse Effect 36 CFR 800.9(c)(1).

(5) Due to the small size of the site, even though project impacts are not expected to destroy the entire site, the Navy proposes to sample the entire site as part of the data recovery program and view the site as completely destroyed while substantially recovering the important information values within the site deposits.

Based on staff review of the documentation provided, I agree that the Navy has taken reasonable measures to identify historic properties within the APE consistent with the Secretary of the Interior's Standards for Identification and the requirements of 36 CFR 800.4 (a and b).

Archaeological site CA-SNI-169 was found to contain datable materials and a varied tool assemblage which suggest it contains valuable scientific information concerning the San Nicolas' Middle Phase occupation. I agree that CA-SNI-169 is eligible for the National Register of Historic Places under Criterion D.

Archaeological site CA-SNI-170 lacks both integrity and scientific research value. I agree. Since the site lacks integrity, it is ineligible for the NRHP.

Given the nature of the undertaking, I agree that site CA-SNI-169 (an historic property) is likely to be adversely affected. I agree as well that, under the circumstances, a data recovery program is the most appropriate form of treatment for CA-SNI-169. Since this historic property is of value only for its potential contribution to archaeological research, and because the proposed program will recover this information, I agree that this treatment is consistent with the Exceptions to the Criteria of Adverse Effect as stated in 36 CFR 800.9(c)(1).

Your consideration of historic properties is appreciated. If you have any questions regarding our review of this undertaking, please call archaeologist Chuck Whatford of my project review staff at (916) 653-2718.

Sincerely,

Cheri Lyn Widell
State Historic Preservation Officer
Mr. Peter Douglas  
Executive Director  
California Coastal Commission  
45 Fremont Street, Suite 2000  
San Francisco, CA 94105-2219

Dear Mr. Douglas:

This Negative Determination (CCD), in compliance with Section 930.35(d) of the National Oceanic and Atmospheric Administration (NOAA) Federal Consistency Regulations (15 CFR 930), is submitted for the nonwarhead Standoff Land Attack Missile Program (SLAM) on behalf of Naval Air Warfare Center Weapons Division (NAWC), Point Mugu.

The project consists of nonwarhead missile firings which are critical in engineering test and evaluation and conducting Naval Fleet training. The target site is located on the western end of San Nicolas Island (SNI), Ventura County, California. The missile is fired from NAWC's Sea Range located outside of the Coastal Management Zone (CMZ), then flies across the CMZ of SNI to a target located on SNI located on Federal property.

Mitigation for potential impacts are included in the project, for example, the California State listed Island fox will be physically excluded from the target and storage building so that none den in or under the buildings where they might be harmed during a missile impact. In addition, archeological resource impacts will be minimized during any access road or target building pad expansion through the presence of an archeological representative to oversee construction activities. Marine mammals will be monitored for any potential startling responses during missile and aircraft overflights. In conclusion, there will be no negative impacts to the Coastal Management Zone from this action.

Please FAX a copy of your letter of concurrence directly to Mr. James Danza, Environmental Planner at (805) 989-1308. If there are any questions or concerns, please contact Mr. Danza at (805) 989-9747.

Sincerely,

VIVIAN GDO  
Deputy Public Works Officer  
By Direction Of The Commanding Officer

Enclosure: 1. Coastal Consistency Determination
COASTAL CONSISTENCY NEGATIVE DETERMINATION NONWARHEAD STANDOFF LAND ATTACK MISSILE PROGRAM (SLAM)
SAN NICOLAS ISLAND, VENTURA COUNTY CALIFORNIA

This Coastal Consistency Negative Determination (CCND), in compliance with Section 930.35(d) of the National Oceanic and Atmospheric Administration (NOAA) Federal Consistency Regulations (15 CFR 930), is submitted for the Nonwarhead Standoff Land Attack Missile Program (SLAM) on behalf of Naval Air Warfare Center Weapons Division (NAWC), Point Mugu.

Background

Nonwarhead missile firings are critical in engineering test and evaluation (T&E) and conducting Naval Fleet training. Completed T&E provides data for future maneuvers and mass production of the new design in an economical manner. Fleet training helps ensure that crews have a thorough understanding of the device theory, operation, and elements that can vary its function.

The target site is located on the western end of San Nicolas Island (SNI), Ventura County, California. The missile is fired from NAWC’s Sea Range located outside of the Coastal Management Zone (CMZ), then flies through the CMZ of SNI, to a target located on SNI located on Federal property. The missile is precision guided, flies pre-planned routes and is continuously tracked.

Similar activities have occurred at the same locations. Because the program has grown from a trial test into a full development program, it is now a major action. A draft environmental assessment has been prepared and can be consulted for more in depth information on this action.

Project Description

The proposed action is to conduct firings of the (SLAM) (AGM-84E), SLAM Expanded Response (ER) (AGM-84H), and future models of the SLAM missile over water against a target located at the western end of SNI from 1998 through 2018. The term “firing” describes a military event where a SLAM is launched, the engine starts and propels the missile, the missile flies a pre-planned route, is guided and controlled to a target, and nonexplosively impacts the target. This is different from a missile being carried captive on an aircraft (but never launched), or is dropped from the aircraft but its engine not fired.

Tests and training exercises will be conducted on 2 to 16 operational days per year involving up to 26 missile firings per year and the total program may involve up to 100 T&E missile firings and 300 training exercise firings over its 20 year life. Standard range clearance procedures will be conducted before each exercise to insure public safety.

The proposed action includes potential access road and target building pad expansion; target setup; visual equipment setup on the target site; infrared (IR) video camera and captive carriage of a SLAM to verify IR image acquisition prior to a missile launch: missile launch: flight and control event.
recording (chase aircraft and on-site cameras, excluding recording activities at Point Mugu on the mainland), nonwarhead missile impact; missile recovery; and required resource protection procedures and mitigation measures (see mitigation summary below). The exact hardware, software, and launch and control platforms may vary slightly from one test event or training exercise to another. Cranes, trucks and other heavy equipment may be used for target placement.

Existing Environment

Numerous wildlife species occupy the island’s coastal areas beneath a segment of the missile flight path including migratory birds and marine mammals. However, a monitoring study of wildlife responses to aircraft over flights in the area was conducted in November 1997. In that study, birds did not respond to aircraft over flights although they may be startled by target acquisition aircraft over flights during the breeding season. The infrequent nature of the activities and consultation with NAWS Point Mugu Environmental Division will prevent any adverse effects on birds and bird populations. In the same study only a few of the marine mammals present were alerted by the over flights. These animals exhibited a startled reaction, but did not move toward the water. In fact, startle reactions are a frequent natural occurrence and over flights are proposed very infrequently. Therefore, the over flights are not considered to be a harassment. Furthermore, all aircrews will be instructed to fly over SNl as high and as slow as they can to avoid disturbing the mammals, and chase aircraft will normally stay 500 feet or more above ground level. The study concluded that no significant adverse effects on the birds and marine mammals result from over flights as in the proposed action.

Although Federally listed endangered and threatened species also occupy the coastal areas nearby to the missile flight path, there are no such species in the vicinity of the SLAM target site. The only species of concern at the site is the California State threatened Island fox which resides in the area of the target site. Island foxes will be physically excluded from the target and storage building so that none den in or under the buildings where they might be harmed during a missile impact. A summary of other special wildlife concerns is as follows:

- The Island night lizard (Federal threatened list) is present on SNl but not at the sand dunes near the target site;
- The California brown pelican (Federal and State endangered list) roosts on the western end of SNl neither under the proposed flight paths nor near the target site;
- The Western snowy plover (Federal threatened list) nests on the beaches both south and north of the target site. Effects on the plover will be avoided by monitoring;
- The American peregrine falcon (Federal and State endangered list) is only an occasional visitor. One seen during the November 1997 study did not appear to notice aircraft over flights;
- The Southern sea otter (Federal threatened list) lives in kelp beds offshore. Because of the very short time of over flight they are not expected to respond to the target acquisition aircraft or missile over flights.
All aircrews will be instructed to fly over SNI as high and as slow as possible to avoid disturbing the mammals and chase aircraft will usually stay 500 feet or more above ground level.

There are no wetlands at the target site area and there will be no discharges of any pollutants into the Area of Special Biological Significance surrounding SNI. There are no surface water resources near the SLAM target site. Groundwater quality might be affected for short terms if missile jet fuel reaches it through the overlying sand layers. The SLAM target site watershed does not feed the potable spring or wells used for potable water at SNI.

Two archeological sites are within the target site (CA-SNI-168 and CA-SNI-169). The complete value of site CA-SNI-168 has already been preserved and the remaining value of CA-SNI-169 will be preserved. These actions have been coordinated with the State Historic Preservation Officer. An additional portion of these sites' archeological resources may be lost over the course of the SLAM target site's use. Archeological resource impacts will be minimized during any access road or target building pad expansion through the presence of an archeological representative to oversee construction activities.

Mitigation Summary

An archeological representative will be present during construction and preservation of archeological value of both the identified locations.

Bird and pinniped rookeries will be monitored for disturbances.

Resource protection features are built into the flight procedures. Examples: proposed test flights will be rehearsed; a captive-carry seeker lock-on test will be performed no more than 3 hours before any test; any missile impact outside of the Area of Effect (AoE) will result in immediate cessation of further firings until the environmental effects and firing procedures can be re-evaluated.

The missile will be monitored by various systems during its entire flight path. If a missile should stray from its intended flight path, the fuel is cut off, fins are turned down, and it is ditched in the ocean 5-10 miles off SNI.

Personnel will be briefed on natural resource protection and pertinent laws. Examples: personnel, vehicles and equipment will be restricted to existing routes; staff will be prohibited from disturbing, harassing, injuring, or capturing any wildlife or collecting or injuring any plants or artifacts; and the SLAM program AoE will be clearly marked along the west, north and east sides.

Target site will routinely be cleaned; all materials will be removed.

Safety reviews will be conducted: 1) periodic review of missile success rate; 2) wind erosion at target site; 3) biological effects; 4) archeological effects. Of the 71 SLAMs fired, 53 have hit their targets, 4 were directed into the ocean 5-10 miles offshore, 13 hit within the AoE, and one impacted outside the AoE (caused by a mode of operation no longer used).
Coastal Zone Impacts

No impacts from the proposed project are expected on the coastal zone, including no impacts to biological and water resources as discussed above.

The main effects of the proposed firings involve potential access road expansion, target building pad expansion, and missile impacts. Minor effects involve jet engine and diesel generator exhausts, aircraft over flights, target setup and missile recovery activities, and noise.

Airborne noise caused by the pre-launch IR target acquisition and chase aircraft, and missiles will be minimal and very short in duration. The noise emitted by the target acquisition aircraft which over fly the island will be 101 dB or less at the lowest expected altitude of approximately 500 feet above ground level at the expected speeds. The chase aircraft will normally over fly the island at higher altitude at a slow speed, with an expected noise level of 89 dB or less. Natural environmental noise levels from winds and waves of more than 120 dB have been recorded as San Miguel Island, a Channel Island situated very similarly to SNI. Since the operations will be infrequent, and short term, and natural noise levels at ground level can exceed those created by the missiles and aircraft, no adverse effects on the coastal resources are expected due to the project.

No adverse effects are expected to archeological resources located within the construction areas and target site due to the presence of an archeological representative during construction and preservation of archeological value of both the identified sites.

Summary

The proposed project will have no impact on resources of the coastal zone for the following reasons:

- The project will not have an impact on biological resources and wildlife species;
- The project will not have an impact to water quality. No wetlands exist in the target site area and there will be no discharges of any pollutants;
- The Island is restricted Federal property, so public recreational uses is not allowed;
- Airborne noise will be minimal and very short in duration and at times less than natural noise levels at ground level;
- Impacts to National Register eligible properties were previously mitigated so that there will be No Adverse Effects.

Conclusion

In accordance with the Federal Coastal Zone Management Act of 1972, as amended, Section 307 (c) (1), this CCND demonstrates that the activity will not affect resources of the coastal zone. If you have any questions, please contact Mr. James M. Danza at (805) 989-9747.
March 23, 1998

Vivian Goo
Deputy Public Works Officer
Attn: Jim Danza, FAX # (805) 989-1308
Naval Air Weapons Station, Point Mugu
521 19th Street
Point Mugu, CA 93042-5001

San Nicolas Island, Ventura County

Dear Ms. Goo:

The Coastal Commission staff has received the above-referenced negative determination from the Naval Air Warfare Center Weapons Division (NAWC), for the Standoff Land Attack Missile (SLAM) Program, which is a military weapons test program involving the firing of non-warhead missiles from aircraft flying over the Pacific Ocean within the Pacific Missile Test Range. The missiles would be fired towards targets consisting of stacked metal storage trailers located in a previously disturbed area on the west side of San Nicolas Island. The Navy has previously conducted trial tests of this operation (a total of 71 SLAMs have previously been fired); however the Navy now seeks to conduct the tests on a regular basis, and so has published an Environmental Assessment and submitted this negative determination for the program.

The proposed program would involve up to 26 missile firings per year, within a time period of between 2 and 16 days per year, for 20 years. A firing consists of a missile (approximately 15 ft. long and weighing approximately 1500 lbs.) being fired from a military aircraft flying towards San Nicolas Island. The missile would be released from the aircraft wing approximately 50 miles from the Island and fly a pre-planned, route (controlled by autopilot, including the use of GPS and manned video camera links) to the planned target site on the island.

The only potentially present sensitive wildlife species in the target area is the threatened (State-listed) Island fox, which is of concern because foxes could build dens in open areas under the trailers. The Navy has included measures to monitor for the foxes and assure that no open areas are created that could attract foxes. Sensitive avian and marine mammal species would not be affected by the firings. Based on past trials the Navy is confident it will hit the targets accurately, and in any event if a missile is errant the Navy will have the ability to control the missile and guide it along a trajectory taking it above and over the island, to avoid impacts on marine mammals in nearshore and open ocean areas below the missile path. Noise impacts will be minor and insignificant (>101 dB), and the aircraft (the noisiest emitter in the test) will normally
maintain a 2000 ft. distance above the ocean, and will maintain a minimum 500 ft. distance above the ocean at all times. The Navy monitored marine mammal reactions during past SLAM trial tests in November 1997, and noted only slight startle reactions in very few of the mammals present and hauled out on shore, with no adverse biological consequences (e.g., stampeding, or moving towards the water). The Navy will continue to monitor marine mammal and seabird reactions to the tests for any startle or other reactions for the life of the program. There are no sensitive plant species in the project area.

Archaeological resources in the impact vicinity have been documented and the Navy has coordinated with the State Historic Preservation Officer to assure these resources are adequately protected, including assurance that an archaeological representative will be present during construction activities. Concerning recreational boating and commercial fishing, the ocean area west of San Nicolas Island is used sporadically for recreation and commerce, and the proposed 2 to 16 range closures per year (compared to an overall 150-200 range closures for all Navy programs within the Sea Range) represents minimal impacts to recreation and fishing. Air quality impacts and fuel spill risks will be minimal, with a worst case situation of up to 16 gallons of JP-10 fuel spilling if a full tank on a-missile were to land in the ocean and be released; however this amount is small and this type of fuel evaporates quickly. Missile debris on the island will be removed after the impact, and all debris and equipment will be removed at the end of the program.

With the measures incorporated by the Navy into the project to minimize and monitor impacts, we agree that the project would not result in adverse impacts to any coastal zone resources, and we therefore concur with your negative determination made pursuant to Section 15 CFR 930.35(d) of the NOAA implementing regulations. Please contact Mark Delaplaine at (415) 904-5289 if you have questions.

Sincerely,

PETER M. DOUGLAS
Executive Director

cc: Ventura Area Office
NOAA
Assistant Counsel for Ocean Services
OCRM
California Department of Water Resources
Governors Washington D.C. Office
Dear Ms. Noda:

Enclosed for your review and comment is the Draft Environmental Assessment (DEA) for the Standoff Land Attack Missile (SLAM) Program on San Nicolas Island (SNI). This DEA has been prepared in accordance with the National Environmental Policy Act of 1969 and the Council on Environmental Quality Regulations.

The proposed action is to conduct firings of nonwarhead SLAM and future model SLAM missiles over the waters of the Naval Air Warfare Center Weapons Division's Sea Range against a land target located on the western end of SNI. Missiles will be fired for engineering developmental test and evaluation and Fleet training. Test and training exercises will be conducted from two to sixteen operational days per year involving up to twenty-six missile firings per year. The total program may involve up to 100 T&E missile firings and 300 training exercise firings over its 20-year life.

The Navy's analysis of the proposed action has determined that there will be no adverse effects to threatened and endangered species. We request concurrence with these findings.

Please respond within thirty (30) days. Correspondence should be sent to:

Mr. Ron Hudson
Environmental Division (Code 832000E)
Naval Air Weapons Station
521 9th Street
Point Mugu, CA 93042-5001
If you have any questions, please contact Mr. Ron Hudson of our Environmental Division, at (805) 989-7412.

Sincerely,

[Signature]

VIVIAN COO
Deputy Public Works Officer
By Direction Of The Commanding Officer

Enclosure: 1. Draft Environmental Assessment
Dear Ms. Lagomarsino:

Enclosed for your review and comment is the Draft Environmental Assessment (DEA) for the Standoff Land Attack Missile (SLAM) Program on San Nicolas Island (SNI). This DEA has been prepared in accordance with the National Environmental Policy Act of 1969 and the Council on Environmental Quality Regulations.

The proposed action is to conduct firings of nonwarhead SLAM and future model SLAM missiles over the waters of the Naval Air Warfare Center Weapons Division's Sea Range against a land target located on the western end of SNI. Missiles will be fired for engineering developmental test and evaluation and Fleet training. Test and training exercises will be conducted from two to sixteen operational days per year involving up to twenty-six missile firings per year. The total program may involve up to 100 T&E missile firings and 300 training exercise firings over its 20-year life.

The Navy's analysis of the proposed action has determined that there will be no adverse effects to protected marine mammals. We request concurrence with these findings.

Please respond within thirty (30) days. Correspondence should be sent to:

Mr. Ron Hudson
Environmental Division (Code 832000E)
Naval Air Weapons Station
521 9th Street
Point Mugu, CA 93042-5001
If you have any questions, please contact Mr. Ron Hudson of our Environmental Division, at (805) 989-7412.

Sincerely,

VIVIAN GOD
Deputy Public Works Officer
By Direction Of The Commanding Officer

Enclosure: 1. Draft Environmental Assessment
From: Officer in Charge, Naval Air Warfare Center Weapons Division
To: Commander, Naval Air Warfare Center Weapons Division, Point Mugu Code 4KLEAQE, 521 9th Street, Point Mugu, CA 93042-5001

Subj: ENVIRONMENTAL REVIEW FOR THE STANDOFF LAND ATTACK MISSILE (SLAM) EXPANDED RESPONSE (ER)

Ref: (a) NAWCWPNS PM ltr 5090 Ser 4KLEAQE/A-234 of 27 Jan. 98

Encl: (1) Environmental Review Record of Environmental Consideration Control Number RC-98026a

1. Enclosure (1) provides concurrence as requested in reference (a).

David Morris
By direction
US ARMY WHITE SANDS MISSILE RANGE
WHITE SANDS MISSILE RANGE, NEW MEXICO 88002-5048

ENVIRONMENTAL REVIEW
RECORD OF ENVIRONMENTAL CONSIDERATION
CONTROL NUMBER RC-98026a

TITLE: Standoff Land Attack Missile Expanded Response

PROPOSI TION: [Signature]  DATE: 4/2/98
Name/Office Symbol/Phone Number

This proposed action has been reviewed by the National Range Environment and Safety Directorate (NRES) and found to be in accordance with the environmental, safety, fire and radiation protection rules, regulations, laws and policies established for actions occurring on White Sands Missile Range. The project will be using an existing target site, and the NEPA requirements are covered in the HELSTF and WSMR Environmental Assessments.

CONCURRENCE:

[Signature]  DATE: 4/8/98
Bobbye A. Mathews
Chief, Customer Support Office, 675-5670

[Signature]  DATE: 5/15/98
THOMAS A. LADD
Director, National Range
Environment and Safety Directorate

Encl (1)
WHITE SANDS MISSILE RANGE
ENVIRONMENTAL IMPACT REDUCTION PROCEDURES

RECORD OF ENVIRONMENTAL CONSIDERATION
CONTROL NUMBER: RC-98026a

TITLE: Standoff Land Attack Missile Expanded Response

The proponent of the action described in this Environmental Review document must adhere to the following procedures and deliver an after action report to the WSMR Customer Support Office (NRES-C) at the completion of the proposed action. The report shall contain a status of the Environmental Impact Reduction Procedures as they relate to the proposed action. Comments evaluating their effectiveness are also encouraged.

PROCEDURES TO BE FOLLOWED:

1. NRES-C shall be contacted prior to any changes to the proposed action as detailed in the attached environmental review document.

2. All contractor owned vehicles and motorized heavy equipment shall be equipped with portable fire extinguishers (min. 2.5 dry chemical).

3. The use of any construction equipment which contains radioactive materials (i.e. soil density gauges, lead paint analyzers, radiography sources, well logging equipment), or produces ionizing (i.e. X-ray machines) or nonionizing (i.e. laser leveling devices) radiation, must be coordinated with the WSMR Radiation Protection Division, (505) 678-1019/3210.

PROPOSED: [Signature]

DATE: 4/6/98

Name/Office Symbol/Phone Number
(signature certifies acceptance of these procedures)
APPENDIX A

STANDOFF LAND ATTACK MISSILE (SLAM) EXPANDED RESPONSE (ER)

1. BACKGROUND/PURPOSE: In 1994 the SLAM program completed an environmental assessment for the Standoff Land Attack Missile for testing on WSMR. Two sites were identified for non-warhead impacts, TS-513 and J-140. In keeping with the trend to reduce spending on new missile systems and upgrade the capabilities of existing ones, the SLAM has been upgraded to the SLAM ER. In addition to retaining all the capabilities of the baseline SLAM, the ER variant has longer range, improved countermeasures capability, better kill probability against hardened targets, and improved user interfaces. Figures 1-5 provide a comparison of the baseline SLAM and the SLAM ER, system description.

2. NEED: Most of the improvements are electronic in nature, with one exception which are the two wing deployment unit charges (Figures 6 and 7 exhibit a comparison of the two weapons hazardous materials). As a result of the improvements, the ER must be tested to its maximum capabilities prior to being fielded. To achieve this, the configuration of the target and the area at TS-513 needs to be changed and expanded.

3. PROPOSED ACTION: In mid April 1998, the SLAM ER program plans to commence testing and continue intermittently for approximately three months. There will be no more than three missile firings during the year and all of these will use non-warhead missiles. All aspects of the proposed testing and future tests are well within the "Description of the Proposed Action" of the Environmental Assessment for the Standoff Land Attack Missile, with the exception of the requirement for reconfiguring and expanding TS-513 target area. Specifically four sets of ocean shipping containers will be placed outside the existing target area. To ensure they will be seen by the missile, an approximate 50' diameter circle will need to be cleared with the containers set in the center. The method for clearing the circle will be dragging the expanded target area, as shown in figure 8. The information requested in the WSMR National Environmental Policy Guide and Appendixes C-E has been evaluated and provided in the Environmental Assessment for the SLAM; therefore, those will not be included. Appendix B of this policy is also included as some of the information requested is specific to SLAMER.
Using Pt. (A) as a reference point (0,0), the following are the center points of the buildings.

1. (-50, 875)
2. (225, 650)
3. (500, 500)
4. (-50, -225)
5. (450, 850)
6. (100, -75)

The southwest corner of Building (B) is at (300, 400) and the orientation of the building is at 030°/300°.
# SYSTEM DESCRIPTION

## Table 1: SLAM ER Comparison With Baseline SLAM and Harpoon

<table>
<thead>
<tr>
<th>INFORMATION</th>
<th>HARPOON</th>
<th>BASELINE SLAM</th>
<th>SLAM ER</th>
</tr>
</thead>
<tbody>
<tr>
<td>LENGTH (inches):</td>
<td>151.5</td>
<td>175.2</td>
<td>172.0</td>
</tr>
<tr>
<td>DIAMETER (inches):</td>
<td>13.6</td>
<td>13.5</td>
<td>13.5</td>
</tr>
<tr>
<td>WEIGHT (pounds):</td>
<td>1172</td>
<td>1354</td>
<td>1600</td>
</tr>
<tr>
<td>RANGE:</td>
<td>In excess of 67 NM.</td>
<td>In excess of 50 NM.</td>
<td>In excess of 75 NM.</td>
</tr>
<tr>
<td>Midcourse:</td>
<td>- Active radar.</td>
<td>- Maverick IIR video seeker. - AWW-13 Pod Man-In-The-Loop (MITL) autonomous or third party seeker control.</td>
<td>- Improved MITL logic</td>
</tr>
<tr>
<td>Template:</td>
<td></td>
<td>- Maverick IIR video seeker. - AWW-13 Pod MITL autonomous or third party seeker control.</td>
<td></td>
</tr>
<tr>
<td>Waffen:</td>
<td>600 lb unitary blast/explosive.</td>
<td>600 lb unitary blast/explosive.</td>
<td>Tomahawk Block III-derivative, titanium design.</td>
</tr>
<tr>
<td>SYSTEM ELEMENTS:</td>
<td>MK-82</td>
<td>MK-82</td>
<td>MIL-STD-1760</td>
</tr>
<tr>
<td>Missile:</td>
<td>Common data processor permits integration with existing ship and aircraft launch systems.</td>
<td>Common data processor permits integration with existing ship and aircraft launch systems.</td>
<td></td>
</tr>
<tr>
<td>Command and Launch System:</td>
<td></td>
<td>Common data processor permits integration with existing ship and aircraft launch systems.</td>
<td>Integration with FA-18C/D 13C.</td>
</tr>
</tbody>
</table>
Figure 1. Basic Configuration of an Operational SLAM
SYSTEM DESCRIPTION

**Global Positioning Satellite (GPS) Receiver/Processor Unit**

**GPS Antennas**

**Radar Altimeter**

**Midcourse Guidance Unit**

**Maverick IIR Seeker**

**Weapon Data Link**

**Warhead**

**Battery**

**Turbojet Engine**

**Control Fins**

**Fuel Tank**

**Data Link Antenna**

---

**Performance**

<table>
<thead>
<tr>
<th>Range:</th>
<th>&gt;50 NM (Launch &amp; Control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penetration:</td>
<td>Medium</td>
</tr>
<tr>
<td>Launch Envelope:</td>
<td>- Harpoon</td>
</tr>
<tr>
<td>Accuracy:</td>
<td>16 m Mid Course Precision Terminal</td>
</tr>
</tbody>
</table>

**Dimensions**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter, cm (in.)</td>
<td>34.3 (13.5)</td>
</tr>
<tr>
<td>Length, cm (in.)</td>
<td>445 (175)</td>
</tr>
<tr>
<td>Weight, kg (lb)</td>
<td>920 (1,366)</td>
</tr>
</tbody>
</table>

---

Figure 2. Basic Components of an Operational SLAM
SYSTEM DESCRIPTION

Figure 3. Basic Configuration of an Operational SLAM ER
SYSTEM DESCRIPTION

Nominal Characteristics

Length = 172.0 in.
Diameter = 13.5 in.
Weight = 1,463 lb

Seeker Power Supply
Folding Lug
Guidance Navigation Unit
Wing Deployment Unit and Folding

Figure 4. Basic Components of an Operational SLAM ER
SLAM Hazardous Item Summary
(Air launch Exercise Missile)

A summary of the Hazardous Items present in a SLAM Exercise Missile is shown in the table below. These Hazardous Items do not create an unacceptable risk to the user under normal handling, storage and use.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>TYPE OF HAZARD</th>
<th>AMOUNT OR EXPLOSIVE WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guidance Section:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Cryoengine Assembly</td>
<td>High Pressure (with Avionics Power Off)</td>
<td>10 Liters He @ STP 900 psi</td>
</tr>
<tr>
<td>Exercise Section (note 1):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Safe-Arm Contact Fuze</td>
<td>Electro-Explosive</td>
<td>2.170 gm</td>
</tr>
<tr>
<td>- Air Pressure Probe</td>
<td>Electro-Explosive</td>
<td>0.390 gm</td>
</tr>
<tr>
<td>- Crush Sensors (2)</td>
<td>Electro-Explosive</td>
<td>0.324 gm (total)</td>
</tr>
<tr>
<td>- RFTS Battery</td>
<td>Electro-Explosive, Electrical, Corrosive</td>
<td>1/Missile</td>
</tr>
<tr>
<td>Sustainer Section:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Initiators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Start Tank Valve</td>
<td>Electro-Explosive</td>
<td>0.264 gm</td>
</tr>
<tr>
<td>- Main Fuel Valve (2)</td>
<td>Electro-Explosive</td>
<td>0.530 gm (total)</td>
</tr>
<tr>
<td>- Bleed Air Valve</td>
<td>Electro-Explosive</td>
<td>0.264 gm</td>
</tr>
<tr>
<td>- Inlet Duct Cover (2)</td>
<td>Electro-Explosive</td>
<td>0.530 gm (total)</td>
</tr>
<tr>
<td>- Engine Start System</td>
<td>Electro-Explosive</td>
<td>0.264 gm</td>
</tr>
<tr>
<td>- Engine Start System (less initiator)</td>
<td>Electro-Explosive</td>
<td>586.370 gm</td>
</tr>
<tr>
<td>- Battery</td>
<td>Electro-Explosive, Electrical, Corrosive</td>
<td>1/Missile</td>
</tr>
<tr>
<td>- Fuel</td>
<td>Combustible Liquid</td>
<td>128 lbs. (18.4 gallons)</td>
</tr>
<tr>
<td>Boattail Section:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Data Link Antenna</td>
<td>RF Radiation</td>
<td>1 mW-Hr/Cm² @ 2.2 Ft. (note 2)</td>
</tr>
</tbody>
</table>

Notes:
1. For tactical missiles add a warhead with 215 lbs. high explosive; a Fuze Booster (110 gm); and delete the RFTS battery.
2. Applicable allowable limit per the Occupational Safety & Health Administration (OSHA) is 1 mW-Hr/Cm² during any 0.1 hour day.
SLAM ER Hazardous Item Summary
(Air launch Exercise Missile)

A summary of the Hazardous Items present in a SLAM ER Exercise Missile is shown in the table below. These Hazardous Items do not create an unacceptable risk to the user under normal handling, storage and use.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>TYPE OF HAZARD</th>
<th>AMOUNT OR EXPLOSIVE WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Guidance Section:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Cryoengine Assembly</td>
<td>High Pressure</td>
<td>10 Liters He @ 157F</td>
</tr>
<tr>
<td>•</td>
<td>900 psi</td>
<td></td>
</tr>
<tr>
<td>• Air Data Probe</td>
<td>Hot Surface, Burn</td>
<td>&gt;140° F @ ambient</td>
</tr>
<tr>
<td><strong>Exercise Section (note 1):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Safe-Arm Contact Fuze</td>
<td>Electro-Explosive</td>
<td>1.950 gm</td>
</tr>
<tr>
<td>• Air Pressure Probe</td>
<td>Electro-Explosive</td>
<td>0.290 gm</td>
</tr>
<tr>
<td>• Wing Deploy - Initiator/Cartridge (2)</td>
<td>Electro-Explosive</td>
<td>15.626 gm (total)</td>
</tr>
<tr>
<td>• RFTS Battery</td>
<td>Electro-Explosive, Electrical, Corrosive</td>
<td>1/Missile</td>
</tr>
<tr>
<td>**Sustainer Section:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Initiators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Start Tank Valve</td>
<td>Electro-Explosive</td>
<td>0.264 gm</td>
</tr>
<tr>
<td>• Main Fuel Valve</td>
<td>Electro-Explosive</td>
<td>0.364 gm</td>
</tr>
<tr>
<td>• Bleed Air Valve</td>
<td>Electro-Explosive</td>
<td>0.284 gm</td>
</tr>
<tr>
<td>• Inlet Duct Cover (2)</td>
<td>Electro-Explosive</td>
<td>0.530 gm (total)</td>
</tr>
<tr>
<td>• Engine Start System</td>
<td>Electro-Explosive</td>
<td>0.264 gm</td>
</tr>
<tr>
<td>• Engine Start System (less initiator)</td>
<td>Electro-Explosive</td>
<td>598.370 gm</td>
</tr>
<tr>
<td>• Battery</td>
<td>Electro-Explosive, Electrical, Corrosive</td>
<td>1/Missile</td>
</tr>
<tr>
<td>• Fuel</td>
<td>Combustible Liquid</td>
<td>128 lbs. (18.4 gallons)</td>
</tr>
<tr>
<td><strong>Boattail Section:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Data Link Antenna</td>
<td>RF Radiation</td>
<td>1 mW-Hr/Cm² @ 2.2 Fl (note 2)</td>
</tr>
</tbody>
</table>

Notes:
1. For tactical missiles add a warhead with 165 lbs. high explosive; a Fuze Booster (215 gm); and delete the RFTS battery.
2. Applicable allowable limit per the Occupational Safety & Health Administration (OSHA) is 1 mW-Hr/Cm² during any 0.1 hour day.
APPENDIX B

(REQUIRED FOR ALL MISSIONS)

1. NAME OF PROJECT/ACTION TO BE ASSESSED
   Standoff Land Attack Missile Expanded Response (SLAM ER)

2. MAJOR CATEGORY OF PROJECT/ACTION TO BE ASSESSED (SEE ATTACHED FOR DEFINITIONS)
   Aircraft Dispenser and Bomb Drop Programs

3. LENGTH OF THE ASSESSED PROJECT AT WSMR, IN WEEKS (THIS IS THE TOTAL TIME THE PROJECT WILL BE OPERATING AT WSMR INCLUDING PERIODS OF LITTLE OR NO ACTIVITY)
   Per Reference (b), 2008

4. TOTAL OPERATING BUDGET OF THE ASSESSED PROJECT (AT WSMR) IN THOUSANDS OF DOLLARS
   Unk

5. TYPE (GAS, DIESEL, OTHER) AND NUMBER OF GOVERNMENT VEHICLES TO BE USED BY THE PROJECT AT WSMR (THESE ARE GOVERNMENT OWNED OR OPERATED VEHICLES WHICH ADD TO THE VEHICLE COUNT USED IN NORMAL OPERATIONS)
   No Additional

6. TYPE (GAS, DIESEL, OTHER) AND NUMBER OF CONTRACTOR VEHICLES TO BE USED BY THE PROJECT AT WSMR (THESE ARE CONTRACTOR OWNED OR OPERATED VEHICLES WHICH ADD TO THE VEHICLE COUNT USED IN NORMAL OPERATIONS)
   Approximately 4 GAS (Contractor)

7. UTM COORDINATE PAIR LOCATION OF ALL ELECTRICAL GENERATORS
   TS-513, E=355271.94M, N=3732230.20, H=1443.5T

8. TYPE, RATING IN KW, NUMBER OF EACH RESPECTIVE GENERATORS
   1 each 10kw gas

9. UTM COORDINATE LOCATIONS ALL NOISE SOURCES OVER 85 dBA
   See Reference (b), Section
10. TYPES AND dBA LEVEL FOR ALL RESPECTIVE NOISE EMISSION SOURCES ABOVE 85 dBA
   See Reference (b), Section 3.7

11. WILL A SONIC BOOM BE GENERATED (YES/NO)?
    No

12. LIST THE FREQUENCY (TIMES/DAY) AND TIME OF DAY INCREMENT OF THE
    SONIC BOOM(S) (0001-0400, 0401-0800, 0801-1200, 1201-1600, 1601-2000, 2001-2400)
    N/A

13. NAMES AND QUANTITIES OF CHEMICALS, PAINTS, SOLVENTS, OILS, ETC. TO
    BE USED
    See Reference (b), Section 3.11

14. WILL DEBRIS RESULT FROM THIS ACTION (YES/NO)? (IF YES, DESCRIBE TYPE,
    UTM LOCATION/PREDICTED AREA, AND FORCE OF IMPACT IN FT-LBS)
    With the absence of a warhead, most debris will be large, however all practicable debris will be
    recovered. See Reference (b), Section 4.1

15. UTM COORDINATES OF THE ACTION (LAUNCH, IMPACT, CONSTRUCTION
    POINTS, ETC) WITH SITE NAMES.
    See question 7, Appendix B

16. LIST THE AIR CONTAMINANTS EMITTED AND THEIR TOTALS (LBS) AND
    THEIR TOTALS PER DAY AND PER HOUR (LBS/DAY, LBS/HR)
    See Reference (b), Section 4.3

17. LATRINE REQUIREMENTS (NUMBER AND UTM LOCATIONS)
    Same as Reference (b)

18. WATER USE REQUIREMENTS (GAL)
    Same as Reference (b)

19. WATER SOURCES FOR DRINKING AND SANITARY WATER
    Same as Reference (b)

20. DOES THIS ACTION INVOLVE CONSTRUCTION? (IF YES COMPLETE
    APPENDIX C)
    Yes, Refer to Figure 8 of Appendix A and Reference (b)
21. DOES THIS ACTION INVOLVE TARGETS? (IF YES COMPLETE APPENDIX D)
   Yes, Refer to Figure 8 of Appendix A and Reference (b)

22. DOES THIS ACTION INVOLVE ELECTROMAGNETIC RADIATION OR LASERS?
   (IF YES COMPLETE APPENDIX E)
   Yes, Refer to Reference (b), Section 3.7.4
APPENDIX H

DISTRIBUTION LIST AND COORDINATION CORRESPONDENCE

Federal Agencies

National Marine Fisheries Service
Ms. Irma Lagomarsino
Fisheries Biologist
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U. S. Fish and Wildlife Service
Ms. Diane Noda
Field Supervisor
2493 Portola Road, Suite B
Ventura, CA 93003

State Agencies

California State Historic Preservation Officer
Ms. Cherilyn Widell
Office of Historic Preservation
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Sacramento, CA 94296-0001

California Coastal Commission
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Executive Director
45 Fremont Street, Suites 1900 & 2000
San Francisco, CA 94105-2219

California Department of Fish and Game
Ms. Patricia Wolf
Regional Manager (Region 5)
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Long Beach, CA 90802

State and Local Interest Groups

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(Ventura Audubon Society - Central California Coast Audubon Council)
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Ventura, CA 93001