

Navy Training Lands Sustainability: Initiation Decision Report



NFESC 411
805-982-1618

NFESC 427
858-537-0255

NFESC 40
805-982-1674

Innovation...

Leadership...

Performance

**0817 Review
May 17, 2004**

Introduction

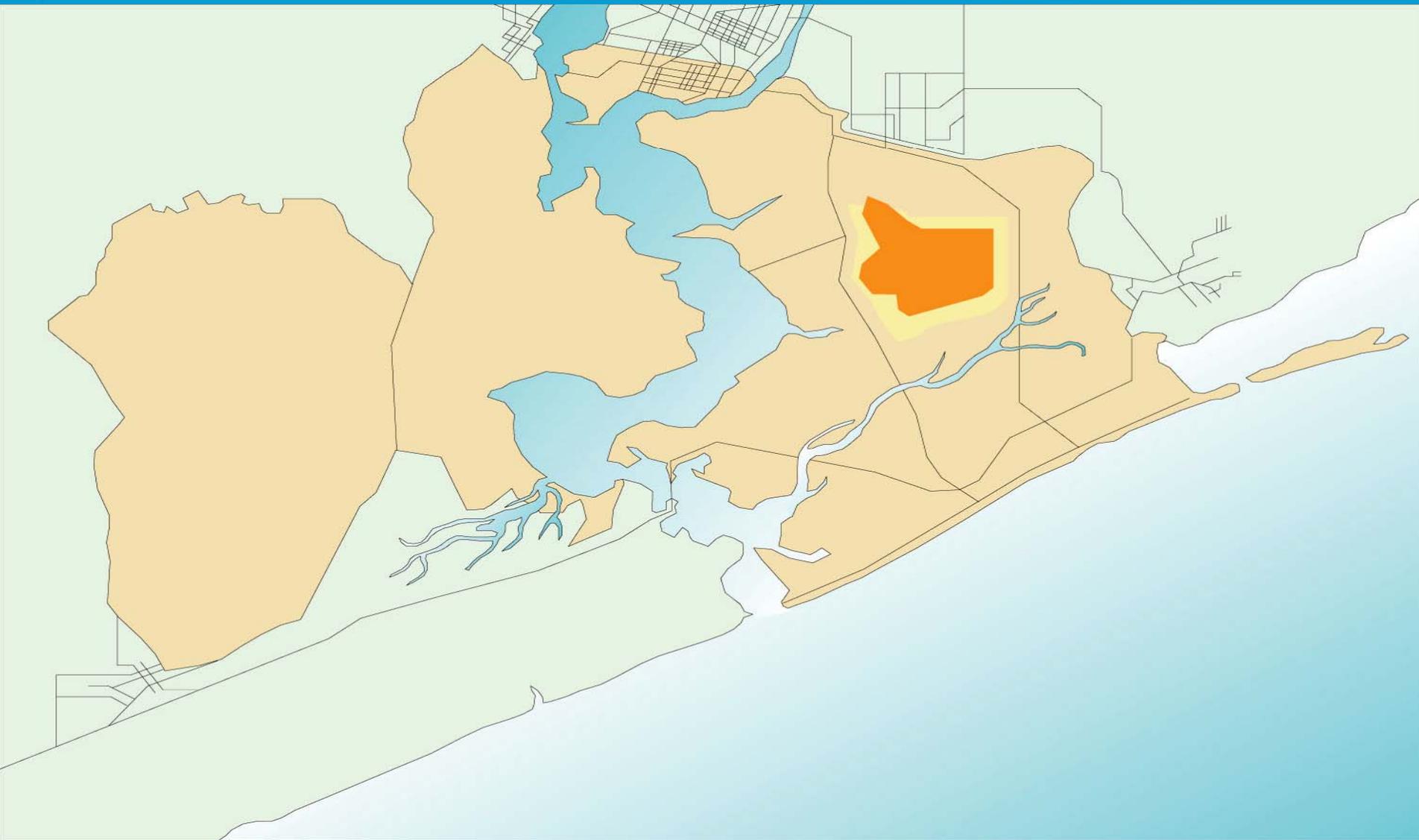


- **Objective:** Determine critical data needs of Navy range managers to support Fleet Inter-Deployment Training Cycle (*warfighter readiness*) & RDT&E range needs to support the testing and fielding of new weapons systems.

- **EQ Issue (Proposed Requirement):** Control and Management of Emissions/Wastes from Ranges

- **EQ Requirements:**
 - 2.IV.02.a Aircraft Noise Control
 - 2.IV.02.e Blast Noise Mitigation
 - 2.IV.02.f Protecting Marine Mammals and Threatened/Endangered Species from Acoustic Emissions
 - 2.V.01.d Reduced Incidental Take of Marine Mammals/Threatened Endangered Species
 - 4.III.03.d Methods and Protocols for Management of Properties with T&E or Archeological/Historical Sites
 - 2.I.02.b Characterization of Emissions from Open Burning and Open Detonation Disposal Activities.

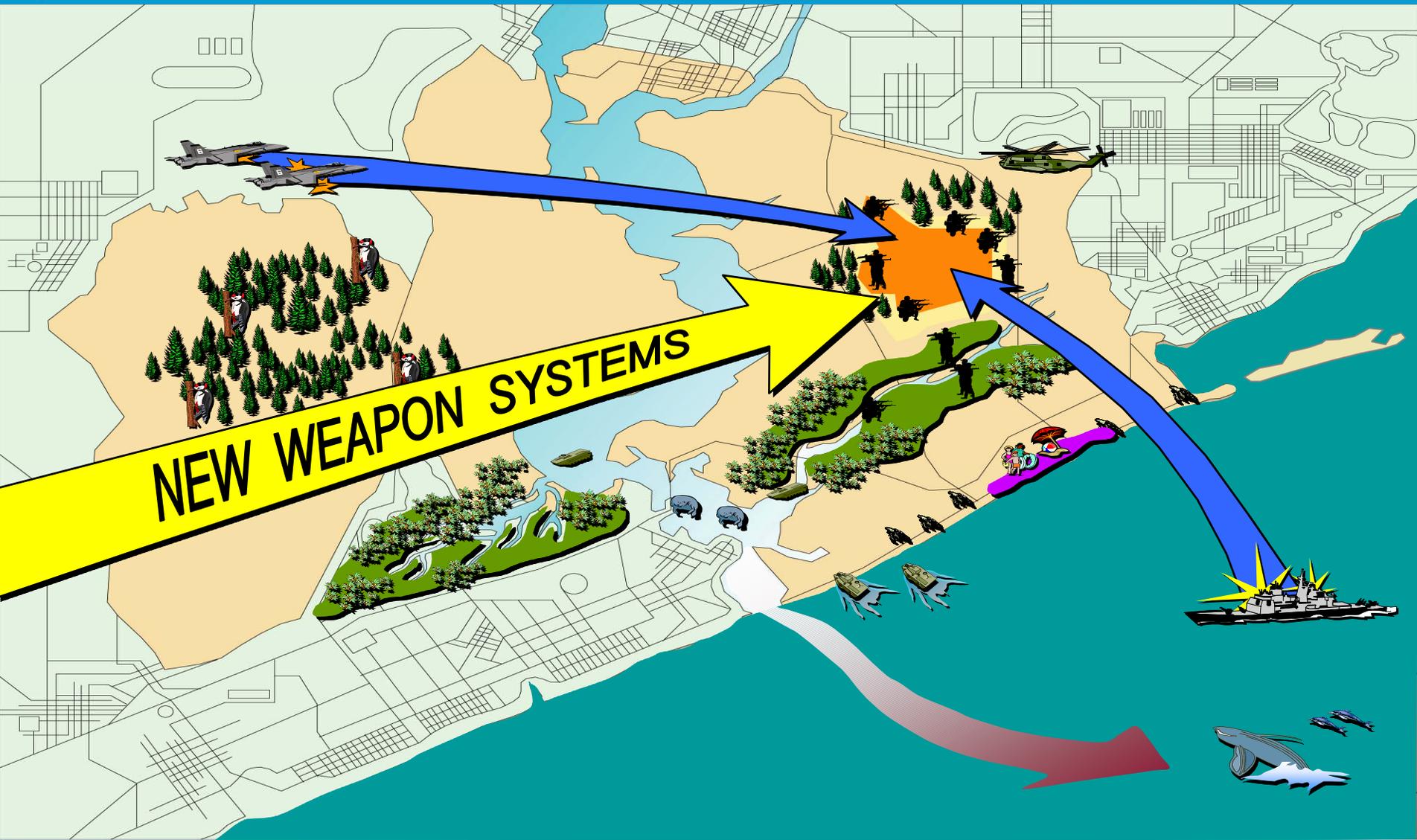
Training Lands (1940)



Training Lands (2004)



Training Lands (2025)



Problem: Encroachment Pressures



Population Growth
Urban Sprawl

Endangered Species
Habitat

Competition for
Airspace

Protected Marine
Resources

Air Pollution

UXO/Munitions Components

Noise Pollution

Competition for
Radio Frequency
Spectrum

= Reduced Flexibility

Regulatory Drivers



- **DOD 4715.11 & DOD 4715.12**
 - **Environmental & Explosive Safety Management of DOD Active and Inactive Ranges Within and Outside of the United States**
- **NEPA, ESA, MMPA, CWA, CAA**
- **U.S. Navy Range Sustainability Environmental Program Assessment (RSEPA) Policy Implementation Manual**
- **OPNAV Instruction 3550.XX**
 - **U.S. Navy Range Clearance Policy**
- **Military Munitions Rule (MMR), 62 FR 6621**

Table D-1. Master List of Applicable Laws, Regulations, and Other Directives

LAWS – FEDERAL	Currently Impacts	May Impact in Future	Not Applicable
Abandoned Ship Wreck Act of 1987, PL 100-298 (43 USC 2101-2106)			X
Alternative Motor Fuel Act of 1988, PL 100-494, as amended	X		
American Indian Religious Freedom Act of 1978, PL 95-341, as amended (42 USC 1996-1996a)	X		
Anadromous Fish Conservation Act of 1965, as amended (16 USC 757a-757f)			X
Antiquities Act of 1906, PL 59-209 (16 USC 431-433)	X		
Archaeological and Historic Preservation Act (Moss-Bennett Act) of 1974, PL 86-532 (16 USC 469-469c)	X		
Archeological Resources Protection Act of 1979, PL 96-95 (16 USC 470aa-470mm)	X		
Atomic Energy Act of 1954, as amended (42 USC 2011 <i>et seq.</i>)	X		
Base Closure and Realignment Act (BRAC) of 1988, PL 100-526	X		
Clean Air Act of 1955, 69 Stat. 322, as amended (42 U.S.C. 7401-7671q)	X		
Clean Air Act of 1970, as amended (42 U.S.C. 7401 <i>et seq.</i>)	X		
Clean Water Act of 1977, PL 95-217 (33 U.S.C. 1251 <i>et seq.</i>)	X		
Coastal Zone Management Act of 1972, PL 92-583 (16 USC 1451-1465)	X		
Community Environmental Response Facilitation Act of 1992, PL 102-426	X		
Comprehensive Environmental Response, Compensation, and Liability (CERCLA) Act of 1980, as amended (42 USC 9601 <i>et seq.</i>)	X		
Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 (42 USC 11001 <i>et seq.</i>)	X		
Emergency Wetlands Resources Act of 1986, PL 99-645 as amended, (16 USC 3901-3932)	X		
Endangered Species Act of 1973, PL 93-205, as amended (16 U.S.C. 1531-1534)	X		
Energy Policy Act of 1992, PL 102-486	X		
Energy Policy and Conservation Act of 1975, as amended (42 USC 6201 <i>et seq.</i>)	X		
Erosion Protection Act of 1960, PL 86-645 as amended (33 USC 426-426-3)	X		
Estuary Protection Act of 1968, PL 90-454 (16 USC 1221-1226)	X		
Estuaries and Clean Waters Act of 2000, PL 106-457 (33 USC 2901)	X		
Farmland Protection Policy Act of 1981, PL 97-98, as amended (7 USC 4201-4209)		X (a)	(a) Applies to land leased from Dept of Interior and Dept. of Agriculture
Federal Cave Resources Protection Act of 1992, PL 100-691, as amended (16 USC 4301-4310)	X		
Federal Facility Compliance Act of 1992, PL 102-386 (42 USC 6901 note, 6908)	X		
Federal Insecticide, Fungicide, and Rodenticide Act of 1947, PL 92-516, as amended (7 USC 136-136y)	X		
Federal Land Policy and Management Act of 1976, PL 94-579, as amended (43 USC 1701-1785)	X		
Federal Noxious Weed Act of 1974, PL 93-629, as amended (7 USC 2801-2814)	X		
Federal Property and Administrative Services Act of 1949 (10 USC 484 <i>et seq.</i>)	X		
Federal Tort Claims Act of 1946, as amended (28 USC 2671 <i>et seq.</i>)	X		
Fish and Wildlife Conservation Act of 1980, PL 96-366 (16 USC 2901-2912)	X		
Fish and Wildlife Coordination Act of 1934, PL 85-624 (16 USC 661-666c)	X		
Food, Agricultural, Conservation, and Trade Act of 1990 (Pesticide Recordkeeping), PL 101-624, as amended (7 USC 136i-1)	X (b)		(b) Requires all applicators of regulated pesticides to be certified and recordkeeping of all pesticides applied
Forest Rangeland Renewable Resource Planning Act of 1974, PL 93-378 (16 USC 1600-1624)	X ©		© Affects lands leased from Department of Interior
Freedom of Information Act of 1966, as amended (5 USC 552 <i>et seq.</i>)	X		
Hazardous and Solid Waste Amendments of 1984, PL 98-616	X		
Hazardous Materials Transportation Act of 1975 (49 USC 5101 <i>et seq.</i>)	X		

Table D-1. Master List of Applicable Laws, Regulations, and Other Directives (page 2 of 5)

LAWS – FEDERAL (Continued)	Currently Impacts	May Impact in Future	Not Applicable
Hazardous Materials Transportation Uniform Safety Act of 1990, PL 101-615	X		
Historic Sites, Buildings, and Antiquities Act of 1935, as amended by PL 74-292, PL 100-17 (16 USC 461-467)	X		
Lacey Act of 1900, 31 Stat. 187, as amended (16 USC 701)	X		
Low-Level Radioactive Waste Policy Act of 1980, as amended (42 USC 2021 <i>et seq.</i>)	X		
Magnuson-Stevens Fishery Conservation and Management Act of 1976 (16 USC 1801 <i>et seq.</i>)	X		
Marine Mammal Protection Act of 1972, PL 92-522, as amended (16 U.S.C. 1361-1421h)	X		
Marine Protection, Research, and Sanctuaries Act of 1972, as amended (33 USC 1401 <i>et seq.</i> and 16 USC 1431 <i>et seq.</i>)	X		
Migratory Bird Treaty Act of 1918, 40 Stat 755, as amended (16 USC 703-712)	X		
Military Construction Authorization Act, Passed Annually	X		
Military Construction Codification Act of 1982, PL 97-214	X		
Military Reservation and Facilities: Hunting, Fishing, and Trapping Act of 1958, PL 85-337 (10 USC 2671)	X		
Multiple-Use Sustained Yield Act of 1960, PL 86-517 (16 USC 2671)	X		
National Environmental Policy Act of 1969, PL 91-190 (42 U.S.C. 4321-4370d)	X		
National Historic Preservation Act of 1966, PL 89-665, as amended (16 U.S.C. 470-470x-6)	X		
Native American Graves Protection and Repatriation of 1990, PL 101-601 (25 USC 3001-3013)	X		
Noise Control Act of 1972 (42 U.S.C. 4901 <i>et seq.</i>)	X		
North American Wetlands Conservation Act of 1989, PL 101-233 (16 USC 4401-4414)	X		
Noxious Plant Control Act of 1968, PL 90-583 (43 USC 1241 <i>et seq.</i>)	X		
Occupational Safety and Health Act of 1970, PL 91-596 (29 USC 651 <i>et seq.</i>)	X		
Oil Pollution Act of 1990, PL 101-380 (33 USC 2701 <i>et seq.</i>)	X		
Outdoor Recreation -- Federal/State Program Act (16 USC 460 (L) <i>et seq.</i>)	X		
Outleasing for Grazing and Agriculture on Military Lands (10 USC 2667)	X		
Plant Quarantine Act of 1912, as amended (7 USC 151 <i>et seq.</i>)			X (d)
Pollution Prevention Act of 1990 (42 USC 13101 <i>et seq.</i>)	X		
Resource Conservation and Recovery Act of 1976, PL 94-580, as amended (42 USC 6901 <i>et seq.</i>)	X		
Rivers and Harbors Appropriations Act of 1899, 30 Stat. 1141, as amended (33 USC 401-403)	X		
Safe Drinking Water Act of 1974, PL 93-523, as amended (42 USC 300f-300j-26)	X		
Sikes Act (Conservation Programs on Military Reservations of 1960), PL 86-797, as amended by Sikes Act Improvement Amendments, PL 93-452 (16 USC 670-670f)	X		
Soil Conservation Act of 1938 (16 USC 5901 <i>et seq.</i>)	X		
Soil and Water Resources Conservation Act of 1977, PL 950192, as amended (16 USC 2001-2009)	X		
Solid Waste Disposal Act of 1965, PL 89-272, as amended (42 USC 3251 <i>et seq.</i>)	X		
Superfund Amendments and Reauthorization Act (SARA) of 1986, PL 99-499		X	
Taylor Grazing Act of 1934, PL 73-482 (43-USC 315-315o-2)			X
Timber Sales on Military Lands (10 USC 2665)	X		
Toxic Substances Control Act of 1976 (15 USC 2601 <i>et seq.</i>)	X		
Used Oil Recycling Act of 1980, PL 96-463, as amended	X		
Water Resources Planning Act, PL 89-80, as amended (42 USC 1962-1962d-20)	X		
Water Quality Act of 1965, PL 89-234	X		
Water Quality Improvement Act of 1970, PL 91-224	X		
Watershed Protection and Flood Prevention Act, PL 92-419 (16 USC 1001-1011, 33 USC 701)	X		
Wild and Scenic Rivers Act of 1968, PL 90-542, as amended (16 USC 1271-1287)		X	

(d) Sections repealed

Table D-1. Master List of Applicable Laws, Regulations, and Other Directives (page 3 of 5)

EXECUTIVE ORDERS (E.O.)	Currently Impacts	May Impact in Future	Not Applicable
E.O. 11514 Protection and Enhancement of Environmental Quality, March 5, 1970 (35 FR 4247), as amended by E.O. 11541 and 119911	X		
E.O. 11593 Protection and Enhancement of the Cultural Environment, May 13, 1971 (36 FR 8921)	X		
E.O. 11644 Use of Off-Road Vehicles on Public Lands, February 8, 1972 (37 FR 2877), as amended by E.O. 12608	X		
E.O. 11988 Floodplain Management, May 24, 1977 (42 FR 26951), as amended by E.O. 12148	X		
E.O. 11990 Protection of Wetlands, May 24, 1977 (42 FR 26961), as amended by E.O. 12608	X		
E.O. 12088 Federal Compliance with Pollution Control Standards, October 13, 1978 (43 FR 47707), revoked in part by E.O. 13148	X		
E.O. 12114 Environmental Effects Abroad of Major Federal Actions, January 4, 1979 (44 FR 1957)	X		
E.O. 12843 Procurement Requirements and Policies for Federal Agencies for Ozone-Depleting Substances, April 21, 1993 (58 FR 21881)	X		
E.O. 12856 Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements, August 3, 1993 (58 FR 41981)	X		
E.O. 12873 Federal Acquisition, Recycling, and Waste Prevention, October 20, 1993 (53 FR 54911)	X		
E.O. 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations, February 11, 1994 (59 FR 7629)	X		
E.O. 12906 Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure, April 11, 1994 (59 CFR 17671)	X		
E.O. 12962 Recreational Fisheries, June 7, 1995 (60 FR 30769)	X		
E.O. 13007 Indian Sacred Sites, May 24, 1996 (61 FR 26771)	X		
E.O. 13045 Protection of Children from Environmental Health Risks and Safety Risks, April 21, 1997 (62 FR 19885)	X		
E.O. 13089 Coral Reef Protection, June 11, 1998 (63 FR 32701)	X		
E.O. 13112 Invasive Species, February 3, 1999 (64 FR 6183)	X		
E.O. 13123 Greening the Government through Efficient Energy Management, June 8, 1999 (64 FR 30851)	X		
E.O. 13134 Developing and Promoting Bio-Based Products and Bioenergy, August 16, 1999 (64 FR 44639)		X	
E.O. 13148 Greening the Government through Leadership in Environmental Management, April 21, 2000 (65 FR 24595)	X		
E.O. 13158 Marine Protected Areas, May 26, 2000 (65 FR 34909)	X		
E.O. 13186 Responsibilities of Federal Agencies to Protect Migratory Birds, January 10, 2001 (66 FR 3853)	X		
Guidance for Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds, April 26, 1994 (60 FR 40837)	X		
Memorandum on Environmentally Beneficial Landscaping: Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds, April 26, 1994	X		
Memorandum of Understanding between the Department of Defense and the US Fish and Wildlife Service for the Ecosystem-Based Management of Fish, Wildlife, and Plant Resources on Military Lands, May 1999	X		
Memorandum of Understanding to Foster the Ecosystem Approach, December 15, 1995	X		

Table D-1. Master List of Applicable Laws, Regulations, and Other Directives (page 4 of 5)

NONMILITARY NOTICES, POLICIES AND REGULATIONS	Currently Impacts	May Impact in Future	Not Applicable
Code of Environmental Management Principles for Federal Agencies (61 FR 54062)	X		
Curation of Federally Owned and Administered Archalogical Collections (36 CFR 79)	X		
Determination of Eligibility for Inclusion in the National Register of Historic Places (36 CFR 63)	X		
Environmental Protection and Enhancement: Subpart H Historic Preservation (32 CFR 650)			X (e)
Federal Wildland Fire Management Policy (1995)	X		
Final Notice of Issuance and Modification of Nationwide Permits, March 9, 2000 (65 FR 12818)	X		
Fish and Wildlife Service List of Endangered and Threatened Wildlife and Plants (50 CFR 17.11 and 17.12)	X		
Historic Preservation Certificates (36 CFR 67)	X		
Hunting and Fishing Permits (32 CFR 552.19)	X		
National Historic Landmarks Program (36 CFR 65)	X		
National Register of Historic Places (36 CFR 60)	X		
Native American Graves Protection and Repatriation Act Regulations (43 CFR 10)	X		
Preservation of American Antiquities (Antiquities Act regulations) (43 CFR 3)	X		
Protection of Historic and Cultural Resources (36 CFR 800)	X		
Regulations for Implementing NEPA (Council on Environmental Quality) (40 CFR 1500)	X		
The Secretary of Interior's Standards for Historic Preservation Projects (36 CFR 68)	X		
Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management, Notice of Final Policy, October 18, 2000 (65 FR 62566)	X		
Waiver of Federal Agency Responsibility under Section 110 of the National Historic Preservation Act (36 CFR 78)	X		

(e) Army regulation -- only affects Army ranges

Table D-1. Master List of Applicable Laws, Regulations, and Other Directives (page 5 of 5)

MILITARY DIRECTIVES, ORDERS, INSTRUCTIONS, MEMORANDUMS, POLICIES, AND NOTICES	Currently Impacts	May Impact in Future	Not Applicable
"Agreements to Limit Encroachment and Other Environmental Constraints on Navy and Marine Corps Installations" Assistant Secretary of the Navy (Installations and Environment) Memorandum of 23 Jan 2003	X		
Acquisition, Use By Others and Disposal of Department of the Navy Real Property SECNAVINST 11011.47		X	
Air Installations Compatible Use Zones (AICUZ) Program OPNAVINST 11010.36B		X	
Archeological and Historic Resources Management (Department of Defense Directive) DoDD 4710.1 (June 21, 1984)	X		
Encroachment Control, MCO 11011.22A (November 25, 1987)	X (f)		
Environmental and Explosive Safety Management on Department of Defense Active and Inactive Ranges Outside the United States, DoD Directive 4715.12 (August 17, 1999)	X		
Environmental and Explosive Safety Management on Department of Defense Active and Inactive Ranges Within the United States, DoD Directive 4715.11 (August 19, 1999)	X		
Environmental and Natural Resources Program Manual OPNAVINST 5090.1B (October 17, 2002) (f) Impacts Marine Corps Ranges	X		
Environmental Compliance and Protection Manual, Marine Corps Order (MCO) P5090.2A	X		
Environmental Conservation Program (Department of Defense Instruction) DoDI 4715.3 (May 3, 1996)	X		
Environmental Compliance (Department of Defense Instruction) DoDI 4715.5 (April 24, 1996)	X		
Environmental and Explosive Safety Management of DoD Active and Inactive Ranges Within and Outside of the United States DoD 4715.11 and 4715.12	X		
Environmental Planning and Analysis (Department of Defense Instruction) DoDI 4715.9	X		
Military Munitions Rule (MMR), 62 FR 6621	X		
Navy "At Sea" Policy -- UASN Robert Pirie Memorandum (December 28, 2000) Compliance with Environmental Requirements in the Conduct of Naval Exercises or Training at Sea.	X		
U.S. Navy Range Clearance Policy (CNO N45 Draft) OPNAVINST 3550.XX		X	
U.S. Navy Range Sustainability Environmental Program Assessment (RSEPA) Policy Implementation Manual	X		
Use of Ecological Risk Assessments (Department of the Navy Environmental Policy Memorandum 97-04 (CMC Ltr 5090 LFL/KK-140 of March 23, 1997))	X		

(f) Impacts Marine Corps Ranges

Approach



- **Conduct an Initiation Decision Report**
 - **Problem Definition**
 - **Identify User Needs**
 - Contact Range Managers
 - OESO, RSG & RSEPA Coordination
 - RSWG (SERDP) SONs
 - Natural Resource Managers
 - **Prepare Technology Assessment**
 - State-of-the-art
 - Emerging Technologies (DoD RDT&E Program)
 - **Identify Technology Gaps**
 - **Program Recommendations**

Milestones



Milestone

Planned Completion

1.0 Identify User Needs/Regulatory Issues	06/30/03
2.0 Perform Tech Assessment & Identify Technology Gaps	12/31/03
3.0 Prepare Draft IDR	03/31/04
4.0 Complete Final IDR	06/30/04

Project Initiation: 12/03

FY03/FY04-Accomplishments to Date



FY03

- Coordinate scope of work with sponsor
- Coordinated with RSG and RSEPA
- RSG accepts role as FWG
- Initiate ID of user needs
- Initiated review of Navy range database
- Initiated review of on-going RDT&E

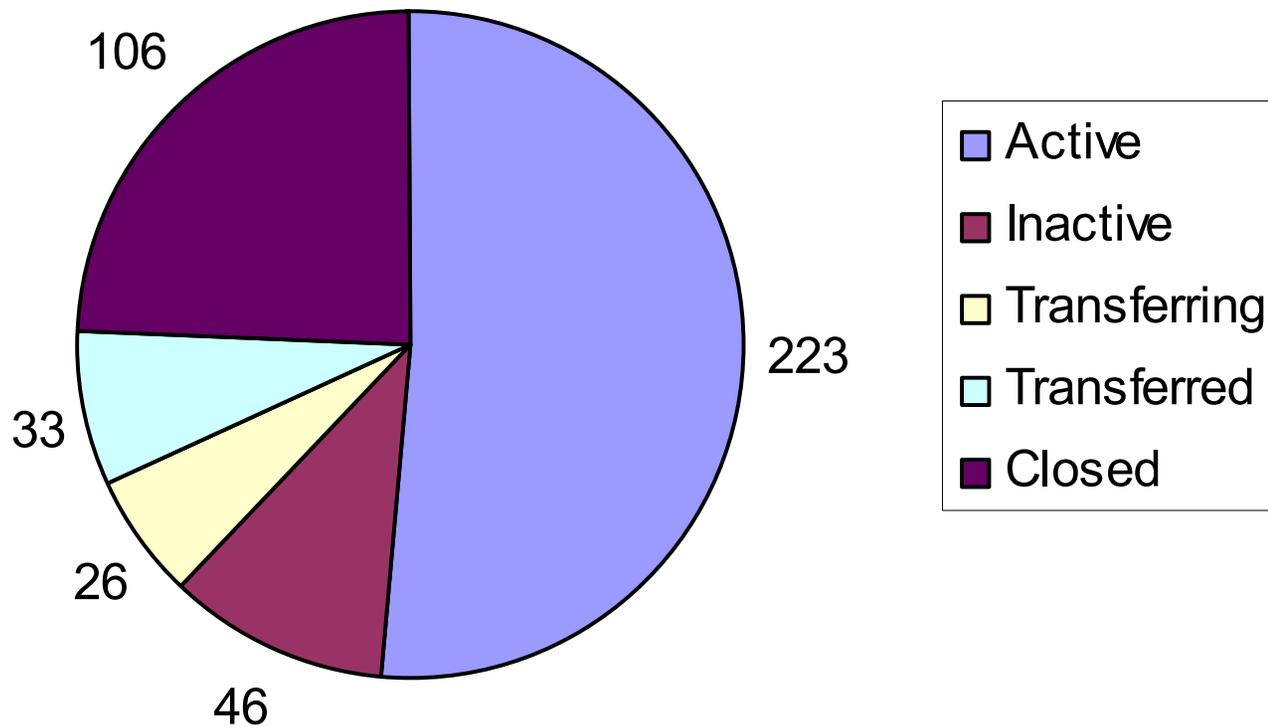
FY04

- Completed review of Navy/MC range database
- Completed review of DoD RDT&E
- Identified technology gaps
- Draft IDR to be completed June

RESULTS

RESULTS

Status of Navy Ranges (2001 database) (434 Ranges Total)



Navy Range Firing Types



1. Fired from land, air, or water into water	175
2. Fired from land, air, or water into land	291
3. Fired from land, air, or water into air	106

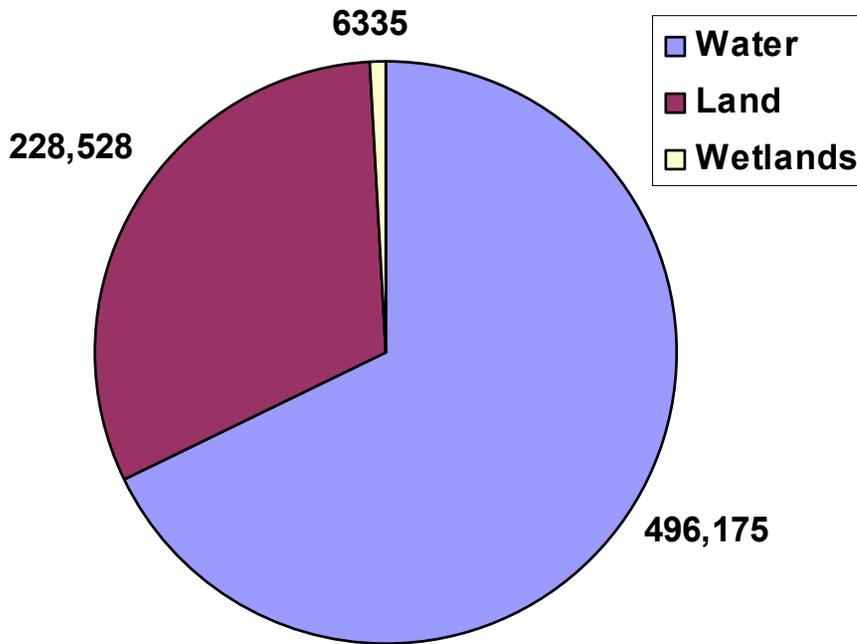
Range Uses

Small arms (209)	Firing (80)
Test (101)	Training (236)
Open Burn (52)	Other (80)

Navy Range Impact Areas

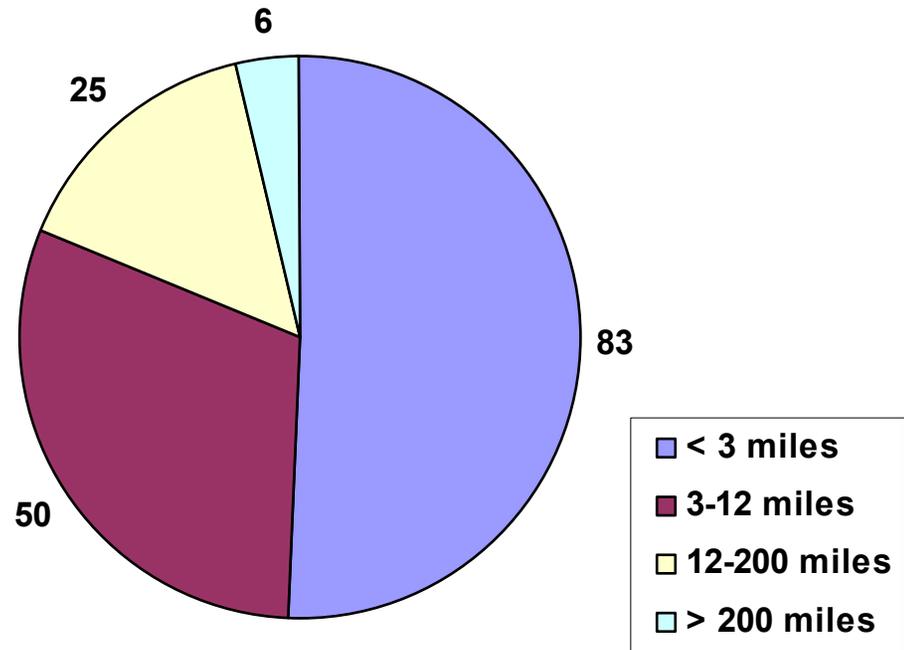


Impact Areas by Type & Size (Acres)



Greatest number of regulatory drivers apply to 0-12 mile zone

Water Impact Areas: Shore Proximity (Number of Ranges)



Navy Range



Bombing Range



(Photo courtesy of U.S. Navy)

Bombing Range

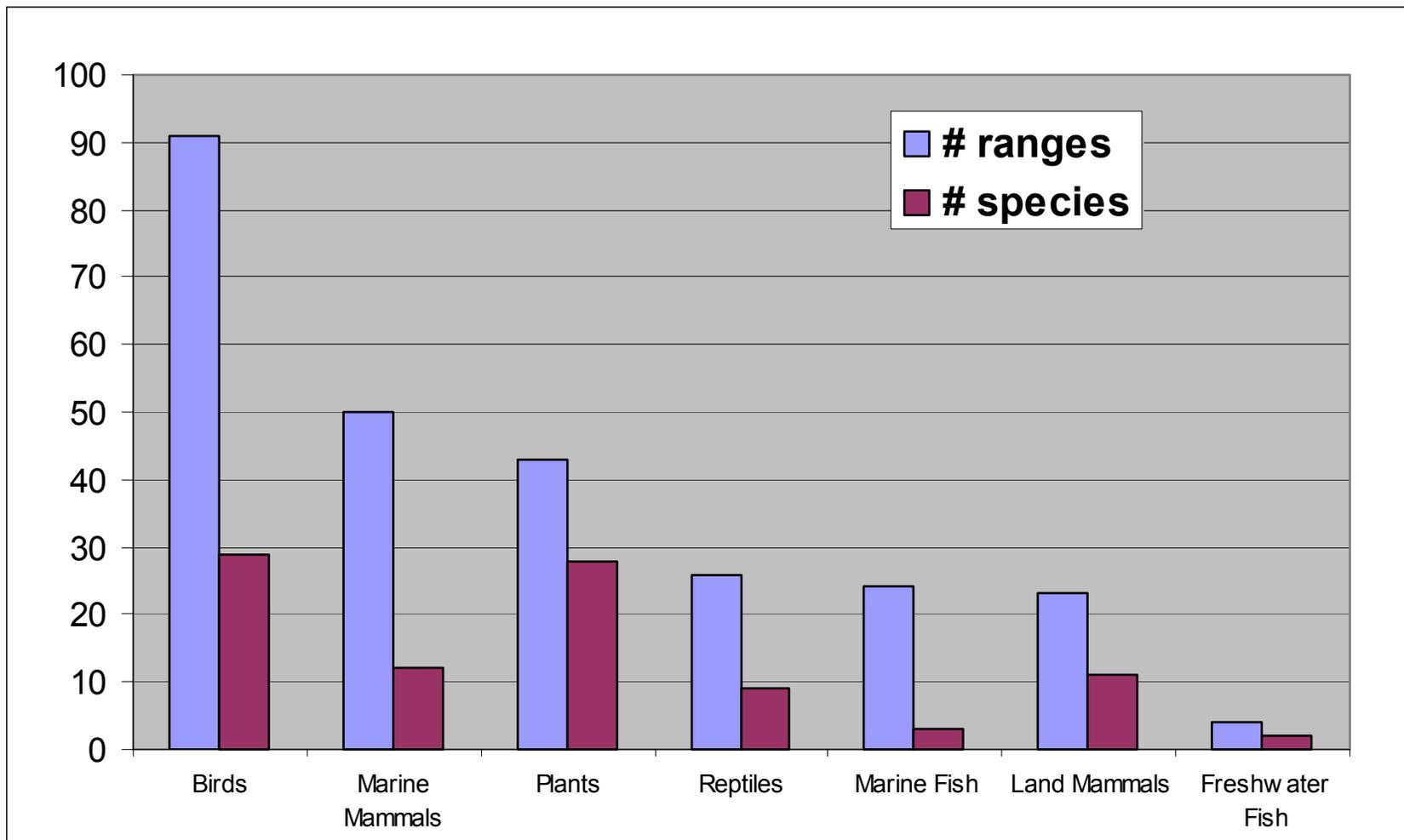


Test & Evaluation Range

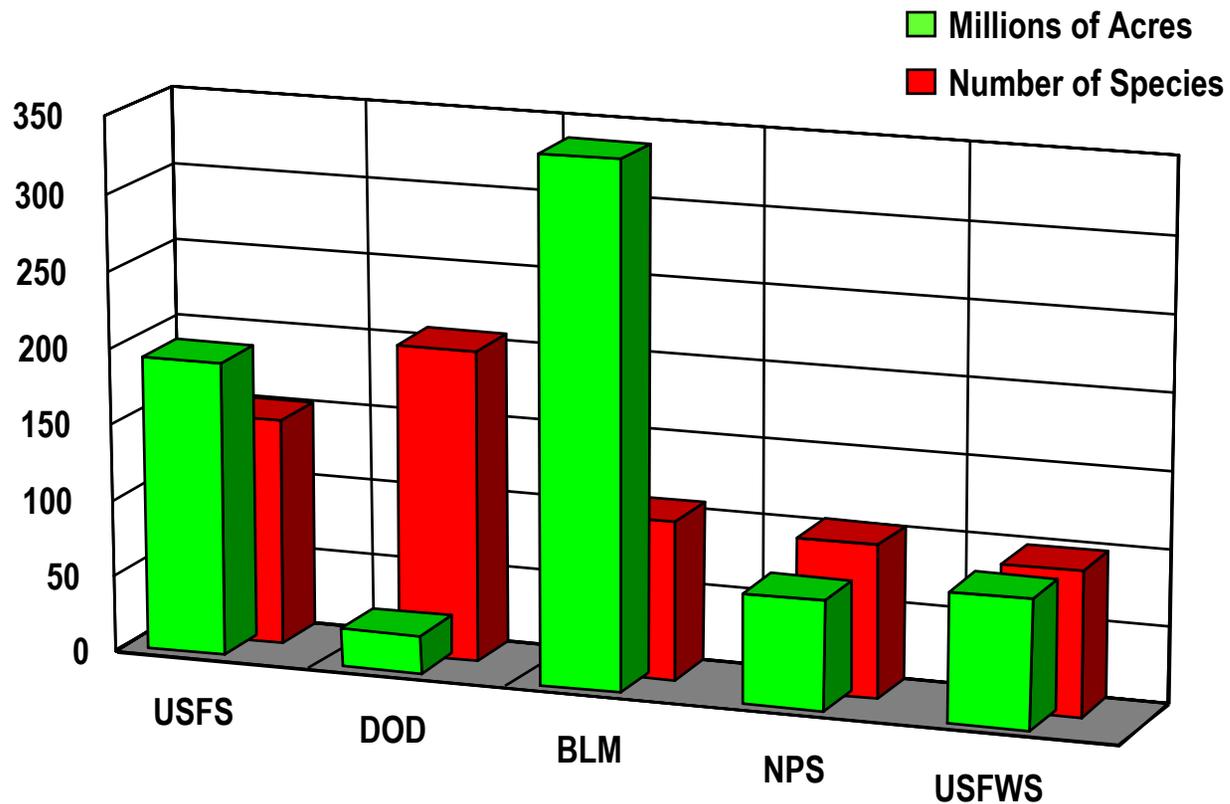


Information Gathering: Navy Ranges Affected by Endangered Species

(of 192 Ranges with Known or Potential Endangered Species)



National Lands and TES Distribution



*Adapted from Natural Heritage Data Network
- The Nature Conservancy

TAP Components



- ***Range Complex Management Plans (RCMPs)***
 - ensure consistent management processes for Navy ranges
- ***Environmental Planning Documents***
 - environmental analysis in accordance with NEPA
- ***Operational Range Clearance (ORC)***
 - routine removal of munition and target scrap from impact areas
- ***Marine Species Density Data (MSDD)***
 - Determine population densities and effects on species in ocean operating areas
- ***Range Sustainability Environmental Program Assessment (RSEPA)***
 - evaluate ranges for regulatory compliance and assess the potential of off-range release of munitions constituents

Technology Gaps

Technology Gaps: Munition Constituents



- **Improved capabilities still required for rapid and cost effective:**
 - Field detection of MC's in water, soil, & sediments
 - Mitigation strategies for MC's in surface & ground waters, & particulate transport on active ranges
 - Monitoring strategies in coastal & estuarine areas
 - Technology transfer of SERDP/ESTCP/Army RDT&E efforts
 - RSEPA implementation

Technology Gaps: Munition Constituents



- 1) Detail workable management solutions for mitigation of munitions constituents off-range. Include review of existing and future technologies such as groundwater well injection, bioremediation, surface application of lime, low cost electron donor application, and other methodologies.**
- 2) Prioritization of munitions constituents in regards to those most likely to occur on Navy/USMC ranges, and toxicity.**
- 3) Investigate technologies for the treatment of perchlorate-contaminated drinking water. Include review of existing and future technologies such as selective ion exchange resins to remove perchlorate from drinking water, modified granular activated carbon for drinking water treatment and remediation, and demonstration of a drinking water treatment using a biological process.**

Technology Gaps: Munition Constituents



- 4. Develop Best Management Practices manual for operational ranges describing control procedures, available technologies, and other issues concerning munitions constituents. Include descriptions of both proven, experimental, and new R&D technology for implementation on DoN/USMC ranges. Include scientifically defensible risk-based DoD range clearance guidance and management procedures. Involve Navy EOD and UXO contractor participation in improved, range clearance operations designed to minimize munition constituent contamination. Suggest improved policies and technologies for tracking range and ordnance use**

Technology Gaps: Munition Constituents



5. **Provide compliance and technical guidance on management of Material that Presents a Potential Explosive Hazard (MPPEH) and other range residue on operational ranges. Detail policies and procedures on how to manage, certify, and process to ensure no MPPEH, and assist in reduction of MPPEH stocks on ranges. Also include information on purchasing/contracting specialized processing equipment for short and long-term range clearance operations, RHAs, and demilitarization, including identification of funding and training availability. Define current and future CERCLA liability from MPPEH contamination**

6. **Assessment of applicable predictive models for RSEPA implementation**

Technology Gaps: Protected Marine Resources



- **Improved capabilities still required for rapid and cost effective:**
 - Monitoring and inventorying of coral reefs
 - With increased monitoring, specific issues may arise
 - Numerous marine mammal issues addressed by ONR

- 1) **Provide coordination for upcoming DoD-funded R&D on coral reef assessments, and define how to codify, acquire or transition this technology for implementation by Natural Resource managers at affected Navy Regions.**

Technology Gaps: Threatened and Endangered Species



- **Improved methods required for TES and natural resource assessment, monitoring, and management.**
- 1) **Develop ecosystem “holistic” approach to species protection & viability, perhaps using innovative approaches such as animal landscape modeling, in lieu of traditional approaches.**
- 2) **Provide information of current policies and suggested improvements to methods for quantifying impacts of operational training and ordnance use on habitat and TES.**
- 3) **Although under RSEPA endangered species are to be addressed under the NEPA process, there are general issues associated with assessing risk to endangered species. The Endangered Species Act requires protectiveness of individual animals as well as populations. However, there is no effective process to assess risk to the individuals.**

Technology Gaps: Range Management



- **Improved methods for cost effective control of invasive species:**
 - **In terrestrial and aquatic environments**
- 1. Determine strategy for control of Phragmites at Dare County Range; current methods are labor intensive; funds not available for adequate control on a recurring basis.**
 - 2. Maximize technology transfer of current SERDP/Army efforts for terrestrial invasive species of concern.**

Technology Gaps: Range Management



Standardize methods for data gathering, analysis, display and sharing:

– For all ranges

1. GIS applications: Provide guidance on application of GIS to operational ranges for Navy range personnel to include training resources, availability of data layers, coordination of Navy-wide GIS efforts, and identification of associated costs. Coordinate application of GIS with Navy Range Office for service-wide standardization.

Technology Gaps: Range Management



- **Range Residue/Scrap**
 - To be added

Technology Gaps: Range Management



- **Improved Ecological Risk Assessment MC data:**
 - See Table 3-4 “Munitions Constituent Toxicology Gaps for Ecological Risk Assessments”
 - Coordinate with data gap “ Prioritization of munitions constituents in regards to those most likely to occur on Navy/USMC ranges, and toxicity”.
 - Additional studies in the distribution and metabolism of TNT into its breakdown products are needed to better understand fate, transport, and toxicity to humans and the ecosystem.
 - Development of and verification of fate and transport predictive models for surface water and soil pathways

Technology Gaps: Range Management



- **Improved Ecological Risk Assessment MC data:**
 1. An RCA is performed every five years to determine, in part, if further analysis is required to assess risk of any off-range release. Prior to any sampling effort, predictive modeling will be done, utilizing MC data to predict migration off range and the potential concentrations. Groundwater fate and transport predictive models have been utilized; fate and transport for soil and surface water is also required; it is unknown which model is more accurate and realistic.

Technology Gaps: Range Management



- **Improved Ecological Risk Assessment MC data (cont):**
2. The Army Center for Health Promotion and Preventative Medicine (CHPPM) produced a report in March 2002 titled *Bioconcentration, Bioaccumulation and Biomagnification of Nitroaromatic and Nitramine Explosives and their Breakdown Products* (Toxicology Study 87-MA-4677-01). This report identified the available bioavailability information for TNT, RDX, HMX and their breakdown products and made general conclusions. Current risk assessment practice for determining exposure and effects of contaminants to the higher trophic levels is done through modeling. **Additional studies are needed to confirm and improve the bioavailability and trophic transfer data to reduce the conservative assumptions that are currently used in the modeling.** In addition, guidance is needed on making the models more site specific and verifying the accuracy of the models for munitions constituents.

Technology Gaps: Range Management



- **Improved Ecological Risk Assessment MC data (cont):**
- 3. **Impacts of munitions and their constituents to marine mammals in the open ocean are largely unknown. As a result, the ability to assess risk is problematic. Additional studies are needed to determine the impacts and effects of munitions constituents to these animals.**
- 4. **There is a lack of data on the munitions constituent impacts to unique marine environments including coral reef systems and critical sea grass beds.**
- 5. **The carrying capacity of munitions constituents in various ecosystems is largely unknown. Nature generally has the ability to handle a certain level of contamination without impact to the environment. Excedances of these levels are an indication that there is a potential impact. The lack of knowledge on the specific levels leads to potentially overly conservative assumptions regarding the impact of munitions constituents concentrations in the environment**

Technology Gaps: Range Management



- **Improved Ecological Risk Assessment MC data (cont):**
 6. **More work is needed on defining a reasonable methodology for establishing and defending realistic, consistent site-specific exposure scenarios for both human health and ecological risk assessments.**
 7. **Improved field screening tools for measuring munitions constituents at sufficiently low detection levels to perform risk assessments.**
 8. **At least one good acute and subchronic study, designed with the proper QA/QC to derive defensible TRVs is needed for plants and animals associated with Navy unique environments such as marine mammals, coral reef systems and critical sea grass beds with a focus on the key Navy aquatic munitions constituents.**

Technology Gaps: Range Management



- **Improved Human Health Risk Assessment MC data :**
 1. **Some of the carcinogenicity studies done prior to 1990 should be reviewed. Due to a limited understanding of the carcinogenic process, many early studies often overestimated cancer risk. Recently reevaluated studies have shown RDX cancer risk was shown to be too high, the RDX RfD was probably too low and the 1,3,5-trinitrobenzene (TNB) RfD was increased significantly.**
 2. **Significant number of data gaps in the available screening values or benchmarks for the human health risk assessment. See Table 3-3.**
 3. **Standard exposure parameters for the munitions response workers for RSEPA preliminary screening need to be developed, particularly when the area will remain active/industrial.**

Technology Gaps: Range Management



–Coordinate with Technology Gap 2 under TES:

1. Implement a long-term monitoring effort at some time scale to document changes to the current and future conditions of three (minimally) separate targeted areas of research: 1) immediately offshore benthic habitat; 2) properties of the beach, physical and geological, and 3) the productivity and water characterization of near-shore waters. This should be set up to actually examine the affects and impacts of episodic events vs. chronic trends.

Technology Gaps: Range Management



- **Determine environmental effects of undersea cables.**
 - 1) **Define potential environmental issues for undersea cables placement at operational ranges. Define regulatory issues, potential construction and long-term environmental concerns, installation and removal technologies, and provide recommendations for solutions least disruptive to underwater habitat. Explore and scientifically document long-term consequences for leave-in-place cable scenarios.**

Technology Gaps: Range Management



- **Improved methods of identifying & delineating cultural resources**

1. **Ensure technology transfer from SERDP/Army RDT&E. Methods may be applicable for the coastal and estuarine areas with minimum effort.**

Technology Gaps: Air Pollution



- Technological gaps exist in the characterization, capture, and control of hazardous air pollutants (HAPs) emitted from ranges and sites during the OB/OD destruction of ordnance.
- Air emissions generated over ranges by ordnance and aircraft operations may not be an issue, but air emissions from total range-related aircraft operations (i.e., to / over / from ranges) are yet to be included in estimates of range air emissions.
- Improved air quality modeling capability is needed for both small scale (100 m) resolutions and for regional (+ 50 km) calculating domains to determine the impact of the above on air quality.
- Emissions from jet aircraft engines is considered a top environmental issue for NAVAIR.

Technology Gaps: Noise Pollution



- **AIRCRAFT NOISE** – a top environmental issue for NAVAIR.
 - measure the magnitude and directivity of noise emitted by in-flight aircraft.
 - develop noise contours to determine the impact of existing and proposed alternative aircraft operations on ranges and contiguous areas.
 - develop improved noise abatement devices for aircraft engine ground testing and operations.
 - develop practical acoustic models for generation and propagation of noise from high-thrust, vectored jet engines.
- **WATERBORNE NOISE** – effect of sonar on sea mammals being addressed by ONR

Technology Gaps: Range Management



- Improved coordination, preparation, and dissemination of information; training opportunities

Technology Gaps: Urban Encroachment



- **Enhanced programs & tools for implementation:**

- Community outreach
- Community sitings
- DoD land purchase on base fringes
- Navy facility sitings (OLF's)

Recommendation: Environmental Effects of Seafloor Cables



Issue: There are increasing regulatory concerns over abandoning-in-place versus removal of cables

Goal: Perform preliminary analysis to determine potential for adverse environmental impacts of leaving cable in place versus pulling cable out and land-based disposal



Coordination



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- RSG: Frank Peters/John Van Name
- RCC: Tony Parisi/John Smith
- NRO: Lt. Paul Kesler
- NOSSA: John Dow
- SERDP/ESTCP: Brad Smith/Dr. Holst
- HQMC: Nick Ta/Deborah Morefield/Sherrill Gardner
- CERL: Robert Lacey
- SSC-SD: Bill Wild/Chip Johnson
- CRREL: Dr. Tom Jenkins
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- Hank Eacho
- Larry Foster
- Larry Chernikoff
- Dr. Diane Drigot
- Conrad Erkelens
- Gregory Schirf

Questions?



Backup Slides



Navy Range Sustainability



- **Tactical Training Theater Assessment and Planning Program (TAP)**
 - An operationally driven, comprehensive integrated process started in 2002 to sustain use and access to Navy ranges and operating areas
- **Navy Range Strategic Plan development**
 - An integrated Navy range vision for organization, requirements, funding, and sustainment for both RDT&E and Training ranges
 - A roadmap to achieve the desired end state
- **Range Requirements Document development**
 - Document in draft delineating range requirements specific to each naval warfare area
- **Range Assessment project**
 - Developing a model to determine range adequacy to meet training requirements



Navy Ranges & Fleet Training Branch

Working Draft

N433 (O-6)

N433 A

N433B – Deputy Branch Hd, Ranges

N433B1 – Policy and range sustainment

N433B1A/B1B – Range Sustainment Support*

N433B2 – Range Ops & Maintenance

N433B2A – Range O&M,N Analyst

N433B3 – Range Infrastructure

N433B4A – Range Resource Analyst

N433B4B – Range Resource Analyst

N433B4C – Range Resource Analyst

N433B4 – Target Development & Procurement

N433B4A – Target Procurement

N433C– Deputy Branch Hd, Fleet Training

N433C1 – Fleet Training Requirements

N433C2 – Modeling & Simulation Rqmts

N433C3A - Training Analysis Support*

N433C3B – Training Analysis Support*

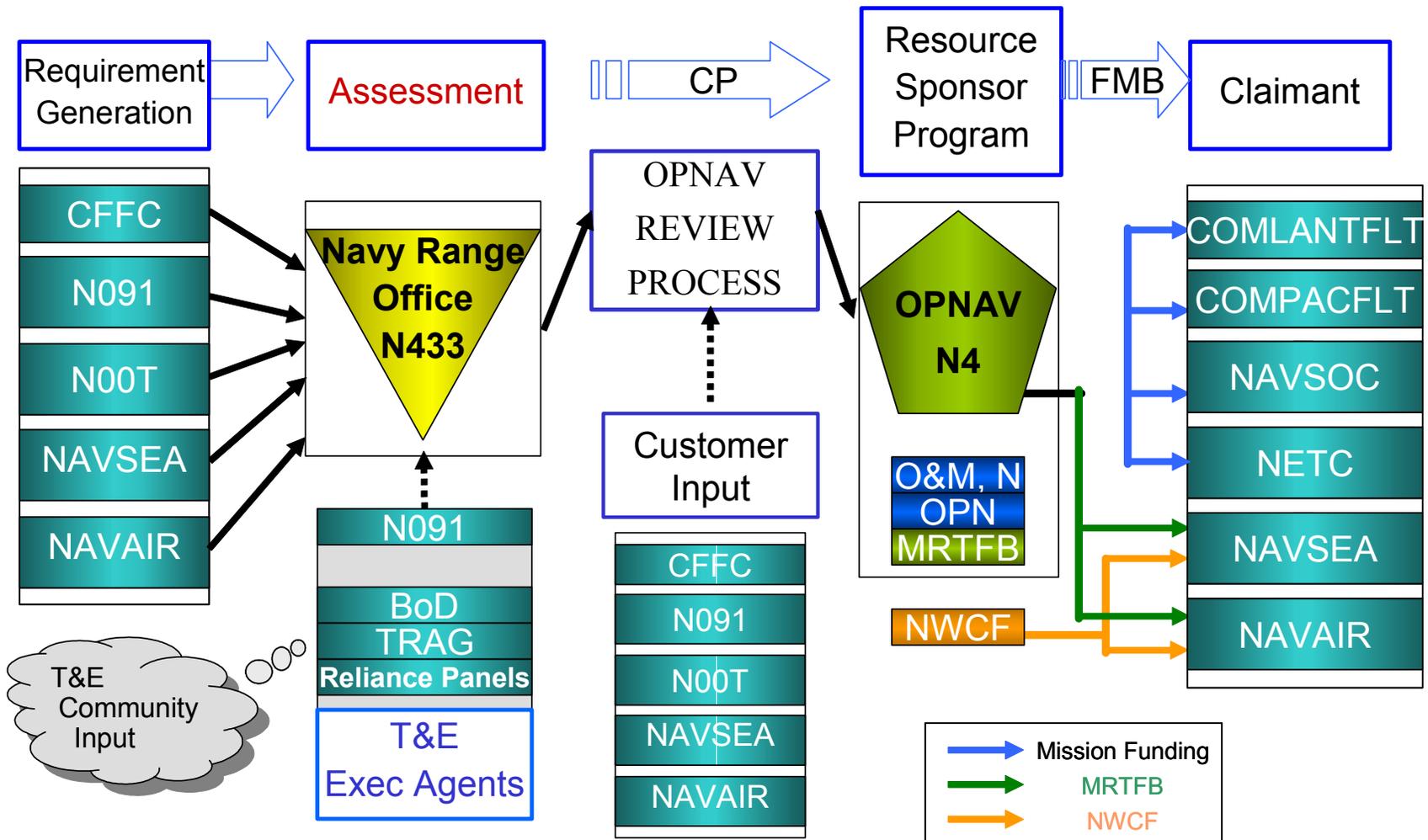
N433C3C – Training Analysis Support*

* - Range Sustainment Support
additional duty from N45

Ten Personnel full time in Ranges Section

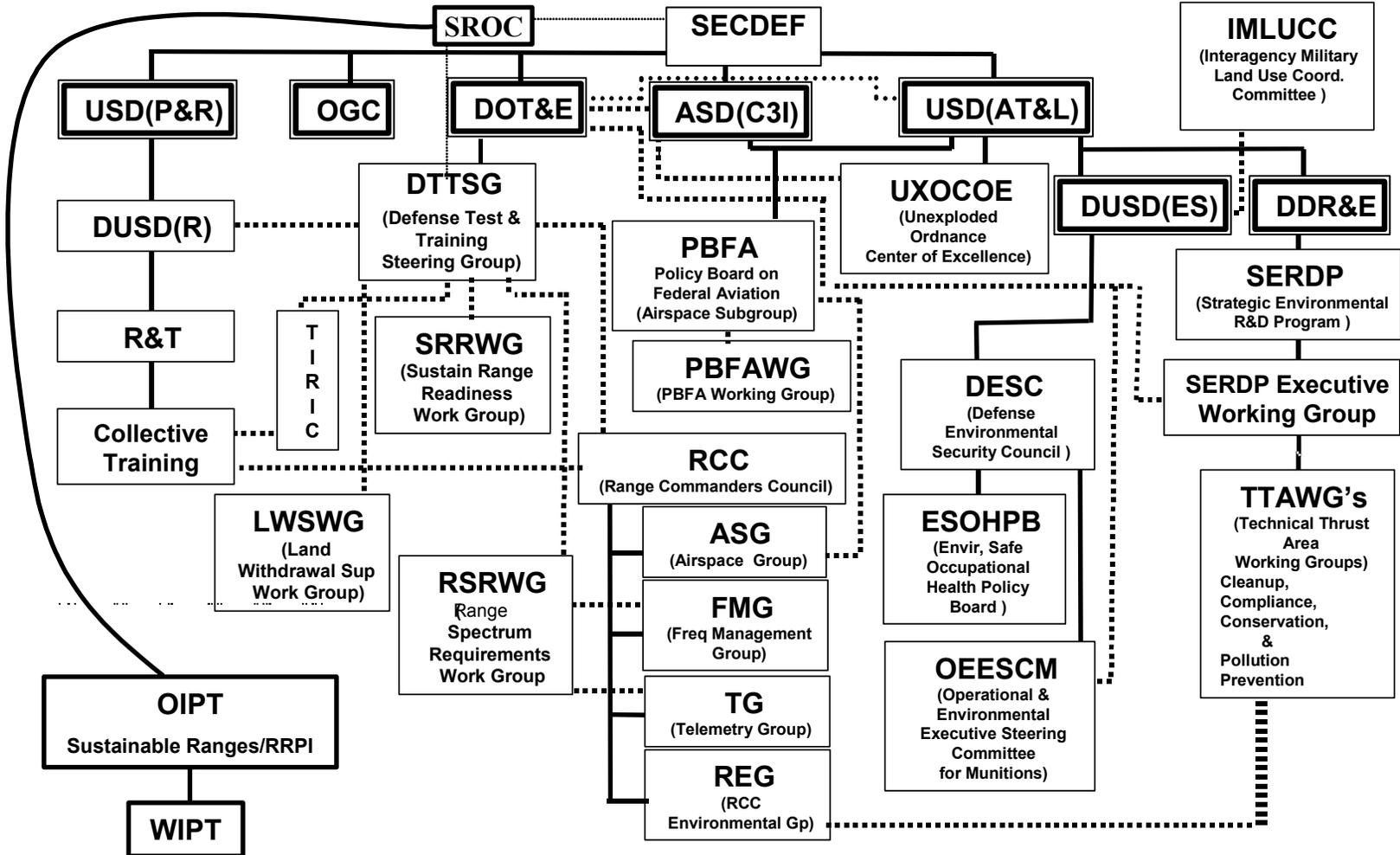


Revised Range PPBE Process



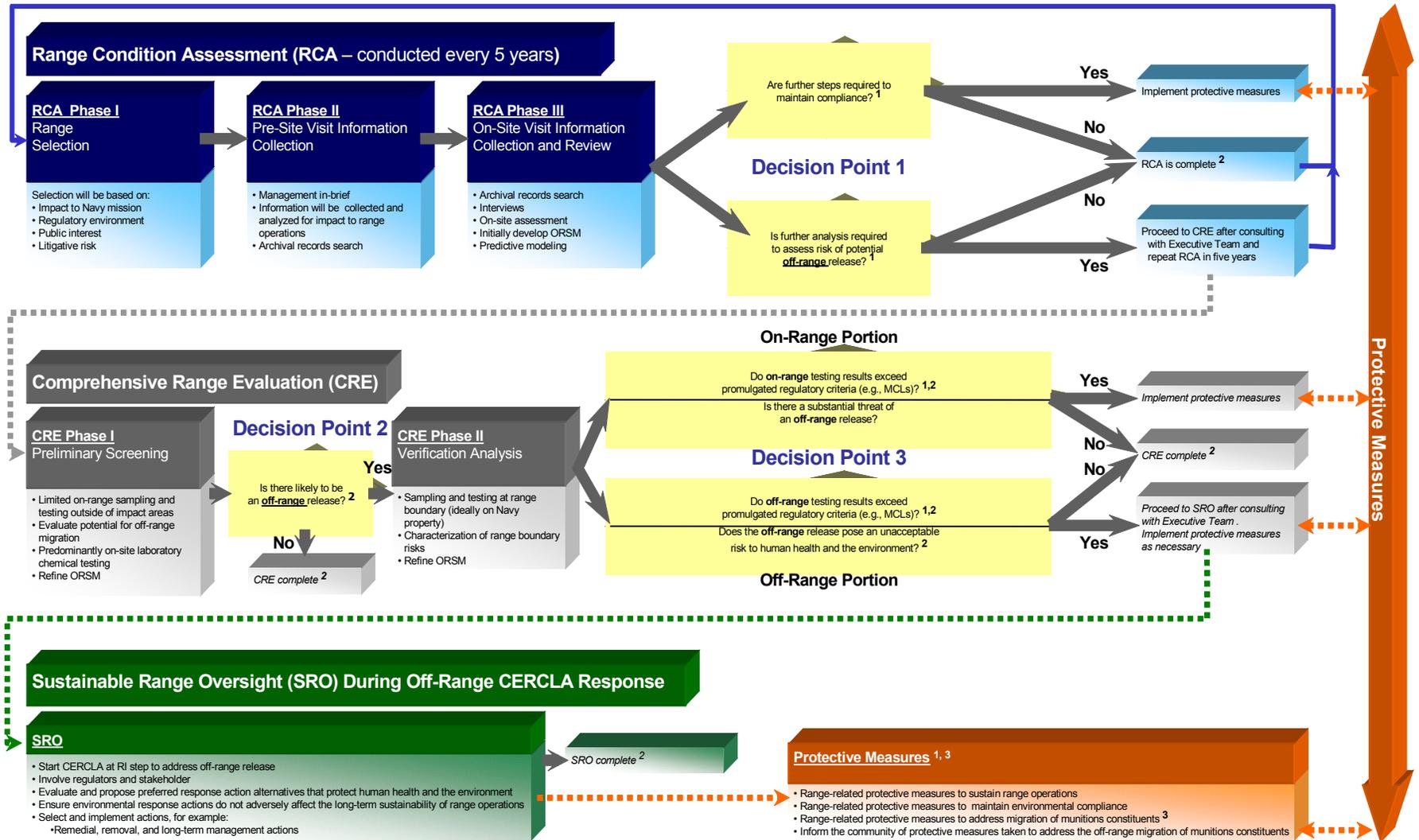


DoD Range Organizations



NAVY RANGE SUSTAINABILITY ENVIRONMENTAL PROGRAM ASSESSMENT (RSEPA)

Process Overview



Notes: 1. Protective measures can be implemented at any point in the process
 2. RCA will be repeated every 5 years regardless of whether a CRE and/or SRO are conducted
 3. Implement concurrently with CERCLA response when applicable

Table 3-3. Screening Values for Munitions Constituents

Analyte	Abbr.	CAS Num.	Reporting Limit				Human Health Screening Values				Federal Ambient Water Quality (µg/L)		Sediment Quality Benchmark (mg/Kg) ³	
			Ground Water (µg/L)	Surface Water (µg/L)	Sediment (mg/Kg)	Soil (mg/Kg)	Residential Soil ¹ (mg/Kg)	Cancer/ Non-Cancer	Industrial Soil ¹ (mg/Kg)	Ground Water (µg/L)	CMC ²	CCC ²		
Hexahydro-1,3,5-trinitro-1,3,5-triazine	RDX	121-82-4	0.1	0.3	0.01	0.01	4	C	16	0.61 ^{1,4}	4000 ^{5*}	190 ^{6*}	0.190	
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	HMX	2691-41-0	3	3	0.05	0.05	3100	NC	31000	400 ⁷		330 ^{6*}	0.330	
2,4,6-Trinitrotoluene	2,4,6-TNT	118-96-7	0.03	0.03	0.01	0.01	16	C	60	2.2 ^{1,4}	560 ^{5*}	<40 ^{5*}	0.13	
Perchlorate		7601-90-3	See Section 3.3.3.3								1-18 ⁸			
1,3,5-Trinitrobenzene	1,3,5-TNB	99-35-4	0.03	0.03	0.02	0.02	1800	NC	18000	1100 ^{1,4}	30 ^{6*}	14 ^{6*}	0.02	
1,3-Dinitrobenzene	1,3-DNB	99-65-0	0.09	0.09	0.02	0.02	6	NC	60	1.0 ⁹	110 ^{6*}	30 ^{6*}	0.04	
2,4-Dinitrotoluene	2,4-DNT	121-14-2	0.02	0.02	0.02	0.02	120	NC	1200	5.0 ⁷	0.11 ¹⁰		0.230	
2,6-Dinitrotoluene	2,6-DNT	606-20-2	0.01	0.01	0.02	0.01	60	NC	600	5.0 ⁷	18,500 ^{5*}		18.5	
2-Amino-4, 6-dinitrotoluene	2-Am-DNT	355-72-78-2	0.1	0.1	0.02	0.02								
2-Nitrotoluene	2-NT	88-72-2	0.09	0.09	0.02	0.02	370	NC	1000	61 ^{1,4}				
3-Nitrotoluene	3-NT	99-08-1	0.09	0.09	0.02	0.02	370	NC	1000	61 ^{1,4}				
4-Amino-2,6-dinitrotoluene	4-Am-DNT	1946-51-0	0.1	0.1	0.05	0.05								
4-Nitrotoluene	4-NT	99-99-0	0.09	0.09	0.05	0.02	370	NC	1000	61 ^{1,4}				
Nitrobenzene	NB	98-95-3	0.03	0.03	0.02	0.02	20	NC	100	3.4 ^{1,4}	27,000 ^{6*}		27.0	
Nitroglycerin	NG	55-63-0	0.09	0.09	0.05	0.05	30	C	120	4.8 ⁷	1,700 ^{5*}	200 ^{5*}		
Methyl-2,4,6-trinitrophenylnitramine	Tetryl	479-45-8	0.5	0.5	0.02	0.02								

1. EPA Region 9 Preliminary Remediation Goal Tables (10/01/02) (www.epa.gov/region09/waste/sfmd/prg/index.htm).

2. CMC, the criteria maximum concentration, will protect against acute effects in aquatic life and is the highest in-stream concentration of a priority toxic pollutant consisting of a 1-hour average not to be exceeded more than once every 3 years on average. CCC, the criteria continuous concentration, will protect against chronic effects in aquatic life and is the highest in-stream concentration of a priority toxic pollutant consisting of a 4-day average not to be exceeded more than once every 3 years on average.

3. Calculated from water toxicity data based on 1% organic matter according to Talmage S.S., and D.M. Opreško, 1995, Draft Ecological Criteria Documents for Explosives, Oak Ridge National Laboratory, Oak Ridge TN.

4. EPA Region 6 Corrective Action Strategy, EPA Region 6, Dallas TX, November 2000.

5. Burrows, E.P., D.H. Rosenblatt, W.R. Mitchell, and D.L. Parmer, 1989, Organic Explosives and Related Compounds: Environmental and Health Considerations, U.S. Army Biomedical Research and Development Laboratory.

6. Talmage, S.S., and D.M. Opreško, 1995, Draft Ecological Criteria Documents for Explosives, Oak Ridge National Laboratory, Oak Ridge TN.

7. U.S. Environmental Protection Agency, Summer 2000, Drinking Water Standards and Health Advisories, EPA 822-B-00-001, Office of Water, Washington, DC.

8. Currently proposed, state and federal advisory limits for perchlorate range from 1 to 18 µg/L. These health risk values continue to be developed.

9. Roberts, W.C., and W.R. Hartley, editors, 1992, *Drinking Water Health Advisories: Munitions*, U.S. EPA Drinking Water Health Advisories, Lewis Publishers, Boca Raton, FL, 535 pp.

10. Human Health for Consumption of Water and Organism, U.S. Environmental Protection Agency, National Recommended Water Quality Criteria: 2002 Office of Water, Washington, DC., EPA-822-R-02-047

* Lowest observed adverse effect level (LOAEL). Not enough data to develop criteria.

Source: RSEPA Appendix D-QAPP (U.S. Navy, 2003).

Table 3-4. Munitions Constituent Toxicology Data Gaps for Ecological Risk Assessments^(a)

					Invertebrates				
Compound	Plants	Mammals	Birds	Fish	In Soil	In Water	In Sediment	Reptiles	Amphibians
TNT	Acute toxicity data for ryegrass and alfalfa ^(b) Substantial Bioaccumulation studies in plants ^(c)	Sufficient for TRV (many rodent, other mammal species, one wildlife species)	Sufficient for TRV (two species, one wildlife, feeding and gavage)	Acute toxicity data for several species	Acute/ chronic data for earthworms	Acute toxicity data for several species	Acute/chronic toxicity data for amphipods and polychaete	One acute study: insufficient data available.	One study with only one dose and NOAEL: insufficient data available
2,4-Dinitrotoluene	(a)	Sufficient for TRV.	One wildlife study in progress.	Acute toxicity data for redfish	Acute data for earthworms; chronic underway: currently unpublished	Acute toxicity data for several species	No Data	One acute study: insufficient data available.	One study with multiple treatments. Sufficient for soil screening.
2,6-Dinitrotoluene	(a)	Sufficient for TRV.	No Data	Acute toxicity data for redfish	Acute/ chronic data for earthworms finished but: currently unpublished	Acute toxicity data for several species	Acute toxicity data for amphipod	No Data	No Data
RDX	Short-term screening bioassay developed for 15 terrestrial plants **; Bio-accumulation factors developed for sunflower plants ***, On-going study developing bioaccumulation factors in 2 terrestrial plants – additional research needed	Sufficient for TRV.	One feeding study. Sufficient data for TRV.	Acute toxicity data for several species	Acute/ chronic data for earthworms	Acute toxicity data for several species	Acute/ chronic toxicity data for amphipods and polychaete	One acute study: insufficient data available.	One study with multiple treatments. Sufficient for soil screening.
HMX	On-going study developing bioaccumulation factors in 2 terrestrial plants – additional research needed	Many mammalian data, however, acute rabbit data suggest possible sensitive species.	One study (limit test and 28 oral) in Northern Bobwhite. Sufficient data for TRV.	Acute toxicity data for several species	Acute/ chronic data for earthworms	Acute toxicity data for several species	Acute/ chronic toxicity data for amphipod and polychaete	No Data	No Data
PETN	(a)	Mammalian data lacking, however, TRV is available but questionable.	No Data	No Data	(a)	Acute toxicity data for copepod	No Data	No Data	No Data
Picric Acid	(a)	Mammalian data lacking, however, TRV is available but questionable.	No Data	Acute toxicity data for redfish	(a)	Acute toxicity data for several species	Acute toxicity data for amphipod	No Data	No Data

Table 3-4. Munitions Constituent Toxicology Data Gaps for Ecological Risk Assessments (page 2 of 3)

Compound	Plants	Mammals	Birds	Fish	Invertebrates			Reptiles	Amphibians
					In Soil	In Water	In Sediment		
Nitroglycerin	(a)	Data adequate for TRV.	No Data	No Data		No Data	No Data	No Data	No Data
Trinitrobenzene	(a)	Sufficient for TRV (many rodent, other mammal species, one wildlife species)	No Data	Acute toxicity data for sheepshead minnow* and redfish	Acute/chronic data underway with earthworms	Acute toxicity data for several species	Acute/chronic toxicity data for amphipod and polychaete	No Data	No Data
Dinitrobenzene	(a)	Sufficient for TRV, however, medium confidence in TRV.	No Data	Acute toxicity data for redfish	(a)	Acute toxicity data for several species	No Data	No Data	No Data
Tetryl	(a)	Sufficient for TRV, however, medium confidence in TRV (no wildlife data).	No Data	Acute toxicity data for redfish	(a)	Acute toxicity data for several species	Acute toxicity data for amphipod	No Data	No Data
Perchlorate	(a)	Sufficient data exists for TRV derivation	Study in progress (McNabb; Northern Bobwhite).	No Data	No Data	No Data	No Data	No Data	Data available for water exposures (Texas Tech).
2-Amino-dinitro-toluene	(a)	(a)	(a)	Acute toxicity data for fathead minnow and sheepshead minnow*	Earthworm Contact toxicity (acute, no soil) only	Acute toxicity data for several species	No Data	(a)	(a)

Table 3-4. Munitions Constituent Toxicology Data Gaps for Ecological Risk Assessments (page 3 of 3)

Compound	Plants	Mammals	Birds	Fish	Invertebrates			Reptiles	Amphibians
					In Soil	In Water	In Sediment		
4-Amino-dinitro-toluene	(a)	(a)	(a)	Acute toxicity data for several species	Earthworm Contact toxicity (acute, no soil) only; in SERDP report	Acute toxicity data for several species	No Data	(a)	(a)
2,4-Diamino-nitro-toluene	(a)	(a)	(a)	Acute toxicity data for sheepshead minnow*	(a)	Acute toxicity data for oyster larvae and copepod	Acute/ chronic toxicity data for amphipod and polychaete	(a)	(a)
2,6-Diamino-nitro-toluene	(a)	(a)	(a)	No Data	(a)	No Data	No Data	(a)	(a)
Nitro-guanidine	(a)	(a)	(a)	No Data	(a)	Acute toxicity data for copepod	No Data	(a)	(a)
Diphenyl-amine	(a)	(a)	(a)	No Data	(a)	Acute toxicity data for several species	No Data	(a)	(a)
2-Nitro-toluene	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
3-Nitro-toluene	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
4-Nitro-toluene	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Ammonium Picrate	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Nitro-benzene	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Nitro-cellulose	(a)	Data Available Suggest Substance Is not Bioavailable	Data Available Suggest Substance Is not Bioavailable	(a)	(a)	(a)	(a)	(a)	(a)

Note: If there was no information available on the status of the data, the cell was left blank. If it was known that there is no data, then "No Data" was put in the cell.

(a) Note that blank cells indicate a lack of knowledge on the status of data and not a lack of data.

(b) Information from Sustainable Range Management Conf, 6-8 Jan 2004. Paper by Dr Elly Best *Toxicity and Residues of Aged TNT in Plants and Worms*.

(c) *Bioconcentration, Bioaccumulation and Biomagnification of Nitroaromatic and Nitramine Explosives and their Breakdown Products*, The Army Center for Health Promotion and Preventative Medicine (CHPPM), March 2002, Toxicology Study 87-MA-4677-01.

* Study has been completed but the data has not been published as of 12/10/03

** Study completed, draft journal accepted for publication in 2004 – Ecotoxicology

*** Study completed, draft journal submitted; responding to editors comments- Ecotoxicology