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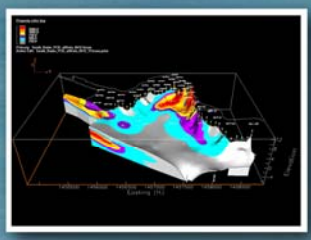

Department of the Navy Environmental Restoration Program Manual

Preface

This manual is an update and replacement for the 1997 Navy/Marine Corps Installation Restoration (IR) Program Manual. Since then, the Navy and the Marine Corps have continued to make great progress in cleaning up bases and stations across the nation. Simultaneously, the IR program has grown in scope to include cleanup of former ranges and matured to necessitate optimization of cleanup decisions and systems. Consequently, the IR Manual has been renamed *Department of the Navy Environmental Restoration Program (NERP) Manual* to better reflect the broader scope of the cleanup program. This manual applies to all DON Environmental Restoration (ER) sites on active and BRAC installations in the United States.

Some of the significant changes/additions to the cleanup program made since 1997 include:

- Addition of the Munitions Response program;
- Major changes in program responsibilities brought about by the realignment at the Naval Facilities Engineering Command, the Base Realignment and Closure Program Management Office, and the Commander, Naval Installations Command;
- Implementation of Optimization requirements; and
- Issues related to Emerging Contaminants and Vapor Intrusion.

The NERP Manual is meant to be a user-friendly tool for remedial program managers and engineers. It summarizes the organization and responsibilities of DoD and DON offices and provides detailed discussions of terminology and procedures used in implementing the ER program. The manual discusses funding eligibility, priority setting, reporting, and information management systems. In short, the information in this manual is meant to be a comprehensive reference for the DON user to properly identify, investigate, and select protective and cost-effective remedies for the remaining ER program sites.

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Abbreviations and Acronyms

AAR	After Action Report
ACO	Administrative Contracting Officer
AEC	Area Environmental Coordinator
AIRFA	American Indian Religious Freedom Act
AM	Action Memorandum
ANPRM	advanced notice of proposed rulemaking
AOC	area of contamination/area of concern
AOPC	area of potential concern
AQAPS	Automated Quality Assurance Program System
AR	Administrative Record
ARAR	applicable or relevant and appropriate requirement
ARPA	Archeological Resources Protection Act
ARTT	Alternative Restoration Technology Team
ASN(I&E)	Assistant Secretary of the Navy (Installations and Environment)
ASR	Archival Search Report
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
BAA	Broad Agency Announcement
BCP	BRAC Cleanup Plan
BCT	BRAC Cleanup Team
BEC	BRAC Environmental Coordinator
BERA	baseline ecological risk assessment
BHHRA	baseline human health risk assessment
BRAC	Base Realignment and Closure (Act)
BRRM	Base Redevelopment and Realignment Manual
BTEX	benzene, toluene, ethylbenzene, and xylenes
BUMED	Bureau of Medicine and Surgery
CA	Corrective Action
CAA	Clean Air Act
CAD	computer-aided design
CAIS	Chemical Agent Identification Set
CAMU	corrective action management unit
CASU	Cooperative Administrative Support Unit
CEC	Civil Engineer Corps
CECOS	Civil Engineer Corps Officer School
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (of 1980)
CERFA	Community Environmental Response Facilitation Act
CFR	Code of Federal Regulations
CG	Commanding General
CHF	contaminant hazard factor
CLEAN	Comprehensive Long-Term Environmental Action, Navy
CLP	Contract Laboratory Program
CMC	Commandant of the Marine Corps
CMC(LFL)	Commandant of the Marine Corps, Land Use and Military Construction Branch
CNIC	Commander, Navy Installations Command
CNO	Chief of Naval Operations

CNO-N45	Chief of Naval Operations, Environmental Readiness Division
CO	Commanding Officer
COC	contaminant of concern
COPC	contaminant of potential concern
COR	Contracting Officer's Representative
COTR	Contracting Officer's Technical Representative
CPAF	cost-plus-award-fee
CPR	cardiopulmonary resuscitation
CPT	cone penetrometer testing
CRP	Community Relations Plan
CSM	conceptual site model
CTC	cost-to-complete
CWA	Clean Water Act
CWM	chemical warfare material
DASN(E)	Deputy Assistant Secretary of the Navy (Environment)
DASN(I&F)	Deputy Assistant Secretary of the Navy (Installations and Facilities)
DAU	Defense Acquisition University
DAWIA	Defense Acquisition Workforce Improvement Act
DCE	dichloroethylene
DD	Decision Document
DDESB	Department of Defense Explosives Safety Board
DENIX	Defense Environmental Network Information Exchange
DERA	Defense Environmental Restoration Account
DERP	Defense Environmental Restoration Program
DESC	Defense Energy Support Center
DLA	Defense Logistics Agency
DMM	discarded military munitions
DNAPL	dense, nonaqueous-phase liquid
DoD	(United States) Department of Defense
DOE	(United States) Department of Energy
DON	(United States) Department of the Navy
DQO	data quality objective
DSMOA	Defense and State Memorandum of Agreement
DUSD(I&E)	Deputy Under Secretary of Defense, Installations and Environment
EBS	Environmental Baseline Survey
EC	Environmental Coordinator/engineering controls
ECD	electron capture detector
ECP	Environmental Conditions of Property
EE/CA	Engineering Evaluation/Cost Analysis
EMAC	Environmental Multiple Award Contract
EO	Executive Order
EOD	Explosive Ordnance Disposal
EPCRA	Emergency Planning and Community Right-to-Know Act
ER	Environmental Restoration
ERA	ecological risk assessment
ERB	Environmental Restoration and BRAC
ER,N	Environmental Restoration, Navy
ESA	Endangered Species Act
ESD	Explanation of Significant Difference(s)

ESS	Explosive Safety Submissions
ESTCP	Environmental Security Technology Certification Program
ETA	(DoD) Early Transfer Authority
ETV	Environmental Technology Verification (Program)
FAC	NAVFAC Command
FEC	Facilities Engineering Command
FFA	Federal Facility Agreement
FFCA	Federal Facilities Compliance Act
FFSRA	Federal Facility State Remediation Agreement
FID	flame ionization detector
FOSET	finding(s) of suitability for early transfer
FOSL	finding of suitability to lease
FOST	finding(s) of suitability to transfer
FR	Federal Register
FRTR	Federal Remediation Technologies Roundtable
FS	Feasibility Study
FSP	Field Sampling Plan
FUDS	formerly utilized defense site(s)
FY	Fiscal Year
FYDP	Future Year Defense Plan
GC	gas chromatography
GIS	Geographic Information System(s)
GMP	Groundwater Monitoring Plan
GOCO	government-owned/contractor-operated
GPR	ground-penetrating radar
G-RAM	general radioactive material
HA	hazard assessment
HAP	hazardous air pollutant
HARP	Historic and Archeological Resources Program
HASP	Health and Safety Plan
HAZWOPER	hazardous waste operations and emergency response
HHRA	human health risk assessment
HQ	headquarters
HRA	Historical Radiological Assessment
HRS	(U.S. EPA) Hazard Ranking System
HWMU	hazardous waste management unit
IAG	Interagency Agreement
IC	institutional control
IDIQ	Indefinite Delivery/Indefinite Quantity
IDLH	immediately dangerous to life and health
IDW	investigation-derived waste
I-RACR	Interim Remedial Action Completion Report
IR CDQM	(DON) Installation Restoration Chemical Data Quality Manual
IRP	Installation Restoration Program
ISEERB	Interservice Environmental Education Review Board
ITRC	Interstate Technology Regulatory Council

JAG	Judge Advocate General
JEP	Joint Execution Plan
KO	Contracting Officer
LDR	land disposal restriction
LIF	laser-induced fluorescence
LITOFF	(OGC) Litigation Office
LLRW	low-level radioactive waste
LNAPL	light, nonaqueous-phase liquid
LTM	long-term monitoring
LTMgt	Long-Term Management
LUC	land use control
MARCORSYSCOM	Marine Corps Systems Command
MC	munitions constituents
MCL	maximum contaminant level
MCO	Marine Corps Order
MEC	munitions and explosives of concern
MEC HA	munitions and explosives of concern hazard assessment
MILCON	military construction
MIP	membrane interface probe
MML	(Navy's) Master Materials License
MMPA	Marine Mammal Protection Act
MNA	monitored natural attenuation
MPF	migration pathway factor
MRA	Munitions Response Area
MRP	(DON) Munitions Response Program
MRS	munitions response site
MRSPP	Munitions Response Site Prioritization Protocol
MS	mass spectrometry
MTBE	methyl-tert-butyl ether
MTR	minimum technology requirement
NAGPRA	Native American Graves Protection and Repatriation Act
NAPL	nonaqueous-phase liquid
NARM	naturally occurring and accelerator-produced radioactive materials
NAVEODTECHDIV	Naval Explosive Ordnance Disposal Technology Division
NAVFAC	Naval Facilities Engineering Command
NAVSEA	Naval Sea Systems Command
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NCR CA	Navy Cost Reimbursement Cooperative Agreement
NEDD	NIRIS Electronic Data Deliverable
NEHC	Navy Environmental Health Center
NEPA	National Environmental Policy Act (of 1969)
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NFA	no further action
NFESC	Naval Facilities Engineering Service Center
NFPA	National Fire Protection Association
NFRAP	no further remedial action planned
NHPA	National Historic Preservation Act

NIRIS	Naval Installation Restoration Information Solution
NNPP	Naval Nuclear Propulsion Program
NNPP-RAM	Naval Nuclear Propulsion Program radioactive material
NOAA	National Oceanic and Atmospheric Administration
NOID	Notice of Intent to Delete
NORM	Navy "Normalization of Data" database
NOSSA	Naval Ordnance Safety and Security Activity
NPL	(U.S. EPA) National Priorities List
NPV	net present value
NRI	natural resource injury
NRSC	Naval Radiation Safety Committee
NTCRA	non-time critical removal action
NTR	Navy Technical Representative
O&M	operations and maintenance
OGC	Office of the General Counsel
ONR	Office of Naval Research
ORD	(U.S. EPA) Office of Research and Development
OSD	Office of the Secretary of Defense
OSH	Occupational Safety and Health (Act)
OSHA	Occupational Safety and Health Administration
OSWER	(U.S. EPA) Office of Solid Waste and Emergency Response
OU	operable unit
PA	Preliminary Assessment
PA/SI	Preliminary Assessment/Site Inspection
PAO	Public Affairs Officer
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene
PCO	Procuring Contracting Officer
PHA	Public Health Assessment
PID	photoionization detector
PITT	Partitioning Interwell Tracer Test
PMO	(BRAC) Program Management Office
POL	petroleum, oil, or lubricants
POM	Program Objective Memorandum
PP	Proposed Plan
PPE	personal protective equipment
PRG	preliminary remediation goal
PRP	potentially responsible party
QA	quality assurance
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
QC	quality control
R&D	research and development
RA	Remedial Action
RAB	Restoration Advisory Board
RA-C	Remedial Action Construction
RAC	remedial action contract

RACR	Remedial Action Completion Report
RA-O	Remedial Action Operation
RASO	Radiological Affairs Support Office
RASP	Radiological Affairs Support Program
RAW	Risk Assessment Work Group
RAWP	Remedial Action Work Plan
RBC	risk-based concentration
RC	Response Complete
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RDT&E	Research, Development, Testing, and Evaluation
REC	Regional Environmental Coordinator
RF	receptor factor
RFP	request for proposal
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RIP	Remedy In Place
RITS	Remediation Innovative Technology Seminar
RMIS	Restoration Management Information System
ROD	Record of Decision
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
RRSEM	Relative Risk Site Evaluation Model
RSIP	Regional Shore Infrastructure Plan
RTDF	Remediation Technologies Development Forum
SAP	Sampling and Analysis Plan
SAR	Site Approval Request
SARA	Superfund Amendments and Reauthorization Act (of 1986)
SC	Site Closeout
SCAPS	Site Characterization Analysis and Penetrometer System
SCBA	self-contained breathing apparatus
SDWA	Safe Drinking Water Act
SECDEF	Secretary of Defense
SECNAV	Secretary of the Navy
SERDP	Strategic Environmental Research and Development Program
SHSO	Site Health and Safety Officer
SHSP	Site Health and Safety Plan
SI	Site Inspection
SITE	(U.S. EPA) Superfund Innovative Technology Evaluation (Program)
SMP	Site Management Plan
SOP	Standard Operating Procedure
SOW	Statement of Work
SPAWAR	Space and Naval Warfare Systems Command
SRA	screening risk assessment
SSO	Site Safety Officer
SWMU	solid waste management unit

T2	technology transfer
TAG	Technical Assistance Grant
TAPP	Technical Assistance for Public Participation
TBC	to be considered
TCE	trichloroethylene
TCRA	time critical removal action
TENORM	technologically enhanced naturally occurring radioactive materials
TIP	(U.S. EPA) Technology Innovation Program
TRC	Technical Review Committee
TSCA	Toxic Substances Control Act
TSD	treatment, storage, and disposal
UFP	uniform federal policy
USACE	United States Army Corps of Engineers
USC	United States Code
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	underground storage tank
UV	ultraviolet
UXO	unexploded ordnance
VOC	volatile organic compound
WMM	waste military munitions
XRF	x-ray fluorescence

CHAPTER 1

Background: Legal and Historical Context of the Environmental Restoration Program

Note: The Department of the Navy's (DON) Environmental Restoration (ER) Program is governed and executed via several policies, instructions, and guidance documents, which are referenced throughout this manual. Most of these, including other important Web links, may be accessed on the Naval Facilities Engineering Command (NAVFAC) Environmental Restoration and BRAC (ERB) Web site (https://portal.navfac.navy.mil/go/erb) and/or on the Defense Environmental Network Information Exchange (DENIX), Department of Defense (DoD) Menu. You must be registered with DENIX to view these pages, and may register here (http://www.denix.osd.mil/denix/register.html).

1.1 Introduction

A clean, healthy environment is essential to supporting the Department of the Navy's (DON's) primary mission of maintaining fleet readiness. Although past activities have resulted in the release of contaminants into the environment, DON is committed to cleaning up these sites in an effective and efficient manner. To accomplish cleanup, DON's environmental restoration team encourages and supports partnerships among various stakeholders, including state and federal regulators, American Indian tribes, and local communities.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), passed in 1980, created the legal mechanism for cleaning up abandoned or uncontrolled hazardous waste sites. Although CERCLA (also known as Superfund) did not apply to military installations, its provisions were adopted by the Department of Defense (DoD) as a model for environmental cleanups by the military components (Army, Air Force, Navy, and Marine Corps). Therefore, environmental restoration efforts at DON installations generally followed the process established by CERCLA. The Navy Assessment and Control of Installation Pollutant Program (NACIP) initiated an Initial Assessment Study (IAS) of all DON installations. The IAS preceded what was to become the CERCLA Preliminary Assessment (PA) phase. The Resource Conservation and Recovery Act (RCRA) Corrective Action requirements and the state-led RCRA Underground Storage Tank (UST) cleanup requirements also may be applied to DON facilities by regulatory agencies.

In 1986, Congress passed the Superfund Amendments and Reauthorization Act (SARA), which mandated that DoD follow the same cleanup regulations that apply to private entities. SARA also established the Defense Environmental Restoration Program (DERP). Through the DERP, DoD conducts environmental restoration activities at sites on active installations, installations undergoing Base Realignment and Closure (BRAC), and formerly utilized defense sites (FUDS). The Office of the Secretary of Defense (OSD) provides oversight for the DERP, however each of the military departments is responsible for implementing it. The DON Installation Restoration Program (IRP) was designed to identify and clean up past contamination from hazardous substances, pollutants, and contaminants in order to protect human health and safety, and the environment at both Navy and Marine Corps installations. The IRP combines aggressive policies, technical training, innovative technologies, partnering with stakeholders, and proactive, dedicated personnel to clean up past contamination on property under Navy and Marine Corps stewardship.

As part of the Fiscal Year (FY) 2002 Defense Authorization Act, Congress mandated that DoD and the military components develop a program to address military munitions as part of the DERP. DoD responded by developing a unique program element under DERP to address the explosive safety hazards associated with munitions and explosives of concern (MEC) and the human health and environmental risks associated with munitions constituents (MC). The goals of the DoD Military Munitions Response Program are to:

1. Reduce risk to people and the environment from the hazards associated with munitions and munitions constituents.

2. Conduct munitions responses to allow land reuse.

3. Complete all IRP requirements associated with munitions constituents.

1.2 DON Environmental Restoration Program

The purpose of the DON Environmental Restoration (ER) Program is to reduce the risk to human health and the environment from legacy waste disposal operations and hazardous substance spills at DON activities, including certain oil spills that are not addressed by the CERCLA regulatory framework. The program goal is to provide for cost-effective and timely site assessment, planning, and remediation of identified releases consistent with DERP requirements.

Most DON installations provide a variety of support functions for aircraft, submarines, and ships. Historic waste management practices associated with these activities have resulted in the release of contaminants to soil, sediment, and groundwater at numerous DON sites over the last several decades. Some examples include:

- Petroleum hydrocarbons released to soil and groundwater at leaking UST sites, tank farms, or former firefighting training areas;
- Historic equipment cleaning and degreasing operations that led to chlorinated solvent releases to the environment;
- MEC on sites that formerly were used for military training operations;
- Sediments that become contaminated with chemicals such as polycyclic aromatic hydrocarbons (PAHs) or polychlorinated biphenyls (PCBs) through a CERCLA release; and
- Other contaminant releases that could have occurred as a result of other typical activities at DON installations, including municipal solid waste landfills, paint shops, plating shops, dry cleaners, and firing ranges.

The cleanup of DON installations poses a major challenge because of the wide variety of activities conducted at these sites and the fact that most DON installations are located in coastal regions with shallow groundwater and sometimes nearby ecologically sensitive habitats. There are approximately 5,000 sites in the ER Program. It is estimated that, by the time the ER Program is completed, more than $9 billion will be spent on remediation efforts at DON ER sites.

The ER Program has been organized into three program categories:

- Installation Restoration Program (IRP) – The IRP addresses releases of hazardous substances, pollutants, or contaminants that pose toxicological risks to human health or the environment. There are approximately 4,800 IRP sites at DON active and BRAC installations.

- Military Munitions Response Program (MMRP) – The MMRP addresses environmental health and safety hazards from unexploded ordnance (UXO), discarded military munitions, and munitions constituents. Incidental to hazardous waste remediation, a limited number of hazards associated with military munitions were addressed under the IRP. DoD created the MMRP to more thoroughly address potential hazards remaining from its past use of military munitions. DON refers to its program as the Munitions Response Program (MRP). There are approximately 230 MRP sites at DON active and BRAC installations.
- Building Demolition/Debris Removal – This category provides for the demolition and removal of unsafe buildings or structures. DON conducted these in the past but the current and projected DON plan has no funds budgeted for this category. DoD approval is required prior to proceeding in this category.

Collectively, these program categories address the different kinds of contaminants likely to impact active and BRAC installations.

This manual represents a compilation of DERP requirements, policy, and guidance, and focuses on procedural requirements for managing ER Program sites from the time of identification to final closeout. The manual may be used to assist in program management, training of personnel, and as a reference for ER Program implementation and execution. This manual also is consistent with the requirements established by DON and DoD environmental management manuals, particularly the *Navy Environmental and Natural Resources Program Manual* (OPNAVINST 5090.1B), the *Marine Corps Environmental Compliance and Protection Manual* (Marine Corps Order [MCO] P5090.2A, 10 July 1998), and DoD's *Management Guidance for the DERP* (28 Sep. 2001).

Although the IRP and MRP generally follow the same procedures, the MRP is a much newer program and has some unique characteristics. All of the chapters in this manual apply to both the IRP and MRP; however, Chapter 12 provides information unique to the MRP.

This manual is intended to be consistent with existing DoD, federal, and state guidelines, executive orders, regulations, and laws. In the event of a conflict between this manual and statutory or regulatory requirements, this manual shall not supersede such statutory or regulatory requirements.

A comprehensive discussion of the body of environmental laws that could potentially impact the ER Program is beyond the scope of this manual. However, the following discussion provides a general framework for understanding legal and regulatory standards that are likely to impact the ER Program.

1.3 Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)

CERCLA (also known as Superfund) was created in 1980 in direct response to Love Canal and other notable hazardous substance release incidents. CERCLA directly addresses environmental releases or threatened releases to the air, surface water, groundwater, sediment, and soil but does not include releases of petroleum, natural gas, and synthetic gas useable for fuel. Normally, releases in a structure (i.e., asbestos in a building) are excluded from CERCLA action.

CERCLA authorizes the President to study and remediate releases or potential releases of hazardous substances that present a substantial danger to the public health or welfare or the environment. CERCLA also authorizes the President to delegate these responsibilities to the United States Environmental Protection Agency (U.S. EPA) and other federal agencies, which subsequently was authorized through Executive Order 12580 in 1987 (see Section 1.12.2). Responsible parties may take action if willing and

able to respond in a timely fashion. If no responsible party is available, willing, and able to take appropriate action, U.S. EPA may respond using in-house and contract resources funded by "Superfund." If U.S. EPA takes action, they are allowed to recover the cost of their efforts from any or all potentially responsible parties.

Congress did not specify cleanup standards in CERCLA (see CERCLA Title 42, Chapter 103, Subchapter I, Section 9621). Instead, Congress created a process whereby cleanup standards found in other federal and state laws and regulations are applied to a particular CERCLA action. This process is known as selection of "applicable or relevant and appropriate requirements" or "ARARs." A law or regulation is "applicable" if the legal standard would apply independently of CERCLA. Generally, a law or regulation is "relevant and appropriate" if it can be applied at the site even though it is not otherwise legally required. (See Section 8.3.1.1 for a detailed discussion and description of ARARs.)

Under CERCLA Section 121(e), no federal, state, or local permit is required for on-site CERCLA response actions. U.S. EPA's interpretation of CERCLA Section 121(e) waives the requirement to obtain a permit and associated administrative and procedural requirements of permits, but not the substantive provisions of permitting regulations that are ARARs.

1.3.1 Superfund Amendments and Reauthorization Act of 1986 (SARA)

CERCLA, as originally enacted in 1980, did not include specific provisions for environmental restoration at DoD sites. This changed in 1986 with the passage of the Superfund Amendments and Reauthorization Act (SARA), which provides that all federal facilities "shall be subject to, and comply with, this act in the manner and to the same extent, both procedurally and substantively, as any non-government entity." Additionally, SARA established the Defense Environmental Restoration Program (DERP), which has a substantially larger scope than CERCLA. Key differences include:

- DERP funds may be used to remediate certain petroleum releases.
- Sites do not need to be on the National Priorities List (NPL) to be managed using DERP funds.
- Superfund "dollars" may not fund remediation at federally owned facilities.
- DERP-funded projects include certain requirements for Interagency Agreements (IAGs), Annual Reports to Congress, and Restoration Advisory Boards (RABs).
- DoD serves as the Lead Agency on DoD remediation projects. DoD has delegated its Lead Agency Status to the individual military departments.

1.3.2 Emergency Planning and Community Right-To-Know Act (EPCRA)

SARA included several freestanding provisions of law, known as the Emergency Planning and Community Right-to-Know Act. EPCRA provides for public reporting of releases of certain toxic substances, as well as reporting of information related to hazardous substance storage to local emergency response agencies. As originally written, EPCRA was not applicable to federal facilities. However, in 1993, the President issued Executive Order (EO) 12856, which placed federal agencies under the substantive requirements of EPCRA.

1.3.3 Community Environmental Response Facilitation Act (CERFA)

The 1992 amendments to CERCLA, known as the Community Environmental Response Facilitation Act (CERFA), adopted provisions that facilitate the rapid identification and return to local communities of clean properties identified in the BRAC process. CERFA established deadlines for the identification of uncontaminated parcels of real property at all military installations closed or realigned under the BRAC

laws (http://www.dod.mil/brac/index.html). CERFA requires DON to identify uncontaminated properties at installations on which operations are closed or realigned in accordance with a base closure law not later than 18 months after the date on which the real property is selected for closure or realignment.

1.3.4 National Oil and Hazardous Substances Pollution Contingency Plan (NCP)

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] 300) is the regulation that implements CERCLA. The NCP provides the organizational structure and procedures to prepare for and respond to discharges of oil and the release or threatened release of hazardous substances, pollutants, and contaminants. The NCP also outlines actions to be taken upon discovery of a release and following notification of a release of a hazardous substance in a reportable quantity. DON policy is to comply with the NCP for all sites under CERCLA authority.

1.4 Resource Conservation and Recovery Act (RCRA)

1.4.1 RCRA Background

RCRA provides the general regulatory framework for management of solid and hazardous wastes and waste management facilities. RCRA provides standards for:

- Cradle-to-grave tracking of hazardous wastes including recordkeeping on the generation, transportation, storage, and disposal of hazardous materials;
- Operation and closure of hazardous and solid waste management units (SWMUs);
- Recycling and federal affirmative procurement;
- UST construction and operation;
- Corrective Action of USTs; and
- Corrective Action to address releases of hazardous waste and hazardous constituents at RCRA permitted and interim status facilities.

U.S. EPA provides special provisions for site remediation projects under RCRA. Some of these include:

- **Area of Contamination (AOC) Policy.** U.S. EPA interprets RCRA to allow certain discrete areas of generally dispersed contamination to be considered as RCRA units. Because an AOC is equated to a RCRA land-based unit, consolidation and in situ treatment of hazardous waste within the AOC do not create a new point of hazardous waste generation for purposes of RCRA. This interpretation allows wastes to be consolidated or treated in situ within an AOC without triggering land disposal restrictions (LDRs) or minimum technology requirements (MTRs).
- **Corrective Action Management Units (CAMUs).** The CAMU rule created a new type of RCRA unit specifically intended for treatment, storage and disposal of hazardous remediation waste. Under the CAMU rule, U.S. EPA and authorized states may develop and impose site-specific design, operating, closure, and post-closure requirements for CAMUs in place of MTRs for land-based units. Remediation waste placed in approved CAMUs does not have to meet LDR treatment standards. Regulatory requirements for CAMUs are provided in 40 CFR 264 Subpart S.
- **Corrective Action Temporary Units (TUs).** Under the temporary unit regulations, U.S. EPA and authorized states may modify existing MTR design, operating, and closure standards for temporary tank and container units used to treat and store hazardous remediation waste.

Temporary units may operate for one year, with an opportunity for a one-year extension. Regulatory requirements for TUs are provided in 40 CFR 264 Subpart S.

- **Treatability Studies Exemption.** The term "treatability study" refers to a study in which a hazardous waste is subjected to a treatment process to determine: (1) whether the waste is amenable to the treatment process; (2) what pretreatment is required; (3) the optimal process conditions needed to achieve the desired treatment; (4) the efficiency of a treatment process for a specific waste or wastes; or, (5) the characteristics and volumes of residuals from a particular treatment process. Under regulations at 40 CFR 261.4(e) and (f), hazardous wastes managed during a treatability study are exempt from many RCRA Subtitle C requirements. The regulations limit the amount of waste that may be managed under an exempt treatability study to, generally, 1,000 kg of hazardous waste or 1 kg of acutely hazardous waste per study. For contaminated environmental media, the volume limit generally is 10,000 kg of media that contain non-acutely hazardous waste, and 2,500 kg of media that contain acutely hazardous waste per study (*Management of Remediation Waste Under RCRA* [EPA/530/F-98/026, Oct. 1998]). There are limits on the types and lengths of studies that may be conducted under the exemption, as well as record keeping and reporting requirements.

See Chapter 13 of this manual for more information about remediation conducted under the RCRA Corrective Action (CA) program.

1.4.2 RCRA Corrective Action-CERCLA Interface

DoD is the lead agency to respond to hazardous waste releases at DoD sites following the provisions of Executive Order 12580 to CERCLA and the NCP. However, U.S. EPA and the states also have authority to impose corrective action under RCRA. Ideally, the boundary between contaminated areas requiring RCRA CA and those requiring CERCLA response action should be clear: CERCLA applies to releases associated with past operations or activities, whereas RCRA applies to sites and processes still in operation. However, situations do arise where both RCRA and CERCLA apply.

As a matter of DON policy, CERCLA is the preferred process for conducting cleanups. Federal Facility Agreements (FFAs) usually specify that cleanups are to be accomplished under CERCLA, with RCRA as a potential ARAR (see Section 8.3.1.1). DON facilities subject to CERCLA response may be subject to RCRA if they generate, transport, store, treat, or have disposed of hazardous waste as defined by RCRA. Installations with active RCRA sites are likely to be required by regulatory agencies to identify and list all Solid Waste Management Units (SWMUs) on the installation. The Navy Remedial Project Manager (RPM) should work to ensure that the ER Program is consistent with delineated RCRA CAs. RPMs should ensure there is cross-program integration early in the ER process. This will allow the requirements of RCRA permitting/CA and CERCLA to be met via one program's set of procedural steps, thereby eliminating redundant reporting and documentation to address the administrative requirements of both programs.

Although CERCLA and RCRA CA processes are not identical, there are many similarities allowing the potential for interface between the two. Figure 1-1 illustrates the different phases of each program, and presents a side-by-side depiction of the similarities between RCRA CA and CERCLA remediation programs. Note: (1) This figure is not meant to imply that there are phase-by-phase similarities, but rather that each program follows a process with similar phases, and (2) Removal Actions and Interim Measures may occur at any point during the respective action. Additional information regarding RCRA CA-CERCLA interface is provided in Chapter 13.

CERCLA Response Action	RCRA Corrective Action
Preliminary Assessment/Site Inspection (PA/SI) • Preliminary Assessment (PA) • Hazard Ranking System (HRS) Scoring • Site Inspection	**RCRA Facility Assessment (RFA)** • Preliminary Review • Visual Site Inspection • Sampling Visit
Removal Action • Non-Time Critical Removal Actions • Time Critical Removal Actions • Emergency Removal Actions	***Interim Measures*** • Interim Remediation • Temporary Fixes • Alternate Water Supplies
Remedial Investigation (RI) • Site-Specific Data Collection • Source Characterization • Contamination Characterization • Waste Mixtures, Media Interface Zones • Hydrogeological and Climate Factors • Risk Assessment • Potential Routes of Exposure • Extent of Migration	**RCRA Facility Investigation (RFI)** • Background Data Review • Environmental Setting Investigation • Sources Characterization • Contamination Characterization • Potential Receptors Characterization
Feasibility Study (FS) • Define Objectives and Nature of Response • Develop Alternatives • Conduct Detailed Analysis of Alternatives	**Corrective Measures Study (CMS)** • Identify and Develop Alternatives • Evaluate Alternatives • Justify & Recommend Corrective Measure
Remedy Selection • Select Remedy that Meets the 9 NCP Criteria • Proposed Plan • Record of Decision (ROD)	**Remedy Selection** • Select Remedy that Abates Threat to Human Health and the Environment
Remedial Design/Remedial Action (RD/RA) • Design Remedy • Perform Remedial Action • Perform Operations and Maintenance and Monitoring	**Corrective Measures Implementation (CMI)** • Develop Implementation Plan, Program and Community Relations Plan • Corrective Measures Design • Construction and Implementation

*** Note: Removal Actions and Interim Measures may be implemented at any point during the Response Action or Corrective Action.**

Figure 1-1. CERCLA Response Actions and RCRA Corrective Actions at Federal Facilities

1.5 Federal Facilities Compliance Act (FFCA)

The Federal Facilities Compliance Act (FFCA) expanded the enforcement authority of federal and state regulators with respect to solid and hazardous waste management at federal facilities. The FFCA makes federal facilities fully responsible for RCRA violations resulting from their management of hazardous wastes. The FFCA also provides for annual inspections of federal facilities by U.S. EPA or any state with an authorized hazardous waste program.

The FFCA waives federal immunity from fines and penalties imposed as a result of failing to comply with federal, state, and local procedural and substantive requirements relating to RCRA. Although the FFCA relieves federal employees from personal liability or civil penalties resulting from acts or omissions within the scope of their official duties, criminal liability under any federal or state hazardous waste law is not waived.

1.6 Toxic Substances Control Act (TSCA)

The Toxic Substances Control Act (TSCA) authorizes U.S. EPA to establish regulations pertaining to the testing of chemical substances and mixtures, premanufacturing notification for new chemical substances or significant new uses for existing chemical substances, control of chemical substances or mixtures that pose an imminent hazard, and record keeping and reporting requirements. Of these, the regulations controlling hazardous chemicals are potential ARARs for CERCLA actions. TSCA requires U.S. EPA to promulgate regulations when there is a reasonable basis to conclude that a chemical substance or mixture presents or will present an unreasonable risk of injury to human health or the environment. A demonstration that a chemical will present an unreasonable risk is made on the basis of a qualitative or quantitative risk assessment, which evaluates the likelihood that a chemical will cause adverse effects either to human health or the environment. The results of the risk assessment are used to determine whether U.S. EPA should regulate activities involving the use of the chemical or whether the chemical should be referred to another agency (e.g., the Occupational Safety and Health Administration [OSHA]) for regulation.

With respect to CERCLA cleanup actions, TSCA cleanup numbers should be considered during the analysis of ARARs. Of particular relevance to the ER Program are the regulations and policies designed to reduce risks to human health and the environment from specific priority chemicals (i.e., National Program Chemicals) which include polychlorinated biphenyls (PCBs). Requirements and responsibilities for management of PCBs at Navy shore facilities are specified in Chapter 11 of the *Navy Environmental and Natural Resources Program Manual* (OPNAVINST 5090.1B, 01 Nov. 1994). Additional information on PCB cleanups is provided in Chapter 13 of this manual.

1.7 Natural and Cultural Preservation Laws

Although they may not directly pertain to the ER Program, several natural and cultural protection laws should be considered at each step of the ER process. For example, field investigations may need to be scheduled to prevent disruption of marine mammals that are mating in, at, or adjacent to a CERCLA site; or certain remedial options may be precluded or selected because they could harm or benefit an endangered species. A RPM should consult with the Natural and Cultural Resource personnel at each facility to ascertain information regarding any potential impacts and/or requirements specific to ER work performed at the facility. It is also important for RPMs to understand that under CERCLA Section 121(e), no federal, state, or local permit is required for on-site CERCLA response actions. U.S. EPA's interpretation of CERCLA Section 121(e) waives the requirement to obtain a permit and associated administrative and procedural requirements of permits, but not the substantive provisions of permitting regulations that are ARARs.

1.7.1 National Historic Preservation Act (NHPA)

The National Historic Preservation Act (NHPA) of 1966 is intended to help prevent the loss of irreplaceable historic properties. The act established the Advisory Council on Historic Preservation and authorized the Secretary of the Interior to maintain a National Register of Historic Places. The National Register lists sites, districts, buildings, structures, and objects of significance in United States history.

Section 106 of NHPA requires a federal agency to take into account the effect any proposed "undertaking" may have on historic properties prior to the expenditure of any federal funds. Section 110 of NHPA requires each federal agency to establish a program to locate, inventory, nominate, and protect all properties, listed or eligible for listing on the National Register.

The term "undertaking" covers a broad range of activities including construction, rehabilitation and repair projects, demolition, licenses, permits, grants, and federal property transfers. Thus, the NHPA should be evaluated as an ARAR.

1.7.2 Native American Graves Protection and Repatriation Act (NAGPRA)

The Native American Graves Protection and Repatriation Act (NAGPRA) was passed in 1990 and sets forth a process for returning to American Indians, Native Hawaiians, and Native Alaskans, upon request, certain human remains and other cultural items presently held by federal agencies or federally assisted museums or other institutions. NAGPRA defines "cultural items" as human remains, funerary objects, sacred religious objects, and cultural patrimony, defined as material remains of historical, traditional, or cultural importance to a Native American group or culture. Although encountering such remains or objects is not a regular occurrence during environmental restoration, it is important for RPMs to be aware of the provisions in NAGPRA.

1.7.3 Archeological Resources Protection Act of 1979 (ARPA)

The Archeological Resources Protection Act (ARPA) requires issuance of permits for authorized professional excavation or removal of archeological resources. An archeological resource is any material remains of human life or activity that is at least 100 years old and that is of archeological interest as determined by 32 CFR Section 229. ARPA imposes civil and criminal penalties for unauthorized excavation, removal, damage, alteration, or defacement of archeological resources, or attempts to perform such unauthorized acts. Archeological sites may be placed on the National Register of Historic Places if listing criteria are met.

1.7.4 American Indian Religious Freedom Act (AIRFA)

The American Indian Religious Freedom Act (AIRFA) was enacted in 1978 and requires federal agencies to consult with native traditional religious leaders and to consider, but not necessarily defer to, Indian religious values. Federal agencies also should permit access to religious sites, when possible. This is not expected to be a common issue on DON ER sites; however, RPMs should be aware of provisions in AIRFA.

1.7.5 Endangered Species Act (ESA)

The Endangered Species Act (ESA) of 1973 provides broad protection for species of fish, wildlife, and plants that are listed as threatened or endangered in the United States or elsewhere. RPMs shall consult with their environmental counsel to determine if the ESA is an ARAR on a case-by-case basis. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The act outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species, and contains exceptions and exemptions. The ESA (16 USC Section 1536)

outlines a process for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. The ESA requires that individuals or agencies that undertake actions that could result in the "taking" of an endangered or threatened species perform a biological assessment in consultation with the appropriate stakeholders to evaluate potential impacts. Under ESA, "taking" includes harassing, harming, pursuing, hunting, shooting, wounding, trapping, killing, capturing, or collecting.

1.7.6 Marine Mammal Protection Act (MMPA)

The Marine Mammal Protection Act (MMPA) was enacted in 1972 and forbids "taking" of a marine mammal without first obtaining a permit. For on-site CERCLA response actions, no permits are required; however, RPMs should consider the substantive provisions of the MMPA when evaluating remedial strategies. The term "take" is statutorily defined to mean "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill any marine mammal."

1.8 Clean Air Act (CAA)

The Clean Air Act (CAA) was enacted in 1970, with amendments passed in 1977 and 1990. CAA addresses criteria pollutants, hazardous air pollutants (HAPs), and risk management planning. Criteria pollutants include ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, and particulate matter. HAPs include 188 listed compounds that significantly contribute to cancer and other health risks from breathing air. Risk management planning programs are intended to minimize the risk of catastrophic releases of toxic chemicals from industrial operations.

Congress and U.S. EPA have established National Ambient Air Quality Standards (NAAQS) for criteria pollutants. Any area or region that does not achieve these national standards is required to develop and implement a plan to reduce emissions to a level that will allow the area to attain the standards. Generally speaking, local and state agencies have authority to regulate stationary sources such as boilers and incinerators. The federal government is responsible for regulations related to mobile sources such as cars, trucks, and earth-moving equipment.

Hazardous air pollutants are regulated by a series of regulations known as National Emissions Standards for Hazardous Air Pollutants (NESHAP) standards. NESHAP standards regulate emissions from specific industrial categories and sources such as aerospace facilities and shipyards. There is also a NESHAP for site remediation activities (40 CFR Part 63, NESHAP: Site Remediation); however, the standard exempts site remediation projects conducted under CERCLA and RCRA authority (see the Web site: http://clu-in.org/download/reg/neshap.pdf). Certain voluntary remediation projects would be regulated by the site remediation NESHAP. Local CAA regulations, NESHAP standards, and risk management planning regulations could potentially be identified as ARARs under CERCLA.

1.9 Clean Water Act (CWA)

The Clean Water Act (CWA), originally enacted as the Federal Water Pollution Control Act Amendments of 1972, has the goal of protection and maintenance of the chemical, physical, and biological integrity of the nation's waters. Specific provisions of CWA include:

- Requirements for permitting point source discharges in navigable waters (National Pollution Discharge Elimination System [NPDES] permit program);
- Requirements for permitting of non-point discharges such as discharges from industrial and construction sites;

- Requirements for pre-treatment of certain discharges to publicly-owned waste treatment works; and
- Requirements for disposal of dredged or fill materials into navigable waters.
- There should be no discharges of oil or hazardous substances into or upon the navigable waters of the United States, on adjoining shorelines or into or upon the waters of the contiguous zone, or which may affect natural resources belonging to, appertaining to, or under the exclusive management or authority of the United States.

''Oil'' is defined in the CWA as oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil. The CWA definition of "navigable waters" is extremely broad and includes most surface waters and wetlands. State and local water quality standards and water quality criteria could potentially be identified as ARARs at ER Program sites, including UST or other petroleum contaminated sites.

RPMs must comply with the CWA requirements when ER Program actions create the need for water management and/or discharges (e.g., construction nuisance water and ex situ water treatment).

1.10 Safe Drinking Water Act (SDWA)

The Safe Drinking Water Act (SDWA) (42 USC Sections 300f-300j-26) was enacted in 1974 and is the law primarily responsible for regulating standards of drinking water supplied by public systems. SDWA also authorizes allowable concentrations for specified pollutants in drinking water and provides for source water protection programs. U.S. EPA's implementation of regulations establishes National Primary and Secondary Drinking Water Regulations.

Maximum contaminant levels (MCLs) established by U.S. EPA for selected compounds may be appropriate goals for contaminated groundwater cleanups (see U.S. EPA's *Presumptive Response Strategy and Ex Situ Treatment Technologies for Contaminated Groundwater at CERCLA Sites, Final Guidance* [OSWER 9283.1-12, Oct. 1996]). The SDWA also has a "Right to Know" provision that states that the public shall be informed of any contamination to the drinking water supply above MCLs.

1.11 National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) was enacted in 1969 and requires federal agencies to:

- Consider and document the reasonably foreseeable environmental impacts of a proposed action;
- Ensure that the public is fully informed of the proposal; and
- Give the public adequate opportunity to comment on the proposal.

NEPA does not apply to actions taken in accordance with CERCLA and the NCP. Like NEPA, CERCLA and the NCP establish a decision-making process with respect to the cleanup of past contamination that involves public notice and participation. The United States Department of Justice (DOJ) determined that these provisions of CERCLA, enacted into law after NEPA, are the functional equivalent of the NEPA process. Accordingly, compliance with the requirements of CERCLA satisfies NEPA's twin objectives of informed decision-making and public participation. (See *Navy Environmental and Natural Resources Program Manual* [OPNAVINST 5090.1B, 01 Nov. 1994], Ch.2 for a discussion of DON policy related to NEPA.)

1.12 Executive Order (EO) Authority

Executive Orders (EOs) are official documents, numbered consecutively, through which the President of the United States manages the operations of the federal government. The text of EOs appears in the daily Federal Register as each EO is signed by the President and received by the Office of the Federal Register.

The following EOs are presented as background information to RPMs on how the ER Program responsibilities were delegated from the President to the individual military departments, including DON. Some of these EOs have direct applicability to the ER Program and others are presented as information to be considered during the management of ER projects.

1.12.1 Executive Order 12088 (Federal Compliance with Pollution Control Standards)

EO 12088 (43 FR 47707, 17 Oct., 1978) requires federal agencies' cooperation with U.S. EPA, state, and local authorities to prevent, control, and abate environmental pollution. It provides that the head of each federal agency is responsible for compliance with "applicable and substantive control standards." It also provides that any dispute between U.S. EPA and a federal agency regarding environmental violations shall be turned over to the Office of Management and Budget for resolution.

1.12.2 Executive Order 12580 (Superfund Implementation)

EO 12580 (52 FR 2923; 29 Jan. 1987) delegated authority to implement certain CERCLA provisions to a number of federal agencies. Although the NCP describes U.S. EPA's procedures for implementing CERCLA, this order delegates authority and responsibility to DoD for responses at DoD facilities.

1.12.3 Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations)

EO 12898 (59 FR 7629; 16 Feb. 1994) requires federal agencies to identify and address the potential for their programs, policies, and actions to disproportionately and adversely affect human health or the environment in minority or low-income populations.

The DoD *Strategy on Environmental Justice* (24 Mar. 1995) states that RABs and Community Relation Plans (CRPs) are vehicles for implementation of environmental justice principles. Therefore, ER Program activities should focus on identifying the impact of program activities on minority and low-income populations via site-specific studies, promoting partnerships with community stakeholders, encouraging minority and low-income population participation in decision-making processes, and strengthening CRPs. RPMs should be aware of the provisions of EO 12898 and the potential to utilize RABs and CRPs as vehicles to implement environmental justice principles.

1.12.4 Executive Order 13016 (Amendment to Executive Order 12580 Concerning Exercise of Authority under CERCLA Section 106)

EO 13016 (61 FR 45871; 30 Aug. 1996), amended EO 12580 by expanding the delegation of Presidential authority to issue orders or seek judicial relief to address releases that may present an imminent and substantial endangerment to the public health or environment. Prior to this amendment, such enforcement authority was limited to the Administrator of U.S. EPA and to the United States Coast Guard. EO 13016 amended EO 12580 by delegating CERCLA Section 106 authority, where appropriate, to the Departments of Agriculture, Commerce, Defense, Energy, and Interior. These departments, referred to as Federal

Resource Managers, have the authority under Section 106 to issue administrative orders or seek judicial relief with respect to the release or threatened release of a hazardous substance affecting either natural resources under the manager's trusteeship or a vessel or facility subject to the manager's jurisdiction, custody, or control.

EO 13016 authorizes DoD to issue a CERCLA 106 order to require a PRP to perform a response action where there has been a release or threatened release of hazardous substances affecting either natural resources under DoD trusteeship or a vessel/facility subject to DoD jurisdiction, custody or control and subject to concurrence by U.S. EPA or Coast Guard depending upon where the release/threatened release occurred. If the PRP does not consent to the order, DoD may conduct the cleanup and seek financial reimbursement through the courts for an amount more than the actual cost of the cleanup only where the release/threatened release may present an imminent and substantial endangerment to public health or welfare or the environment. DoD also may ask DOJ to enter into a consent decree or seek a judicial order to enforce a DoD-issued CERCLA 106 order.

The EO affects RPMs where a third-party release/ threatened release affects a DON installation. It enables RPMs to ask for support from Navy leadership (discussed in Chapter 2) to issue such an order. It also restricts U.S. EPA's ability to issue a CERCLA 106 order against DON by requiring U.S. EPA to get DOJ concurrence before doing so. If a situation involving EO 13016 evolves during environmental restoration activities, the RPMs shall consult with Naval Facilities Engineering Command (NAVFAC) counsel for assistance on a case-by-case basis.

1.12.5 Executive Order 13148 (Greening the Government Through Leadership in Environmental Management)

EO 13148 (65 FR 24595, 26 Apr. 2000) obligates the heads of all federal agencies to ensure that environmental management and accountability is integrated into all decision-making processes, long-term planning processes, missions, activities, and functions. This order emphasizes increased pollution prevention activities and environmental compliance through audit programs and policies, and significant reductions in both toxic chemical releases and ozone-depleting substances. The order also calls for the application of Life Cycle Assessment Concepts, increased reporting requirements, and environmental management training activities. RPMs should be aware that this EO requires consideration of the impact to natural resources in project decision-making, including possible impacts from environmental remediation projects.

1.13 State "Mini-Superfund" Laws

Many states have laws that are analogous to CERCLA. Although CERCLA does not enable delegation of the Superfund program to the states, under CERCLA Section 120(a)(4), state laws concerning removal, remedial action, and enforcement apply to federal facilities not listed on the NPL. State laws shall be consistent with CERCLA in order to apply to federal facilities. To be consistent, state laws shall: set out a comprehensive scheme for remedial enforcement; establish health-based standards through the ARARs evaluation process; include cost-effectiveness as an element; and be free of discriminatory application to federal facilities (OPNAVIST 5090.1B, 01 Nov. 1994). For more information about state regulatory roles in the ER Program, see Chapter 2 of this manual.

1.14 Guidance and Policy

A complete listing of the policy, guidance, and other DoD and DON documents that are pertinent to the ER Program is provided in Appendix A of this manual.

It is DON policy that all actions carried out under the ER Program comply with all applicable requirements of CERCLA and the terminology used by the ER Program will be consistent with that used in CERCLA and the NCP, 42 USC Section 9620(a)(2). See *Navy Environmental and Natural Resources Program Manual* (OPNAVINST 5090.1B, 01 Nov. 1994) CHANGE-2, Para. 15-5.1; and *Marine Corps Environmental Compliance and Protection Manual* (MCO P5090.2A, 10 July 1998), Para. 10200.1.

DON response actions reasonably interpret and apply U.S. EPA policy and guidance when making cleanup decisions. In addition, CERCLA Section 120(a)(2), prohibits DoD from adopting any guidelines, rules, regulations or criteria that are inconsistent with U.S. EPA's guidelines, rules, regulations and criteria (see 42 USC Section 9620(a)(2) (2001); *Navy Environmental and Natural Resources Program Manual* (OPNAVINST 5090.1B, 01 Nov. 1994) CHANGE-2, Para 15-5.1; and *Marine Corps Environmental Compliance and Protection Manual* (MCO P5090.2A, 10 July 1998), Para. 10200.1).

Appendix A (References) of *Navy Environmental and Natural Resources Program Manual (Change 4)* contains current federal laws, EOs, federal regulations, and DoD Directives. In addition, U.S. EPA maintains a RCRA/Superfund EPCRA Hotline to assist in finding documentation at 1-800-424-9346 or 1-800-535-0202.

1.15 Projects in Foreign Countries

The DERP is applicable only within the United States and its territories and possessions. Restoration activities abroad are carried out in accordance with international agreements (see DoD Instruction 4715.8, *Environmental Remediation for DoD Activities Overseas*).

CHAPTER 2

Organization, Roles, and Responsibilities

Navy RPMs manage ER projects under authorities granted by the President through Executive Orders (EOs). The primary governmental entities involved in the cleanup of past contamination on any DON installation are DON (represented at the project level by the RPM), U.S. EPA, and the respective state. DON is responsible for the execution of its ER Program; however it does so with guidance from the Office of the Secretary of Defense (OSD). This chapter summarizes the organizational responsibilities of each of these participants in the ER Program, and is intended to provide RPMs with the organizational context within which their responsibilities are executed. (Specific training requirements for roles within the ER Program are discussed in Chapter 17, "Training.")

2.1 Department of Defense (DoD)

In accordance with EO 12580, DoD is the lead agency for actions taken under the authority of CERCLA at DoD installations. This order also delegates authority for response action decisions to the Secretary of Defense (SECDEF) "...with respect to release or threatened releases where either the release is on, or the sole source of the release is from any facility or vessel under the jurisdiction, custody, or control of DoD." [EO 12580 (23 Jan. 1987), 52 FR 2923, 3 CFR 1987 Comp. p.193, *as amended by* EO 12777, 56 FR 54757 (22 Oct. 1991), and 3 CFR 1987 Comp., p. 123.]

SECDEF also has responsibilities under CERCLA Sections 105, 109, 111, 116, and 122 (see 42 USC Sections 9605, 9609, 9611, 9611 and 9622 [2001]). The Defense Environmental Restoration Program (DERP) requires that SECDEF identify an office within OSD to carry out the ER Program (10 USC Section 2701 (a) [2001]). The SECDEF has delegated ER Program implementation responsibility to the Deputy Under Secretary of Defense, Installations and Environment [DUSD(I&E)].

DUSD(I&E) is the focal point for DoD-wide environmental policy and planning. DUSD(I&E) represents DoD before Congress, federal and state agencies, news media, and the public in environmental matters. DUSD(I&E) is responsible for policy, management, and oversight of the DERP. DUSD(I&E) responsibilities include the following:

- Maintaining close interaction with U.S. EPA headquarters and national news media, and coordinating broad interface issues with states and the public to implement the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP);
- Providing special notification of hazardous wastes that are specific to DoD installations to the Department of Health and Human Services and U.S. EPA;
- Providing integration of public review and comment on activities associated with implementing the NCP;
- Submitting an annual report to Congress describing DERP activities, in accordance with 10 USC Section 2706;
- Providing oversight to the DERP including consistent program implementation across DoD components and establishing a DoD-wide restoration management information system containing site-specific data; and
- Negotiating Defense and State Memoranda of Agreement (DSMOAs).

The DERP is funded by Congressional appropriation each year. Congress funds the Defense Environmental Restoration Account (DERA), which in turn supplies funding to each of the military service environmental restoration programs (e.g., the Environmental Restoration, Navy [ER,N] account for the DON ER Program). A separate Congressional appropriation is used to manage all BRAC facility issues, including environmental restoration. However, DERP generally follows the same process at BRAC installations as at active installations. Figure 2-1 outlines DoD responsibilities mandated by EO 12580.

2.2 Department of the Navy (DON)

Within DON, there are many organizations, commands, activities, and personnel that work together to execute and manage the ER Program successfully. The following sections provide descriptions of these entities and their interactions.

2.2.1 Assistant Secretary of the Navy (Installations and Environment)

The Assistant Secretary of the Navy (Installations and Environment) [ASN(I&E)] is the Secretary of the Navy's (SECNAV's) designated focal point for all matters related to DON installations and environmental matters and policy. Within ASN(I&E), the Deputy Assistant Secretary of the Navy (Environment) [DASN(E)] is responsible for all matters related to the DERP. DASN(E) duties include coordination with the DUSD(I&E) on policy issues and ultimate responsibility for the ER Program. The DASN(E) also is responsible for the following:

- Providing general policy and oversight for ER Program activities;
- Representing DON with environmental regulatory agencies on ER Program matters;
- Formulating ASN budget guidance commensurate with *Management Guidance for the DERP* (28 Sep. 2001);
- Representing DON with senior level DoD officials and committees; and
- Signing Federal Facility Agreements (FFAs) and Interagency Agreements (IAGs) after appropriate coordination and endorsement by the chain of command. The chain of command for FFAs and IAGs pertaining to Navy installations is via NAVFAC, and Chief of Naval Operations, Environmental Readiness Division (CNO-N45). The chain of command concerning Marine Corps installations and activities is via NAVFAC and Commandant of the Marine Corps, Land Use and Military Construction Branch [CMC(LFL)].

Figure 2-2 shows the DON Chain of Command for the ER Program.

2.2.2 Base Realignment and Closure (BRAC) Program Management Office (PMO)

The BRAC PMO (http://www.bracpmo.navy.mil/) reports directly to ASN(I&E) through the Deputy Assistant Secretary of the Navy (Installations and Facilities) [DASN(I&F)]. The BRAC PMO is the Navy's integrated program management office for all BRAC-related efforts, including management of the cleanup and disposal of Navy and Marine Corps bases closed by the BRAC process, and was established to streamline the BRAC disposal process and to direct BRAC execution and resources. Primary functions of the BRAC PMO within the ER Program include the following:

- Establishing property disposal strategies and establishing cleanup levels to facilitate property disposal;

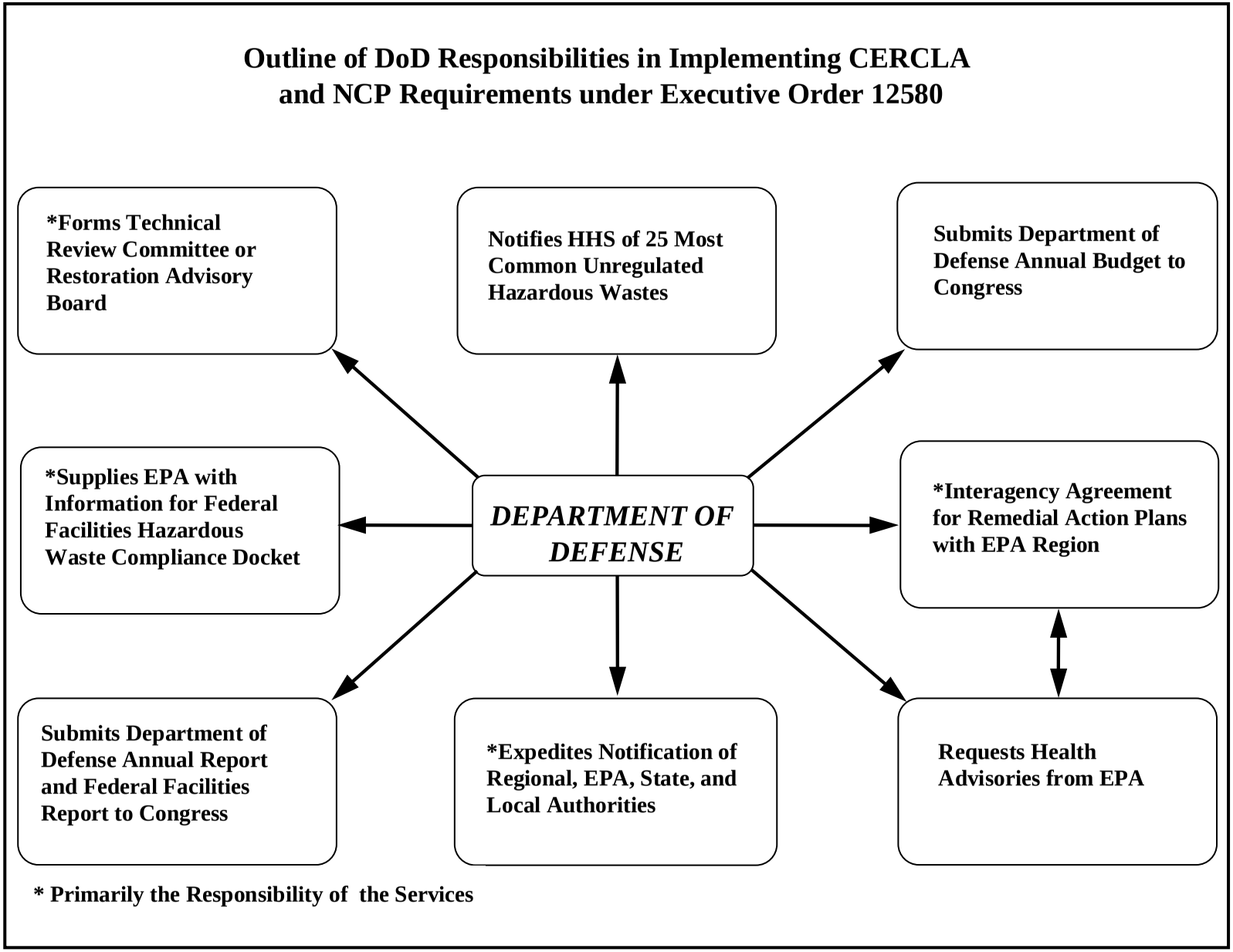


Figure 2-1. DoD Responsibilities for Implementing CERCLA and NCP Requirements Under Executive Order 12580

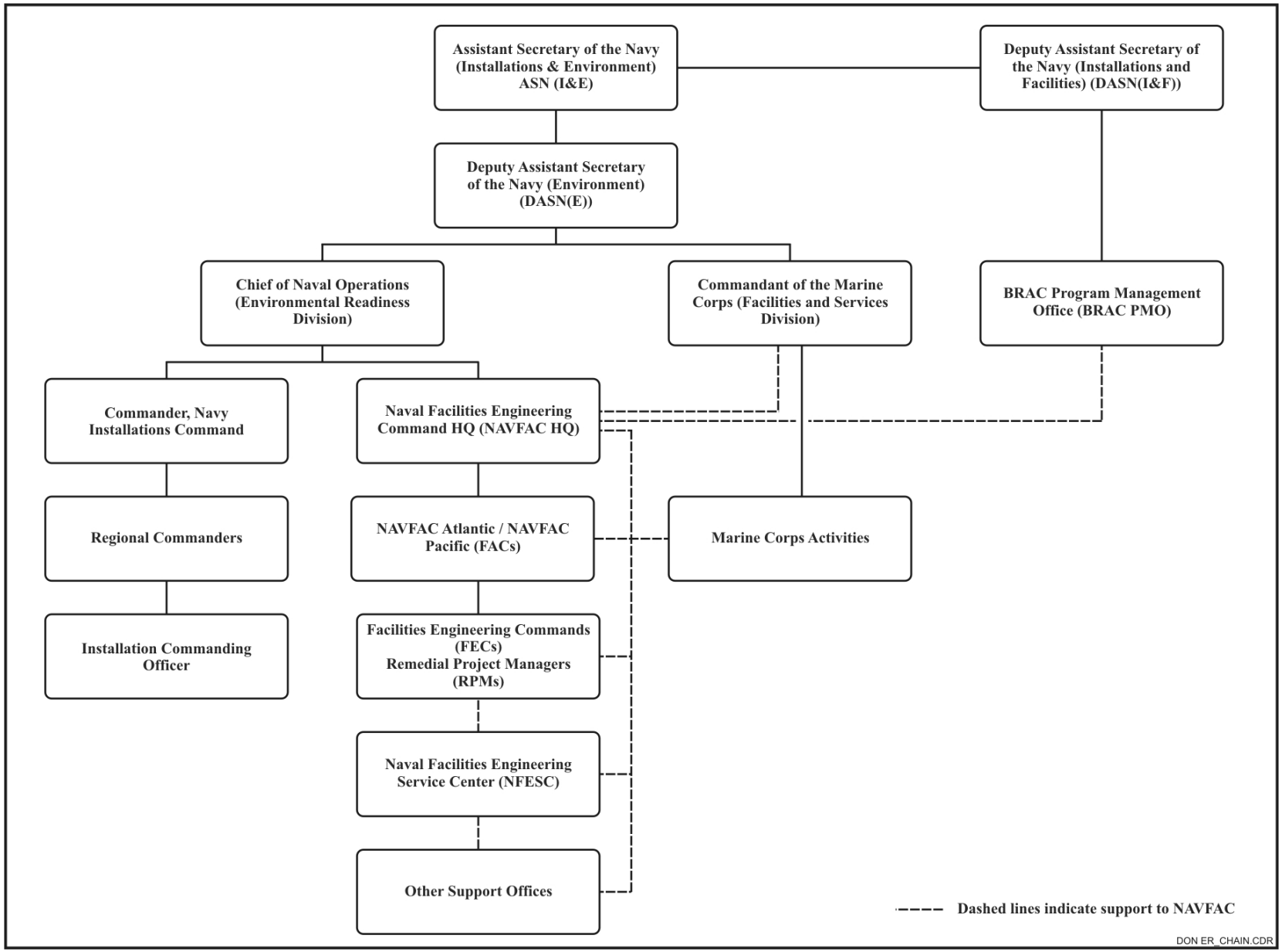


Figure 2-2. Chain of Command for the DON ER Program

- Directing, reviewing, and approving the RPM's base specific plans, schedules, and requirements for environmental cleanup documentation and actions;
- Establishing priorities and directing, reviewing, and approving the RPM's environmental cleanup actions in coordination with property disposal; and
- Serving as primary DON interface with environmental regulators about BRAC cleanup plans and actions in close coordination with the DASN(E).

NAVFAC RPMs are forward-deployed as technical subject matter experts in support of the BRAC PMO to perform environmental restoration functions related to BRAC environmental cleanup.

2.2.2.1 BRAC Environmental Coordinators (BECs)

BRAC Environmental Coordinators within the BRAC PMO are responsible for the following actions:

- Contact or maintain contact with the appropriate U.S. EPA Regional Office and state environmental regulatory agency and form/lead the BRAC Cleanup Team (BCT).
- In conjunction with the other members of the BCT, conduct a "Bottom Up" review of the environmental cleanup programs and implement necessary action plan(s). The "Bottom Up" review will include an evaluation of the existing environmental programs such as the ER Program.
- Ensure a BRAC Cleanup Plan (BCP) that supports the Community Reuse Plan is prepared and updated as needed.
- Implement all ER Program projects related to closure in an expeditious and cost-effective manner in accordance with the BCP.
- Negotiate appropriate cleanup and abatement actions with U.S. EPA and state BCT members.
- Identify resource requirements for ER and abatement actions.
- Act as the liaison/coordinator with appropriate installation commanders and headquarters components with regard to closure-related environmental compliance matters.
- Serve as co-chairman of the Restoration Advisory Board (RAB) with community representative, as agreed to by the Commanding Officer (CO) or Commanding General (CG) of the Installation and the CO of the NAVFAC Command (FAC) or Facilities Engineering Command (FEC).
- Act as liaison to the DoD Transition Coordinator on environmental matters affecting the leasing or conveyance of property (e.g., cleanup schedules and priorities, cleanup actions and levels, reports to community leaders on cleanup, and/or possible impediments to a lease or conveyance).
- Provide direction on the use of appropriate environmental funds to accomplish cleanup and abatement actions within available resources.
- Propose and implement changes to existing cleanup agreements, orders and decrees, and other environmental procedures to achieve timely and cost-effective cleanup.
- Serve as the Program Manager where the installation has a Federal Facilities Agreement (FFA), Federal Facilities Site Remediation Agreement (FFSRA), Interagency Agreement (IAG), or other regulatory cleanup agreement, order, or decree.
- Sign the Record of Decision (ROD) for cleanup actions under CERCLA.

- Sign the decision documents for corrective actions related to cleanup under RCRA (includes pre-operational closure documents).
- Sign decision documents for removal actions under CERCLA (includes pre-operational closure documents).
- Sign the decision documents for corrective actions related to cleanup under applicable state laws, regulations, and programs.
- Sign uncontaminated parcel determinations under CERFA.
- Provide input to the Finding of Suitability to Lease (FOSL) and Finding of Suitability to Transfer (FOST).
- Establish and maintain the Administrative Record (AR) File and public participation procedures required under CERCLA. Establish and maintain the AR Files of all other actions taken with regard to the cleanup of the installation.
- Maintain an awareness of the status of site activities and intervene as warranted to ensure expeditious project completion.
- Integrate property transfer priorities into the ER Program.
- Certify that construction projects requested by lessees will not interfere with the ER Program.
- Sign Environmental Baseline Survey for Transfer (EBST), Environmental Baseline Survey for Lease (EBSL), and Environmental Condition of Property (ECP) documents.
- Initiate any other innovative ideas that will accelerate the cleanup and transfer of excess DON property and are consistent with the intent of this appointment.
- The responsibility to conduct five-year reviews of remedial actions pursuant to Section 121(c) of CERCLA and sign five-year review reports.

2.2.3 General Counsel

The General Counsel is the principal legal advisor to SECNAV and has primary responsibility within DON for providing advice and counsel on environmental matters [see Paragraph 0327, U.S. Navy Regulations (1990), SECNAVINST 5430.25D of 1 Dec. 1977; and General Counsel memo (Subj.: Environmental Legal Services) of 31 Dec. 1992]. Within the Office of the General Counsel (OGC), the Office of the Assistant General Counsel, Installations and Environment, has primary responsibility for advising the ASN(I&E) on legal matters related to the environment. Within DON, the Associate General Counsel (Litigation) has primary responsibility for environmental litigation. The Associate General Counsel (Litigation) is the Navy lead for settling and processing CERCLA contribution claims brought against the Navy by entities other than federal agencies or brought by the Navy against other contributing agencies.

OGC attorneys are assigned to the Offices of Counsel for the Commandant of the Marine Corps, the Navy Comptroller, and the other major commands. OGC attorneys also are assigned throughout NAVFAC, including NAVFAC Headquarters, NAVFAC Atlantic and Pacific (FACs), and all Facilities Engineering Commands (FECs). These counsel are the primary legal resource for the RPM on any legal matter relating to the ER Program, including but not limited to: review of documents at all stages of the CERCLA process, review of ARARs, negotiations of FFAs, review of responses to comments, review of Records of Decision and other decision documents, and coordination of legal issues throughout the chain (internal and external). The NAVFAC counsel should be a primary member of the environmental restoration team. These are the entities with which ER Program personnel may interact in the event of

litigation related to environmental restoration at a DON installation. Contact with these legal resources should be accomplished through the NAVFAC chain of command for active installations or through the BRAC PMO for BRAC installations.

2.2.4 Counsel for the Commandant of the Marine Corps

Counsel for the Commandant of the Marine Corps is the principal legal advisor to the Commandant on environmental matters. The Office of Counsel consists of both Marine Corps judge advocates and civilian OGC attorneys. Two regional offices in the continental United States, the Eastern Area Counsel Office and the Western Area Counsel Office, are similarly staffed and provide advice and counsel on environmental matters to Marine Corps commands, installations, and counsel offices within their respective geographic areas.

2.2.5 Judge Advocate General (JAG)

The JAG is the senior uniformed military lawyer in DON. The duties of the JAG are set forth in Paragraph 0331 of the U.S. Navy Regulations (1990) and in SECNAVINST 5430.27A (01 Dec. 1977). Although environmental law is a matter under the cognizance of the General Counsel, the JAG and the members of the JAG Corps provide significant environmental legal advice and counsel. The Office of Legislative Affairs monitors the Congressional legislative process, advises DON on pending legislation, and develops DON positions for transmission to DoD and Congress. Individual judge advocates are assigned as environmental counsel to CNO-N45, the Area Environmental Coordinators (AECs), and the Regional Environmental Coordinators (RECs) that do not have assigned OGC counsel. Judge Advocates also advise installation commanding officers and their staffs on all legal matters, including environmental issues.

2.2.6 Chief of Naval Operations (CNO)

The Chief of Naval Operations, Environmental Readiness Division (CNO-N45) directs, coordinates, and monitors the ER Program. As the resource sponsor for the ER Program, CNO-N45 is responsible for all the resource planning and programming required to execute the program. In addition to resources, CNO-N45 provides specific Navy guidance and policy and coordinates with DUSD(I&E), ASN(I&E), NAVFAC, CMC, and non-DoD agencies involved in environmental restoration matters. CNO-N45 coordinates very closely with NAVFAC to execute the ER Program. CNO-N45 provides general oversight of the MRP, but delegates program execution and management to NAVFAC and explosive safety oversight to the Naval Ordnance Safety and Security Activity (NOSSA). (Roles/responsibilities of NAVFAC and NOSSA are described in Sections 2.2.9 and 2.2.10 of this manual, respectively.)

CNO-N45 also is the Chairman of the Naval Radiation Safety Committee (NRSC) that administers the Navy's Master Materials License (MML) issued by the Nuclear Regulatory Commission. The NRSC oversees the use of radioactive materials (non-Naval Nuclear Propulsion Program [non-NNPP]) by Navy and Marine Corps commands, particularly byproduct material, source material, and special nuclear material. CNO-N45 provides guidance, resources, and responsibilities to Naval Sea Systems Command (NAVSEA 04N) in administering the MML and the Navy's Radiological Affairs Support Program (RASP), which establishes the requirements for the use, storage, and disposal of general radioactive material (G-RAM). Naval Sea Systems Command Detachment, Radiological Affairs Support Office (NAVSEADET RASO) serves as the technical support center for both CNO-N45 and NAVSEA-04N and is the single DON agent for disposal of all G-RAM low-level radioactive waste (LLRW).

2.2.7 Commandant of the Marine Corps, Land Use and Military Construction Branch

CMC(LFL) has delegated most of the responsibilities for planning, programming, and executing the ER Program at Marine Corps installations to CNO-N45 and NAVFAC. However, CMC(LFL) does provide

oversight for the implementation of the ER Program at Marine Corps installations and coordinates with ASN(I&E), CNO-N45, and NAVFAC on environmental restoration matters. CMC(LFL) has delegated its execution authorities for the MRP at Marine Corps installations to NAVFAC; however, CMC(LFL) continues to submit their own request for MRP funding.

2.2.8 Commander, Navy Installations Command (CNIC)

CNIC is the single responsible office, advocate, and point of contact for Navy installations. The CNIC mission is to provide consistent effective and efficient shore installation services and support to sustain and improve current and future Fleet readiness and mission execution. CNIC provides unified and consistent procedures, standards of service, practices, and funding to manage and oversee shore installation support to the Fleet. CNIC executes delivery of installation services through its regions and installations. Their mission also involves the coordination of policy, planning, budgeting, and reporting for all regions and shore installations.

CNIC's role in the ER Program is in coordinating the ER Program with each installation's mission and community concerns. CNIC roles at specific installations include the following:

- Acting as installation/base CO's ER Program representative;
- Expressing CNIC interest in ER Program actions and remedy selections;
- Coordinating and reconciling Installation Master Plan/Activity mission with ER Program activities;
- Helping to identify activity or community concerns;
- Coordinating with installation CO for required signatures;
- Coordinating installation issues related to remediation work, such as access, scheduling, or recognition of natural and cultural resource issues (breeding seasons, etc.);
- Ensuring that land use controls (LUCs) are monitored and implemented; and
- Coordinating media inquiries with Public Affairs Officers.

Additionally, beginning five years after all ER sites achieve Response Complete (RC) on the installation, CNIC installation personnel shall be responsible for:

- Updating five-year review documents;
- Reporting any remedy failures; and
- Long-Term Management requirements including maintenance of monitoring wells, landfill cap maintenance and inspection, periodic sampling, and all LUC requirements.

2.2.8.1 Area Environmental Coordinator/Regional Environmental Coordinator

The Navy's Area Environmental Coordinators (AECs) are responsible for coordinating environmental issues within their designated U.S. EPA regions. AECs appoint Regional Environmental Coordinators (RECs). The REC is the senior Navy officer in a local region and is responsible for coordinating environmental matters and public affairs. The REC monitors state environmental legislation and regulations for impacts on DON operations. The REC usually does not have direct involvement with RPMs or with the ER Program, but as the officer in charge of Navy installations in a region, there may be times when the REC has interest and interaction with RPMs regarding ER projects. RECs report directly to CNIC.

2.2.8.2 Installation Commanding Officer/Commanding General

The ER Program may affect the mission of an installation, the health and welfare of the people who work and live on or near the installation, and the public's attitude in neighboring communities toward an installation. Commanding Officers/ Commanding Generals (COs/CGs) of installations shall be consulted and kept fully informed about ER Program decisions and actions taken by RPMs that may affect their installations. Their knowledge of the status of the ER Program will assist CO/CGs in making property management decisions for all tenant activities. Navy COs maintain close coordination with the RECs and/or regional commanding officers and CNIC. COs/CGs or their designated representatives are responsible for the following:

- Coordinating with the FAC or FEC concerning all ER or BRAC cleanup matters;
- Expressing command/regional interest in ER remedy selections;
- Representing landholder interests during partnering meetings with regulators, if desired;
- Providing representation on the FFA;
- Aiding in conversion of the Technical Review Committee (TRC) to a RAB, if necessary;
- Coordinating and reconciling Installation Master Plan/Activity mission with ER Program activities;
- Coordinating with NAVFAC on LUC and other compliance issues that arise from intrusive activities on ER sites;
- Ensuring that LUCs are maintained once an individual site is completed;
- Checking for conflicts with ER sites during review for base projects (including any National Environmental Policy Act [NEPA] documentation);
- Ensuring (as the permit holder) that a procedure exists for signature of hazardous and non-hazardous waste shipping documents generated as a result of the ER site investigation and remedial actions;
- Reviewing construction activities to verify no impacts to ER sites;
- Reviewing construction activities at/in ER sites. Request the following, if necessary, from the NAVFAC RPM:
    a. CERCLA guidance on how to proceed
    b. Analytical data for OSHA/Industrial Hygiene concerns pertaining to soil, sediment, surface water, indoor air, and groundwater;
    c. Guidance and approval from U.S. EPA and state environmental regulators.
- Ensuring that installation operations and maintenance funding is not used for projects requiring the use of ER,N funds;
- Notifying the servicing FEC, REC, and the chain of command of any U.S. EPA or state notification of potentially responsible party (PRP) action;
- Signing Records of Decision/Decision Documents (RODs/DDs) for ER Program sites on the installation;
- Identifying funding needs and report to the respective chain of command;
- Preparing a Community Relations Plan (CRP) for the installation;
- Informing and coordinating all public participation actions with the RECs;

- Informing the public of the availability of U.S. EPA Technical Assistance Grants (TAGs), if the site is listed on the NPL;
- Informing the public of the availability of technical assistance from DoD's Technical Assistance for Public Participation (TAPP); and
- Providing documentation concerning underground storage tank (UST) sites (e.g., tank abandoned date, tank installation date, and date when tank was discovered to be leaking) to determine eligibility for ER,N funding.

2.2.9 Naval Facilities Engineering Command (NAVFAC)

NAVFAC is the Navy's real estate and construction agent. It is responsible for the acquisition, construction, operation and maintenance, and when no longer needed, disposal of the Navy's shore infrastructure. NAVFAC HQ, located in Washington, DC, through NAVFAC field commands and specialty centers, manages and executes the DON's ER Program; provides expertise in environmental engineering, technical, contracting, and legal support; and coordinates all DON ER actions. NAVFAC field commands also provide project management and contracting support for the BRAC ER Program. NAVFAC RPMs are forward deployed in support to the BRAC PMO for DON BRAC ER projects.

NAVFAC HQ responsibilities include:

- Execution of the ER Program;
- Providing NAVFAC-wide ER policy and guidance;
- Acting as the Budget Submitting Office for the ER,N Program;
- Providing program and technical support;
- Developing and supporting ER,N resource requests, and managing funds allocated for program execution; and
- Providing ER-related training to FEC in coordination with the Civil Engineer Corps Officers School (CECOS).

The NAVFAC Web site provides further information about the NAVFAC organization.

2.2.9.1 NAVFAC Commands (FACs)/Facilities Engineering Commands (FECs)

NAVFAC aligned itself to provide easy access and support to the Fleets, CNIC, and Regional Commanders by establishing strategically located field commands. There are two primary NAVFAC Commands, NAVFAC Atlantic and NAVFAC Pacific, also known as FACs, which are located very close to the Atlantic and Pacific Fleet Headquarters. These FACs interface with the Atlantic and Pacific Fleets as well as the Combined Fleet Forces Command (CFFC). They provide forward deployed engineering support to CNIC and the Fleets. NAVFAC Facilities Engineering Commands (FECs) are regional subordinate commands under NAVFAC Atlantic and NAVFAC Pacific that provide environmental engineering, technical, legal, and contracting assistance to installations within their respective geographic areas of responsibility. FECs also provide Regional Engineer support to Regional Commanders and RECs. FECs report to NAVFAC Atlantic or NAVFAC Pacific, as follows:

NAVFAC Atlantic (Norfolk, Virginia)

- NAVFAC Mid-Atlantic (Norfolk, Virginia)
- NAVFAC Southeast (Jacksonville, Florida)

- NAVFAC Southwest (San Diego, California)
- NAVFAC Northwest (Poulsbo, Washington)
- NAVFAC Washington (Washington, DC)
- NAVFAC Midwest (Great Lakes, Illinois)
- NAVFAC Europe (Naples, Italy).

NAVFAC Pacific (Pearl Harbor, Hawaii)

- NAVFAC Hawaii (Pearl Harbor, Hawaii)
- NAVFAC Marianas (Guam, M.I.)
- NAVFAC Far East (Yokosuka, Japan).

Each FEC within the U.S. and Territories is responsible for the ER Program within its geographical area, as shown in Figure 2-3.

Each FAC or FEC has an ER Manager who has ultimate responsibility for the successful coordination and execution of the ER Program and key responsibilities within the geographical area of their respective FAC or FEC. The ER Manager's mission is to implement the objectives, policies and functions of their respective FAC or FEC, NAVFAC HQ, and DON and DoD policies, guidance and directives. One of the ER Manager's most important responsibilities is to identify and secure resources, including funding, staffing and equipment, required for the successful execution of the ER Program within their respective FAC or FEC. (Section 18.3.1 describes the functions of the NAVFAC ER Managers Group, which provides direction on how to implement the ER Program.) Key ER responsibilities of NAVFAC Atlantic and NAVFAC Pacific (through FECs and the BRAC PMO) include the following:

- Executing the ER Program at DON installations;
- Providing NAVFAC with cost-to-complete (CTC) estimates for future cleanup requirements;
- Managing and administering contracts supporting the ER Program;
- Employing RPMs to manage remedial or other response actions in the ER Program;
- Enhancing RPM professional development through various training options (see Chapter 17, "Training");
- Developing and performing site-specific projects in coordination with installations to assess and control contamination; preparing project plans, reports, and contract documents; coordinating reviews and comments on project documents; and distributing final documents to the appropriate installation;
- Providing technical and financial oversight and oversight during project performance;
- Maintaining AR Files;
- Developing and revising installation-specific CRPs for the CO/CG;
- Negotiating FFAs on behalf of and in close coordination with installations as necessary;
- Preparing No Further Action (NFA) documentation and Remedial Action Completion Reports (RACRs);

NAVFAC Areas of Responsibility for the ER Program

U.S. and Territories

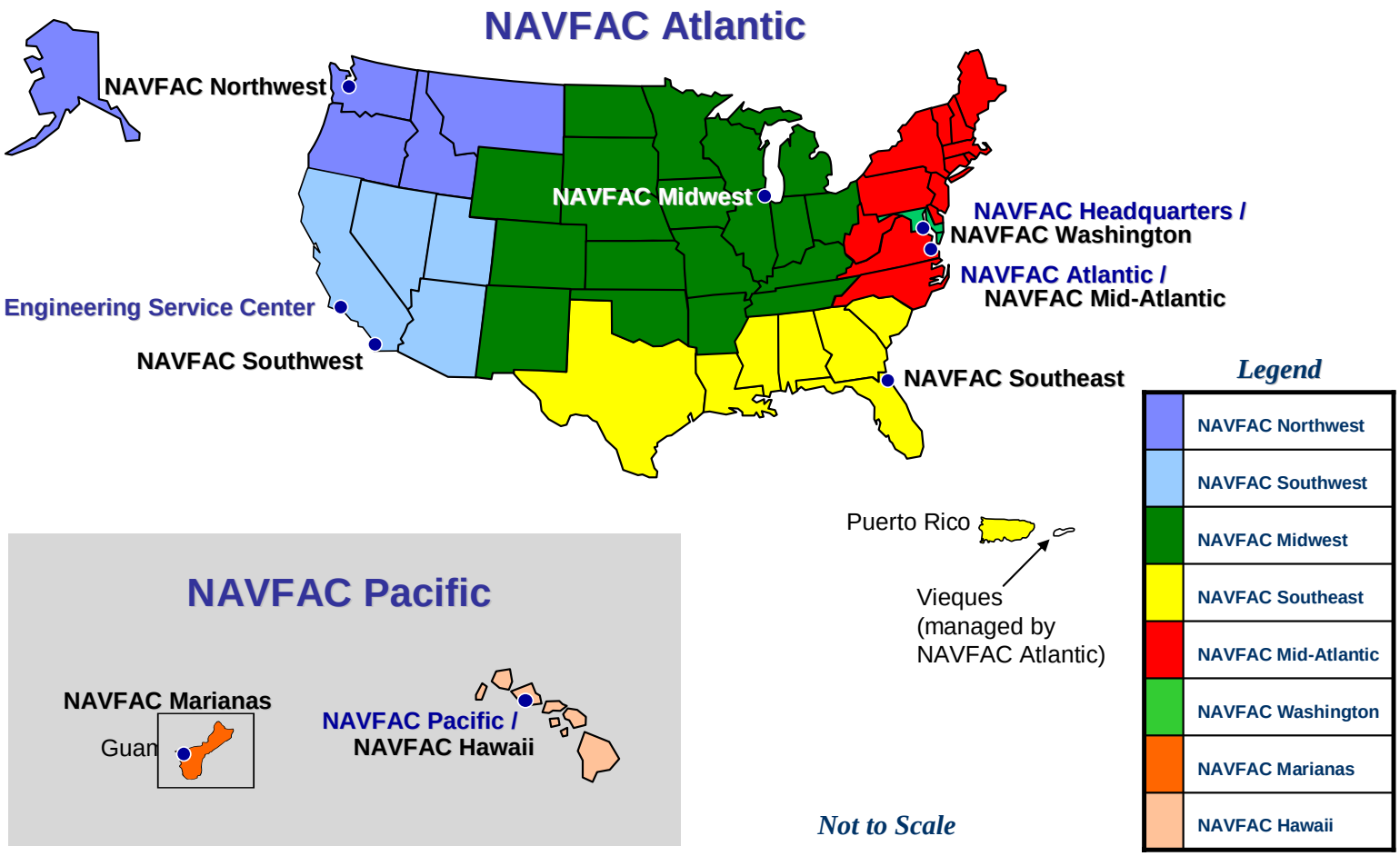


Figure 2-3. FAC and FEC Areas of Responsibility for the ER Program

- Preparing, coordinating, and forwarding RODs to the installation CO/CG for signature;
- Participating in remediation planning meetings with other PRPs, and serving as the DON representative for PRP negotiations with U.S. EPA;
- Providing semi-annual updates to the Navy's ER budgeting database (NORM);
- Coordinating with the installation and regulatory agencies prior to initiating projects and during all phases of the ER project;
- Providing ER study results to planning and real estate personnel, and providing support to acquisition project managers to ensure that hazardous waste site conditions are taken into account by other Navy programs and projects before land use decisions are made;
- Tracking project progress to meet schedule requirements;
- Coordinating with the installation or region to obtain any necessary signatures from the Installation CO/CG or Regional Commander; and
- Briefing the Installation CO/CG on a regular basis on program status.

2.2.9.1.1 Remedial Project Manager

RPMs are employed by the FECs and are responsible for the management of the ER Program at the installation and/or site level. The RPM coordinates the work of Navy technical support agencies and contractors to accomplish ER Program goals and policies. The RPM is the single individual involved in all aspects of the project including interagency relationships, funding, scheduling, design, and remedial action. The RPM's core responsibility is to identify the resources needed to effectively implement the environmental restoration process including CERCLA response actions and ER,N-eligible RCRA USTs and Corrective Actions. RPMs also should coordinate all actions that are driven by regulations outside of CERCLA with the appropriate Commander Navy Region or Marine Corps environmental media managers. RPM responsibilities also include the following:

- Coordinating, directing, and reviewing ER Program site work;
- Coordinating, scheduling and running FFA meetings;
- Maintaining a close relationship with the installation to facilitate communication and recognize the installation's responsibilities for installation property, personnel, and mission;
- Ensuring compliance with the NCP;
- Ensure ER Program studies are forwarded to U.S. EPA and state regulatory agencies during the review process and upon study completion;
- Establishing requirements and generating CTC estimates to be used for budgeting future ER projects;
- Maintaining relationships with representatives of regulatory agencies and natural resource stakeholders/trustees to facilitate communications concerning their environmental and public health interests;
- Managing the ER Program work effort to comply with milestones and commitments in the ROD and FFA;
- Assisting NAVFAC Contracting Officers in the administration of work performed by environmental contractors;

- Ensuring that response action scope and the level of resources allocated to a project is appropriate to the type and severity of environmental and/or public health threats being remedied;
- Coordinating with the installation to ensure that all long-term monitoring is accomplished;
- Developing and signing Joint Execution Plans (JEPs) with states for DSMOA and Navy Cost Reimbursement, and approving state oversight costs;
- Initiating Installation and Site addition requests; and
- Supporting the Installation CO/CG as Navy RAB co-chair. This can be the IR RPM or a forward-deployed NAVFAC employee at the installation.

The following RPM responsibilities are specific to implementing response actions:

- Identifying and providing project funding;
- Developing Statements of Work (SOWs) and Independent Government Estimates;
- Reviewing and recommending acceptance or rejection of technical and cost proposals submitted by contractors;
- Assisting contract specialists with pre-negotiation objectives as required;
- Assisting in contract negotiations;
- Coordinating with Contracting Officer's Representative (COR) for Post-Contract Award Services as required;
- Coordinating project between FEC and Contracting Officer (KO) as required;
- Coordinating technical oversight;
- Coordinating project information with activity and regulatory agencies;
- Coordinating public news releases as required;
- Reviewing project work plans such as the Site Health and Safety Plan (SHSP) and the Quality Assurance Project Plan (QAPP) and participating in the development of Data Quality Objectives (DQOs) as required;
- Reviewing proposals for technical compliance;
- Attending pre-construction meetings;
- Maintaining files of all contractor submittals related to and supporting response action conclusions;
- Ensuring contractor permit submission and approval for all off-site CERCLA generated actions such as for hazardous and solid waste disposal, wastewater transport and disposal, etc., or assisting the Navy Technical Representative (NTR) as appropriate;
- Reviewing daily field logs documenting site activities weekly/biweekly;
- Assisting with performance evaluations, award fee evaluations, and completion statements as required;
- Evaluating contractor invoices and management information system reports with the NTR;
- Addressing performance of work issues and providing technical support to the NTR and COR;
- Ensuring compliance with Navy regulations and guidance, and environmental laws and regulations;

- Preparing contract/task order modification packages with input from NTR (alternatively, the NTR may prepare the modification);
- Submitting modification packages to COR for review;
- Informing COR of changes in scope, cost, or schedule;
- Reviewing documents (construction and other) that may impact ER sites;
- Coordinating all environmental construction activities with the cognizant NAVFAC construction field office. In accordance with NAVFAC Instruction 7820.1J, RPMs shall transfer funding in the amount of 3% of the contract value (construction only) to the construction field office to cover the costs associated with supervision, inspection, and overhead (SIOH) of all ER,N-funded projects and 8% for reimbursable projects; and
- Participating in final inspection to ensure that the contractor has met all requirements of the contract (alternatively, the NTR may perform this responsibility).

Additional RPM duties at BRAC installations involve being a member of the BCT. The RPM's involvement with ongoing and planned restoration program activities is important to the BCT, and the RPM needs to keep the BCT informed of such program activities. Knowing the scope of planned and ongoing program activities and the contracts driving them will facilitate the project team's understanding of the mechanisms and resources available to implement environmental restoration at the installation. Although the BRAC ER Program is managed by the BRAC PMO, NAVFAC continues to execute the program and forward deploy RPMs to manage these projects.

2.2.9.1.2 Contracting Officer (KO)

The Contracting Officer is an individual appointed by warrant and given the authority to execute contractual documents that obligate the government within the authority of their warrant. This person has the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term may include certain authorized representatives of the KO acting within the limits of their authority as delegated by the KO. This also may be titled "Procuring Contracting Officer" (PCO). The KO appoints the COR and the NTR. Often, the KO will designate individuals with authority to issue individual task orders, usually FEC contract specialists with warrants. Contract specialists at a FEC will assist the KO in preparing and administering contracts.

Key KO responsibilities are as follows:

- Appointing a COR;
- Appointing the ordering officers;
- Issuing requests for proposals (RFPs) and receiving proposals;
- Preparing Pre/Post-Negotiation Memoranda and leading negotiations;
- Awarding the contract or task order;
- Delegating Administrative Contracting Officer (ACO) duties, if desired;
- Serving as Award Fee Board Member;
- Performing a periodic review of COR and COR files; and
- Issuing NTR appointment letters.

The ACO is a contracting officer designated in writing by the KO, who administers contracts. The ACO function may reside with a contract specialist with a warrant. The KO determines exactly which duties to assign to the ACO on a case-by-case basis.

2.2.9.1.3 Contracting Officer's Representative (COR)

The COR is an individual designated and authorized in writing by the KO to assist in the technical, monitoring, or administration of a contract. Only one COR shall be appointed for each contract. COR duties are re-delegable only to an appointed alternate COR who may assume the duties only in the COR's absence. The COR may provide technical direction or clarification directly to the contractor when delegated and authorized in writing from the KO. The COR coordinates all government technical interfaces with the contractor, monitors compliance with contract and safety requirements, and inspects and accepts the services performed. In the past, the COR also has been referred to as "Contracting Officer's Technical Representative" (COTR).

2.2.9.1.4 Resident Officer In Charge of Construction (ROICC)

The ROICC is a Civil Engineer Corps (CEC) officer who is responsible for the administration of assigned contracts at FEC contracts office. The ROICC may provide oversight of construction and safety for remedial actions and some treatability studies and may work with the RPM to ensure that the work is accomplished according to plans and specifications and in a manner that protects human health, welfare, and the environment. Because the selected remedial actions are decisions agreed upon among DON authorities and regulatory agencies, the ROICC cannot make field changes without consultation with the RPM, the COR, and the Contract Specialist.

The ROICC should monitor the contractor's Health and Safety Plan (HASP) and other procedures for compliance with the OSHA regulations 29 CFR Section 1910; 42 USC Sections 651-678 [2001]).

2.2.9.1.5 Navy Technical Representative (NTR)

The NTR shall be a DoD military member or DoD civilian employee and shall be designated in writing by the KO. The NTR is responsible to the KO, via the COR, for those actions specifically identified by the KO in the NTR letter of appointment. The NTR does not have the authority to provide any technical direction or clarification to the contractor. The NTR functions as a technical representative to assist the COR in the administration of a Contract Task Order. Specifically, the NTR provides technical input and helps the COR as necessary to specify tasks within the statement of work, and helps monitor and coordinate the performance of work by contractors under a task order.

Each FAC or FEC may have its own procedures for assigning NTRs (for example, a NTR may be a ROICC or Engineering Technician assigned from the ROICC office); however, in many cases, RPMs are appointed as NTRs.

For a more detailed listing of duties associated with KO, COR, and NTR functions, consult the *Clarification of Duties and Responsibilities of Post Award Contract Personnel Involved in Environmental Contracts* (NAVFACNOTE 4330, June 2005) and the *Environmental Cost Reimbursement Contract Manual* (NAVFAC P-1160, Apr. 2003)

Note: Training requirements for RPMs, CORs, NTRs and other acquisition workforce roles related to the ER Program are discussed in Chapter 17.

2.2.9.1.6 Contractor Support for the ER Program

Support contracts play a critical role in the execution of the ER Program. Contractor personnel assigned to each ER project or site quickly become key members of the DON team and provide much of the technical support, data analysis, and reporting required during site characterization, investigation, remediation, and long-term management. RPMs typically rely very heavily on the support provided by their contractor team, which allows the RPM to focus on the overall management of the project and ensure it is executed on schedule and within budget.

Historically, the DON contracting effort with regard to the ER Program has been two-pronged, with the Comprehensive Long-Term Environmental Action, Navy (CLEAN) contracts providing professional services during the study and design phases of the ER Program, and the remedial action contract (RAC) providing the actual remediation, operation, and maintenance. These are high dollar value cost-plus-award-fee (CPAF) contracts that, in the past, were typically awarded to large business contractors.

In 2001, NAVFAC initiated a shift in its Environmental Business Line Acquisition Strategy to increase its acquisition options and flexibility and minimize exposure to contractual risks. The Acquisition Strategy now focuses on the development of a more balanced and diversified contracting approach to meet command-wide program requirements. The goal of the Acquisition Strategy is to continually match the type of work to be performed with the most cost-effective and efficient type of contractual vehicles to accomplish the mission. This strategy strives to make the best contractual solutions available to meet the full range of our corporate and client needs. The strategy provides for greater incorporation of small business participation, fixed-price mechanisms, and use of performance-based contracting. In addition to CLEAN and RAC contracts, NAVFAC has increased the use of additional mechanisms, such as Environmental Multiple Award Contracts (EMACs) where task orders are competed among a pre-selected group of contractors under a fixed-price contract vehicle. The strategy also incorporates the use of several other small and large business Indefinite Delivery/Indefinite Quantity (IDIQ) contracts. The NAVFAC Environmental Business Line Acquisition Strategy is updated annually and is available to DON personnel from NAVFAC HQ.

NAVFAC may also utilize contractors for internal administrative and engineering support for the ER Program. This type of contract support is known as Cooperative Administrative Support Unit (CASU). CASU employees can fill a variety of roles in the ER Program. At the project level, CASU personnel can serve as environmental engineers and environmental scientists providing technical and management assistance. Additional information about the types of services that can be provided by CASU employees is available on the CASU Web site: http://www.casu.gov/services/services.html.

CASU employees sign Non-Disclosure Agreements (NDAs) that prohibit discussion of sensitive Navy issues (contractor rates, government estimates, legal documents, etc.) and their job functions differ from those of government employees in several key ways. CASU personnel cannot authorize, sign, or issue official correspondence, and although they can provide technical support to develop task orders and internal government estimates, they cannot negotiate funding of Navy task orders. Also, when CASU personnel support the Navy in negotiations with regulatory agencies, PRP negotiations, or other legal situations; they can only do so with Navy approval and in the presence of Navy personnel. CASU contractors are prohibited from competing for project contracts issued by the government agency (e.g., CLEAN, RAC, EMAC, etc.) because CASU employees may have access to sensitive Navy contracting materials (though competitive information is protected under the NDA), and CASU technical support personnel would have a conflict of interest executing a project involving their company.

2.2.9.2 NAVFAC Office of Counsel

The NAVFAC Office of Counsel provides environmental law attorneys who serve as legal advisors to NAVFAC program managers responsible for the many environmental programs, including the ER Program, under NAVFAC's responsibility. These attorneys are located at NAVFAC HQ, NAVFAC Atlantic and NAVFAC Pacific, and the FECs. NAVFAC attorneys, working with their engineering and technical counterparts and in close coordination with the installation, negotiate all FFAs and FFSRAs on behalf of DON. NAVFAC Counsel also should provide legal review of Proposed Plans and RODs/DDs at the request of the RPM.

2.2.9.3 Naval Facilities Engineering Service Center (NFESC)

The Naval Facilities Engineering Service Center (NFESC), located at Naval Base Ventura County, Port Hueneme, California, provides ER Program support through the evaluation and development of innovative remediation approaches and cleanup technologies. Some of the key NFESC roles and responsibilities include:

- Providing innovative remedial technologies support through individual consultations, NAVFAC Environmental Restoration and BRAC (ERB) Web site (https://portal.navfac.navy.mil/go/erb), technology transfer Web-based training tools, and Remediation Innovative Technology Seminars (RITS);
- Providing technical input to the ER Program through participation in Strategic Environmental Research and Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP) reviews;
- Providing innovative contract vehicles such as the Broad Agency Announcement (BAA), a flexible contracting approach to identify a wide range of innovative technologies and methodologies from a variety of vendors;
- Performing technical studies, providing specialized field teams (including technology transfer, remedial optimization and ecological risk assessment teams), and providing field support guidance (i.e., manuals, guides, and standard procedures) to assist RPMs in complying with ER Program requirements (including written program quality assurance strategies);
- Providing Ecological Risk Assessment (ERA) support to RPMs through the ERA Technical Assistance Team (ERTAT) consisting of members from NFESC, U.S. EPA, and Space and Naval Warfare Systems Command (SPAWAR) System Center, San Diego; and
- Providing quality assurance/quality control (QA/QC) reviews of environmental laboratories involved in the ER Program.

Further information about NFESC is available at the NFESC Web site: (https://portal.navfac.navy.mil/portal/page?_pageid=181,3463614,181_3463627:181_3463634&_dad=portal&_schema=PORTAL).

2.2.10 Other Support Offices

DON specialty offices provide various areas of technical support or oversight to the ER Program. The following are a few of the offices or commands associated with the ER Program:

Naval Ordnance Safety and Security Activity (NOSSA)

- Provides general supervision of explosives safety throughout the Navy, and technical oversight, review, and verification of the explosives safety aspects of Munitions Response Program (MRP)

response actions. *Explosives Safety Review, Oversight, and Verification of Response Actions Involving Military Munitions* (OPNAVINST 8020.15, 14 Oct. 2003) describes these responsibilities in further detail.

- Reviews, approves, and forwards to Department of Defense Explosives Safety Board (DDESB) all Explosive Safety Submissions (ESSs) and After Action Reports (AARs). NOSSA also reviews and approves requests to waive the requirement to submit an ESS. AARs are submitted to NOSSA once all munitions response actions have taken place at a munitions response site (MRS).
- Maintains a repository of munitions emergency response and response action notifications, ESSs and associated AARs, and other MRP project-related documents, as appropriate. The NOSSA repository is not a substitute for other required documentation repositories (e.g., the Administrative Record) maintained by cognizant commands and/or activities.

Marine Corps Systems Command (MARCORSYSCOM)

- Serves as the Commandant of the Marine Corps' principal agent for acquisition and sustainment of systems and equipment used by the Operating Forces to accomplish their warfighting mission;
- Acts as program manager for ammunition;
- Manages the MRP for the Marine Corps in accordance with MCO 8020.13 and MCO P8020.10-series;
- Reviews all ESSs for Marine Corps installations prior to forwarding to DDESB;
- Maintains archive of MRS-related documents;
- Provides oversight of response actions;
- Reviews and approves AARs; and
- Formally verifies completion of response actions.

Naval Explosive Ordnance Disposal Technology Division (NAVEODTECHDIV)

This division provides technology and logistics management for the Joint Services Explosive Ordnance Disposal (EOD) programs and develops war essential elements of intelligence, equipment, and procedures to counter munitions. It also supports the Navy by providing independent government quality assurance for MRP projects using its Automated Quality Assurance Program System (AQAPS). AQAPS measures contractor performance and contract specification compliance and can aid in the development of project data quality objectives for MRSs. For further information on NAVEODTECHDIV and AQAPS, contact the MRP coordinator at your local FEC.

Navy EOD Units

These units provide support to active Naval installations (or portions of a BRAC facility still in caretaker status) when unexpected MEC are encountered (i.e., an emergency). Navy EOD also responds to MEC found in the oceans and contiguous waters, up to the high water mark of seacoasts, inlets, bays, harbors, and rivers (see OPNAVINST 8027.1G). For off-installation incidents, the U.S. Army's 52nd Ordnance Group (EOD) is the designated responder. Table 2-1 contains contact information for both Army and Navy EOD units. The 52nd Group also should be contacted for EOD support at non-military facilities or facilities that have already been transferred from DoD control.

Table 2-1. Contact Information for Navy EOD Units

Installation Type	EOD Contact	
Active Naval Installations	East of the Mississippi: COMEODGRUTWO Location: NAB Little Creek, VA Phone: 757-462-8452	West of the Mississippi: COMEODGRUONE Location: NAB Coronado, CA Phone: 619-462-8452
Transferred Naval and Non-Military Location	52nd Ordnance Group (EOD) Location: Fort Gillem, GA Phone: 404-469-5953 /5978 /3324	

Bureau of Medicine and Surgery (BUMED)/Navy Environmental Health Center (NEHC)

In accordance with *Navy Environmental and Natural Resources Program Manual* CH-2, Paragraph 1-5.11 and 15-6.3, the Chief, Bureau of Medicine and Surgery (BUMED) is responsible for coordinating with the Agency for Toxic Substances and Disease Registry (ATSDR) concerning ATSDR's legally mandated completion of Public Health Assessments (PHAs) for NPL sites, toxicological profiles on any specific contaminants, health education, health consultations, and other activities provided in the DoD/ATSDR Annual Plan of Work.

In accordance with BUMED Instruction 5450.157, CH-1, BUMED has delegated these responsibilities to the Navy Environmental Health Center (NEHC). NEHC provides technical support in NAVFAC HQ's role as Navy program manager to ATSDR. The organizational context within which NEHC provides support is illustrated in Figure 2-4. NEHC also provides medical consultation for all health-related actions within the ER Programs. NEHC is centrally funded to provide direct and indirect support to Navy RPMs and ER Managers in the following areas:

- Human health risk assessment (HHRA) support;
- Toxicological support on: perchlorate; trichloroethylene (TCE), jet fuel, petroleum-related issues; and emerging contaminants and unregulated chemicals;
- Public Health Assessment Support on sites where ATSDR is involved;
- Health and Safety Support and Intervention;
- Health and Environmental Risk Communication; and
- Risk Assessment, Risk Communication, Vapor Intrusion, and Health and Safety and Toxicology-Related Training.

NEHC Contact Information:

Environmental Programs Directorate
Navy Environmental Health Center
620 John Paul Jones Circle, Suite 1100
Portsmouth, VA 23708
(757) 953-0941

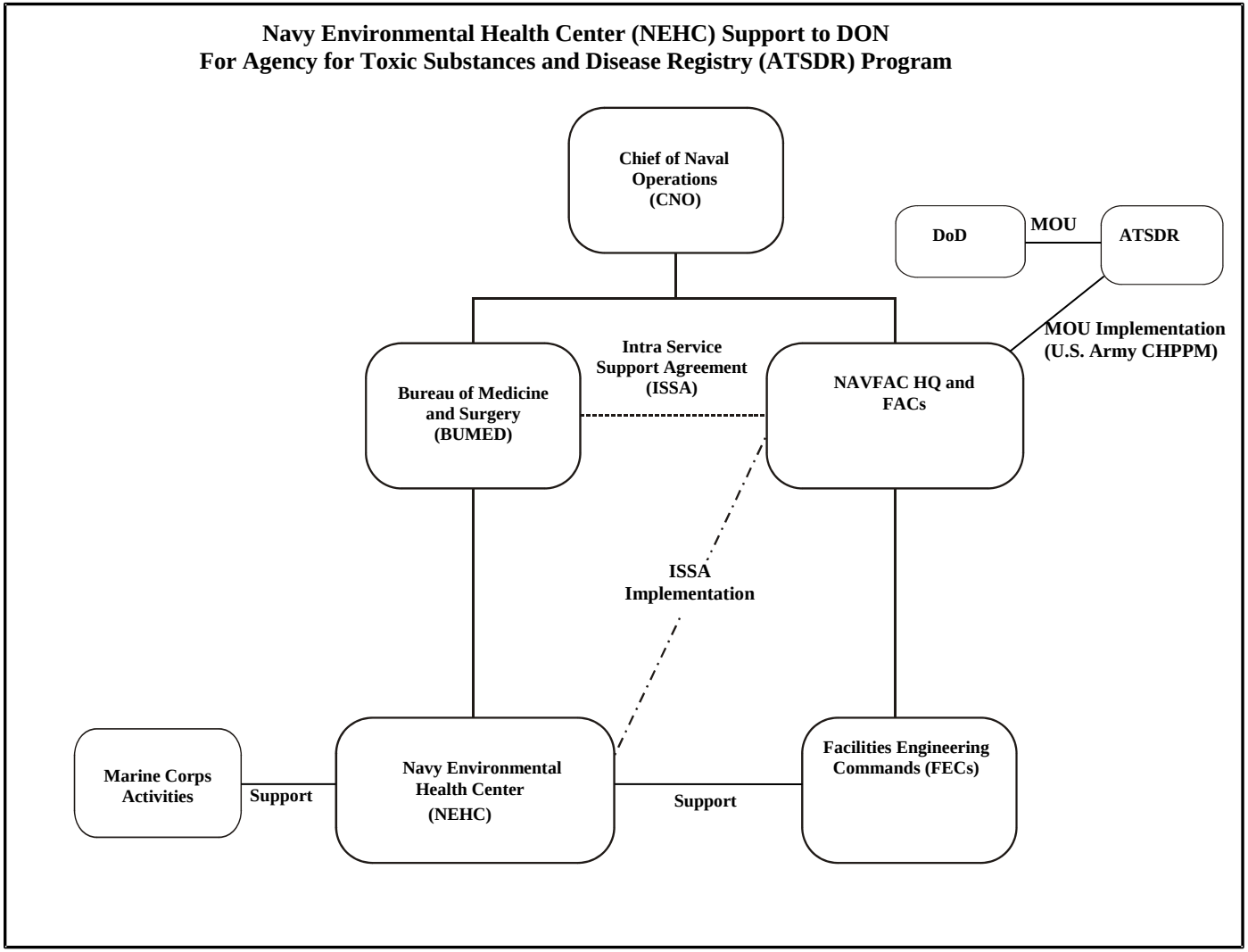


Figure 2-4. NEHC Support to ER Program

Naval Sea Systems Command (NAVSEA)

The Naval Nuclear Propulsion Program (NNPP) in the Office of the Chief of Naval Operations (OPNAV N00N), also known as COMNAVSEASYSCOM Code 08 (NAVSEA 08, Nuclear Propulsion Directorate), is responsible for all matters pertaining to Naval nuclear propulsion, including the control of radioactivity associated with the operation and servicing of Naval nuclear propulsion plants. NNPP regulates this radioactivity in accordance with EO 12344 of 01 Feb. 1982, first set forth in Public Law 98-525 of 19 Oct. 1984 (42 USC 7158 note) and subsequently in Public Law 106-65 of 05 Oct. 1999 (50 USC 2406). Because of this statutory authority, the NNPP is solely responsible for all aspects of environmental remediation related to NNPP radioactive materials. NAVSEA 04N is responsible for the G-RAM (non-NNPP) radiological matters within the remediation processes of the ER Program. NAVSEA 04N has designated Naval Sea Systems Command Detachment, Radiological Affairs Support Office (NAVSEADET RASO) as their technical support center within the remediation process. Services available through NAVSEADET RASO include consultation, assessment of remediation plans, document review, environmental risk communication, and public dialogue support. RASO is located in Yorktown, Virginia and can be contacted at 757-887-4692. Further guidance on radiological issues in the ER Program is provided in Chapter 13 of this manual.

2.3 United States Environmental Protection Agency (U.S. EPA)

U.S. EPA (http://www.epa.gov/) works to develop and enforce regulations that implement environmental laws enacted by Congress. U.S. EPA is responsible for researching and setting national standards for a variety of environmental programs, and delegates to states and tribes the responsibility for issuing permits and for monitoring and enforcing compliance. Where national standards are not met, U.S. EPA can issue sanctions and take other steps to assist the states and tribes in reaching the desired levels of environmental quality.

U.S. EPA provides their own RPMs to oversee environmental cleanups at DoD installations on the NPL. The U.S. EPA RPM's primary responsibilities are to ensure statutory compliance with federal environmental laws governing hazardous waste cleanups, and to provide assistance to DoD in their environmental efforts.

U.S. EPA and DoD seek to operate under the partnering concept. This concept facilitates open communication and information sharing among U.S. EPA, state, and federal facilities. Externally, partnering enhances and expedites the remedial activities required to reach a final cleanup at DoD installations. Internally, it provides an avenue for technology information sharing. This concept both enhances the working environment for the RPMs, and enhances information sharing and relationship building with the communities.

Although DoD is the lead agent at DoD installations, U.S. EPA plays a key role in providing oversight and input to the remedial decision-making process at NPL installations. U.S. EPA is the lead regulator for NPL installations and a BCT member for BRAC installations. U.S. EPA signs FFAs and RODs for NPL installations and concurs on BRAC remedial DDs.

Ultimately, if DoD and U.S. EPA cannot agree on the remedy for a site and dispute resolution fails, U.S. EPA has the right to select the remedy. Therefore, it is important for DoD to work together with U.S. EPA throughout the ER process.

2.4 State Regulatory Agency Role in the ER Program

Federal facilities should coordinate response activities with federal, state, and local authorities in order to implement CERCLA and NCP requirements for NPL and non-NPL sites. CERCLA requires DoD to ensure that U.S. EPA and appropriate state and local authorities have adequate opportunity to participate in the planning and selection of response actions. State regulatory agencies may sign FFAs, RODs, and remedial DDs. The state also provides the lead regulator for non-NPL installations and is a member of the BCT at BRAC installations.

States also have a role in defining ARARs for both NPL and non-NPL sites. CERCLA Section 121(d) requires that, with some exceptions, federal facility remedial actions shall comply with the state ARARs [42 USC Section 9621(d)]. States play a greater role at non-NPL sites. CERCLA specifies that state laws "concerning removal and remedial actions, including state laws regarding enforcement, shall apply to removal and remedial actions at facilities owned or operated by [the federal government] when such facilities are not included on the NPL" [42 USC Section 9620(a)(4)(2001)].

The RCRA Corrective Action Program also requires that installations conduct investigations and cleanup actions as necessary. Staff within state cleanup programs are typically the lead regulators for overseeing Corrective Action when: (1) U.S. EPA has authorized the State Corrective Action Program, or (2) an U.S. EPA Regional Office has entered into a "worksharing agreement" with a state program. U.S. EPA's authorization of the State Corrective Action Program is based on a determination that the state is capable of implementing Corrective Action equivalently to U.S. EPA. States have considerable latitude in making cleanup decisions. Some states have their own specific requirements regarding procedures and cleanup criteria.

It is critical that Navy RPMs understand the statutory requirements as specified in CERCLA and RCRA regarding state regulatory agency involvement in federal facility remedial actions. State regulatory agencies may participate at varying levels including information review, project consultation, and remedial decision-making. It is generally beneficial to have open and honest communications with regulatory agencies regarding federal facility cleanup activities. If there is any doubt about the required level of participation, RPMs are advised to consult Navy environmental counsel.

CHAPTER 3

Partnerships and Legal Agreements

DON's use of a team approach to environmental restoration is reflected in its many partnerships with various stakeholders. These stakeholders may be base residents, local communities, Native American tribes, or other governing bodies. DON's approach to partnering is to involve these stakeholders at the project level early in the process to create a team-like atmosphere towards project execution. Legal agreements are required and/or used to formalize the commitment by DON and various stakeholders, including regulatory agencies, to response action requirements. Various partnerships and legal agreements that have been established to promote partnering are presented in the following sections.

3.1 Partnerships and Stakeholders Participation

To meet the goals of the ER Program, DON fosters partnerships among various stakeholders as well as organizations interested in promoting the use of innovative technologies to enhance the effectiveness and efficiency of environmental cleanups.

Stakeholder involvement could include: participation in Restoration Advisory Boards (RABs); participating in public reviews; commenting on reports, Proposed Plans (PPs), and Decision Documents (DDs); and input into land use planning for parcels being transferred from federal control.

DON has found that the use of RABs is an effective means of promoting stakeholder participation, including interaction with the community. DON uses RABs as the primary mechanism to ensure that individuals within the community not only have access to information relevant to environmental restoration but also have the ability to participate in the decision-making process. Promoting interaction with the community, regulators, and other stakeholders early in the process helps to ensure that remedial actions proposed by DON gain stakeholder acceptance. Further details on RABs are provided in Chapter 15.

3.2 Legal Agreements

Negotiated "legal agreements" include those requirements that have been agreed to by DON and a regulatory authority, and have an established procedure for specifying deadlines for actions to be accomplished. Legal agreements also include unilateral court orders with enforceable deadlines. Legal agreements are a subset of "legal requirements," which are all applicable federal, state, interstate, and local statutory and regulatory requirements, both substantive and procedural, and include those requirements contained in statutory, mandated, or authorized documents such as permits, judicial or consent decrees, compliance orders, or cleanup agreements.

The provisions of negotiated legal agreements are both a factor in setting project execution priorities through risk management and a tool for formalizing DON commitments. DON supports the use of negotiated legal agreements as a way of setting project milestones. However, all legal agreements negotiated shall reflect relative risk and DON ER funding controls (see Chapter 4 for discussion on funding and site prioritization). Enforceable milestones in negotiated legal agreements shall fit within budget and future years' defense plan controls. All new legal agreements negotiated shall include provisions for rolling milestones. Rolling milestones link specific cleanup actions to the availability of funds in a given budget year, and should be displayed in a Site Management Plan (SMP) and not in the body of the agreement.

3.2.1 Federal Facility Agreements (FFAs) and Federal Facility Site Remediation Agreements (FFSRAs)

CERCLA requires U.S. EPA to review the results of the Remedial Investigation/Feasibility Study (RI/FS) for any installation listed on the National Priorities List (NPL). U.S. EPA shall enter a legal agreement with the responsible agency for the expeditious completion of all necessary remedial action at the facility within 180 days after reviewing the final results of the RI/FS.

3.2.1.1 Federal Facility Agreements (FFAs)

The FFA is a negotiated legal agreement governing the CERCLA and RCRA administrative process for cleanup at NPL sites, and allows DON to meet its statutory Interagency Agreement (IAG) requirements. The provisions of these agreements are factors in setting project execution priorities through risk management, and tools for formalizing DON commitments.

FFAs outline the working relationship between the states, U.S. EPA, and DON, and clearly define mutual obligations. The FFA has the following purposes:

- To ensure that DON thoroughly investigates environmental impacts associated with past and present activities at the site and takes appropriate response action as necessary to protect public health, welfare, and the environment;
- To establish a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions at the site in accordance with CERCLA, RCRA, and applicable state laws; and
- To facilitate cooperation, exchange of information, and participation of DON, U.S. EPA, and appropriate state agencies in such actions and outline the working relationship between the parties, especially in terms of review processes and time frames and dispute resolution.

The following procedures shall be observed when negotiating FFAs:

- DON will enter into agreements only if the provisions are realistically attainable and structured to avoid excessive reporting, duplication of effort, and other administrative practices that reduce the efficiency of the overall response action;
- Negotiations on an agreement should in no way impede DON's responsibility to protect the public from harmful exposures. The agreement also should not halt efforts to obtain response action decisions addressing its sites;
- DON will consult fully with U.S. EPA and the states regarding continuing ER efforts while negotiating the terms of the FFA;
- NAVFAC, acting through the FECs, will negotiate the agreements on behalf of and in close coordination with the installation. The language of proposed agreements will be coordinated with the Chief of Naval Operations/Commandant of the Marine Corps (CNO/CMC) and Assistant Secretary of the Navy, Installations and Environment [ASN(I&E)]; and
- The agreements will be signed by the ASN(I&E). Final agreements will be forwarded to ASN(I&E) via the chain of command.

3.2.1.2 Federal Facility State Remediation Agreements (FFSRAs)

For states with mini-Superfund laws, it may be advantageous for DON to negotiate a legal agreement with the state to define the responsibilities of each party to the cleanup of non-NPL installations. The

FFSRA is such a two-party agreement between the DON and the state. The purpose of FFSRAs and procedures for negotiating them are similar to those described above for FFAs. In accordance with the *DON Environmental Policy Memorandum 03-01: Delegation of Authority To Sign State Cleanup Agreements* (14 Oct. 2003), the FFSRAs are signed by the Chief of Naval Operations, Environmental Readiness Division (CNO-N45).

3.2.2 Consideration of New Legal Agreements

Any newly signed legal agreement with U.S. EPA or a state shall:

- Recognize the DoD/DON budget process for funding and prioritize work using risk management, and fit the work within DoD and DON fiscal controls. DON shall maintain control of the pace and timing of all work based on protection of human health and the environment and on fiscal responsibility;
- Recognize the use of Relative Risk Site Evaluations and risk management as important criteria for programming, budgeting, and executing cleanup actions; and
- Include Site Management Plans (SMPs) for setting enforceable and target milestones. The initial draft SMP will be submitted as part of the signature package for the agreement.

In addition, agreements that reflect partnered responsibilities in the preparation and review of deliverables are encouraged. (For example, a work plan could be concurrently prepared and reviewed by the signatories to the legal agreement, rather than being prepared by DON just for delivery to agencies for regulatory review.) A deliverable developed jointly by DON and the regulators can achieve early buy-in by all parties. When those participating in partnering establish deliverable due dates, all parties accept responsibility for timely accomplishment of the noted tasks. All parties have equal responsibilities in the process. Funding and staffing realities should be part of the partnering deliberations when setting dates.

3.2.3 Site Management Plan (SMP)

The SMP is a scheduling tool associated with FFAs and other negotiated legal agreements. The RPM also may develop a SMP for an installation that does not have a negotiated legal agreement. The SMP usually addresses the following topics:

- Introduction (description of the facility, environmental history of the facility, and purpose of the SMP);
- Scope of Work (discussion of work completed and ongoing, planned ER Program activities at each site or operable unit [OU]);
- Site management schedules;
- Removal/interim actions; and
- Estimated cost for each fiscal year until cleanup is completed at the site.

SMPs include rolling milestones, which recognize cleanup-funding controls established by DON. Rolling milestones link specific cleanup actions to the availability of funds in a given budget year. See DON Environmental Policy Memorandum 95-04, *Guidance for Environmental Restoration Program at Active Bases* (26 Oct. 1995). Proposed enforceable milestones may be established for two years beyond the current fiscal year. These should be included only to the extent that they are executable within budget. Target milestones should be established for the life of the project and also must be consistent with adjustments made due to fiscal year controls. For example, a SMP updated by 30 May 2005 would include a

review of the enforceable FY05 milestones and would be adjusted in accordance with any Congressional action. It also would review and establish proposed enforceable milestones for the following two fiscal years (FY06 and FY07). The FY06 proposed enforceable milestones would reflect the DON FY06 budget request submitted to the Congress by the President in January 2005. The FY07 proposed enforceable milestones would reflect the current DON fiscal controls. The FY06 proposed enforceable milestones would become enforceable after the FY06 Congressional appropriation and would be adjusted to reflect any Congressional reductions or program directions.

The process repeats each spring in preparation of the new budget. The 30 May 2006 updated SMP would review the FY06 enforceable milestones and the FY07 proposed enforceable milestones, and would make adjustments to these milestones depending on the outcome of the FY07 budget process and FY06 Congressional appropriation. At the same time, the target milestones for FY08 would be rolled forward and become proposed enforceable milestones.

3.2.4 Defense and State Memorandum of Agreement (DSMOA)

CERCLA Section 211(d) allows SECDEF to enter into agreements with the states, on a reimbursable basis, to support the cleanup effort. DoD developed the Defense and State Memorandum of Agreement (DSMOA) Program to enhance the involvement of states and territories in the cleanup of DoD installations, and to facilitate and clarify the role of states in the ER Program. The primary purpose of a DSMOA is to specify the conditions under which DoD will reimburse a state for costs of providing services in direct support of ER,N-funded or BRAC-funded activities.

A signed DSMOA represents a commitment between DoD and a state to cooperate in expediting the cleanup program for specified installations and establishes the procedural framework for payment. However, a signed DSMOA, although a prerequisite for reimbursement, is not a funding instrument. Prior to a state or territory receiving DSMOA funding, the state shall first enter into a Cooperative Agreement using the Six-Step Process as described in Table 3-1 and Figure 3-1. The Cooperative Agreement includes a specific two-year work plan, developed during Step 2, concerning the restoration activities in the designated state or territory, as well as a plan of projects and activities for the next four years, and a process for payment.

Under Step 6, NAVFAC HQ reviews all final state Cooperative Agreement applications provided to them by the United States Army Corps of Engineers (USACE). This review ensures consistency with the cost estimates and work plan reviews that were concurred with by FECs during Step 4, for state technical services. See NAVFAC's *DSMOA/Cost Reimbursement Implementation Guidance Document* (Ser 9900019/ENC-WS, 26 Mar. 1999) or subsequent updates.

The following are some eligible state services that qualify for reimbursement:

- Technical review, comments, and recommendations on all documents or data submitted to the state for projects using ER,N or BRAC funding, including actions accomplished under the FFA or IAG;
- DSMOA preparation/administration/amendments;
- Identification/review/determination/regulation of applicable or relevant and appropriate requirements (ARARs);
- Site visits to review DoD response actions;
- Site visits to obtain and analyze split samples;

- Support and assistance in conducting public participation requirements;
- Participation in the RAB;
- Preparation and administration of a Corrective Action (CA) to implement the DSMOA;
- Independent quality assurance/quality control (QA/QC); and
- Any additional services that may be set forth in the DSMOA on a state-by-state basis.

Table 3-1. Six-Step DSMOA CA Development and Approval Process

Step 1	**June-July**	State contacts FEC.
Step 2	**June-August**	FEC provides state with activities planned for Years 1-6. Jointly signed forms result describing mutually agreed-to activities.
Step 3	**Sept.-Oct.**	State estimates costs associated with planned activities in Step 2.
Step 4	**Oct.-Nov.**	State provides to component (FEC) draft CA costs. Component coordinates interim review. Backup may be requested from the state.
Step 5	**Dec.-Jan.**	State submits CA to USACE HQ for approval. USACE HQ coordinates with component (NAVFAC HQ).
Step 6	**Feb.-June**	Component (NAVFAC HQ) provides funds for state to USACE HQ. USACE HQ sends "CA Schedule" to state for co-signing to obligate approved Year 1 funds.

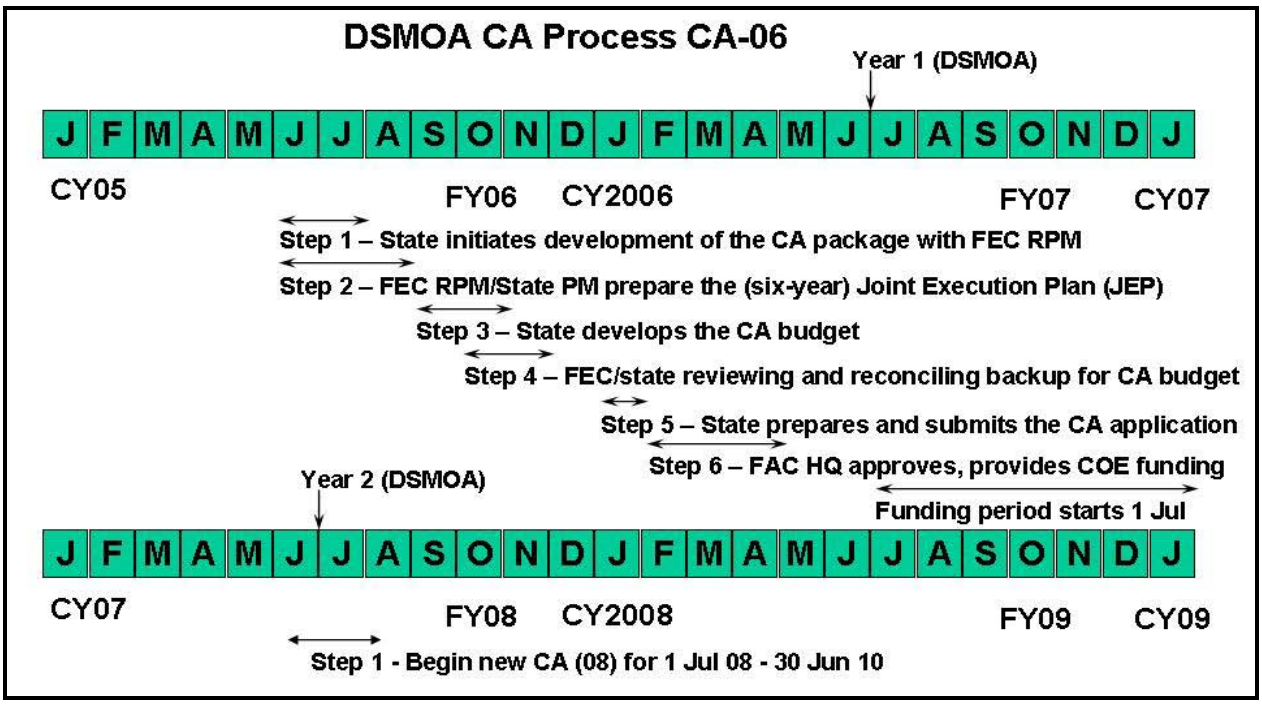


Figure 3-1. DSMOA Six-Step Process Timeline

3.2.5 Navy Cost Reimbursement, Cooperative Agreement (NCR CA) Program

In 1999, DON moved five closing installations in cooperation with California into a Cost Reimbursement Pilot Program. Under this program, the California Department of Toxic Substances Control has lead responsibility for cleanup oversight activities, while other state regulatory agencies (State Water Resources Control Board, Fish and Game and Department of Health Services) participated in providing additional regulatory oversight. Partnership with state agencies allows for state involvement and assistance with DON response activities, as well as the opportunity for direct reimbursement from DON for eligible expenses that are incurred by state agencies.

The pilot program led to the development of the NCR Cooperative Agreement program to replace the DSMOA Program, in California and West Virginia initially, with a process consistent with California's program for providing oversight of the private sector. The NCR CA was signed in September 2003. Table 3-2 outlines the NCR CA process. Under Step 6, NAVFAC HQ reviews all final state NCR CA cost estimate applications for state services provided to them by FECs for consistency with the cost estimates and work plan reviews that were concurred with by FECs during Step 4. NAVFAC HQ also coordinates the processing of CA signatures between DON and states or territories. See NAVFAC's *DSMOA/Cost Reimbursement Implementation Guidance Document* (Ser 9900019/ENC-WS, 26 Mar. 1999) or subsequent updates.

Under the NCR CA program, the RPM or BEC is empowered to hold the state accountable and validate the state oversight hours by person, and concur on payment of their invoice or challenge the state payment if appropriate, yet being reasonable, until resolved. For example, holding up an entire state or territory invoice payment when only a specific section is under question is not reasonable.

It should be noted that this initiative is still undergoing development, and should be attempted only in consultation with counsel and only on a case-by-case basis.

Table 3-2. Six-Step NCR CA Process

Step 1	**Nov**	State contacts FEC.
Step 2	**Jan**	FEC provides state with activities planned for Years 1 through 6. Joint Execution Plan describing mutually agreed to activities is signed by Navy and state Remedial Project Mangers
Step 3	**Mar**	State estimates costs associated with planned activities in Step 2.
Step 4	**Apr**	State provides to FEC estimated cost for oversight. FEC coordinates interim review. State backup documents may be requested.
Step 5	**May**	State submits Cost Estimate to FEC for approval and both develop CA or CA updates for one- or two-year agreements. NAVFAC HQ coordinates with FEC NCR CA funding and CA processing.
Step 6	**Jun**	NAVFAC HQ sends CA to state for cosigning to obligate approved Year 1 funds.

CHAPTER 4

Funding, Eligibility, and Prioritization

This chapter defines how funding is made available to implement response actions within the ER Program, criteria for determining which sites and what specific work elements are eligible for ER,N and BRAC funding, and how eligible sites are prioritized.

4.1 Funding and Budgeting Process

The funding and budgeting process for the ER Program is fairly complex. Through years of experience, DON has developed procedures and tools that have greatly benefited this process. The ER,N and BRAC accounts are the two sources of funding for ER Program execution. The following sections describe the processes for budgeting and funding from these accounts as well as the tools used to help that process.

4.1.1 Environmental Restoration, Navy (ER,N) Funding

In 1998, the National Defense Appropriations Act changed the Defense Environmental Restoration Account (DERA) to a direct appropriation to the individual military services through the establishment of component ER accounts. The Navy's ER account is referred to as ER,N. Congress funds each service's ER Program based on identified needs and their priority.

ER,N funding can only be obligated for response actions under the jurisdiction of the Secretary of Defense (SECDEF). Thus, the implementation of the ER Program must be consistent with Defense Environmental Restoration Program (DERP) requirements, as documented in DoD's *Management Guidance for the DERP* (28 Sep. 2001), typically referred to as the DERP Management Guide. The DERP Management Guide includes information regarding program goals, funding, and eligibility criteria (for component ER, BRAC, and ER-FUDS accounts), as well as numerous other implementation considerations as they apply to all DoD components.

The ER,N account is managed by NAVFAC to execute both the Installation Restoration Program (IRP) and the Munitions Response Program (MRP). Other types of funds are not authorized to be used in place of, or to supplement, ER,N funds. This does not preclude the use of other funding to clean up spills from current operations or conduct activities that are not eligible for the DERP. It also does not preclude the use of military construction funding if a project is impacted at an ER site.

ER,N funds are distributed to the FECs based on program priorities (see Section 4.3). The RPMs at the FECs administer the program for installations under their responsibility. It is the RPM's responsibility to develop a strategic plan to properly close out all environmental restoration sites at the installation in a timely and cost-efficient manner, and to accurately and comprehensively identify all program requirements for each budget submittal in order to obtain required funding. The RPM should work with the installation to gather all necessary information to identify these requirements. This information should include:

- Quantity and location of contamination (sources include Preliminary Assessments, Site Inspections, and Remedial Investigations);
- Identification of highest priority area(s);
- Current or reasonably anticipated future land use;
- Identification of the requirements for cleanup or closeout; and

- Time and resources needed to accomplish the work for all sites or OUs.

To secure the funding required to meet the ER Program objectives, it is critical that accurate budgets be developed for each project which will be used as the basis for developing the ER,N budgets. Sections 4.1.3 and 4.1.4 describe the cost-estimating and budgeting processes, respectively.

4.1.2 Base Realignment and Closure (BRAC) Funding

Separate funding procedures have been established for cleanup requirements at installations being closed or realigned under BRAC. BRAC funding requirements are identified on a line-item basis as part of the budget process, and eligible BRAC projects are specifically budgeted against the BRAC account. All ER Program costs on real property that is to be disposed of as a result of BRAC are charged to the environmental restoration category under the BRAC environmental line of the BRAC account.

The BRAC account is managed by the BRAC PMO, which is responsible for establishing budgets, setting priorities, and negotiating cleanup agreements. The BRAC PMO uses NAVFAC and FEC personnel, including the RPMs, to execute the ER Program and perform environmental engineering functions in support of BRAC environmental cleanup. Thus, for BRAC installations, the RPMs perform similar functions as described in Section 4.1.1.

4.1.3 Cost Estimating for ER Program Budget

Cost estimates for ER projects shall be based on reliable source information, because they are developed to establish funding requirements through the Planning, Programming, and Budgeting System (PPBS). The PPBS is the term for the DoD budget process which includes long-range planning to estimate resource requirements. To facilitate the development of accurate cost estimates in a consistent manner, these estimates are developed using the Navy's programmatic budgeting tool for cost reporting and projecting, the Normalization of Data database, also known as "NORM". The cost-estimating module within NORM is cost-to-complete (CTC). Response actions for every site eligible for ER,N or BRAC environmental funds shall be budgeted for and updated within the NORM-CTC module. Further details about NORM are provided in Section 14.3.1.

NAVFAC HQ and BRAC PMO have established a process of semi-annual updates of CTC estimates through the use of the NORM system. RPMs provide their updates in NORM at the end and middle of each fiscal year. These updates are consolidated, reviewed, and validated at NAVFAC HQ and BRAC PMO, and are used to fulfill all financial reporting requirements. NAVFAC HQ and BRAC PMO provide specific budget submit guidance to the project managers prior to each submittal. During these submits, CTC updates may include requirements such as: escalating costs for annual inflation adjustment, removing current-year execution from the CTC estimate, updating the CTC based on any changed requirements, and ensuring adequate CTC documentation and an audit trail for CTC estimates.

There are several ways to develop a CTC cost estimate for a site using the CTC Module. CTC includes internal parametric cost-estimating tools to help estimators develop budgetary costs, and also provides the flexibility to develop an estimate outside the CTC system and place that estimate back into the CTC Module (for example, Microsoft® Excel spreadsheets).

The parametric cost-estimating models are useful tools for developing budget level estimates. Given the nature of the business, and the uncertainty of the cleanup progression, parametric estimating is an efficient and accredited means for projecting budgetary costs. In the CTC system there are nearly 300 individual cost models, referred to as cost-estimating relationships. To build a CTC estimate using these parametric estimating tools, the estimator chooses the appropriate models that represent the individual

pieces of work that are part of the project. Each model then relates parameters that drive the type of work being performed to a cost.

Developing a CTC estimate is not limited to the parametric tools available in the system. It is NAVFAC policy to use the best available estimate at the time. When little information is available for a project or at a site, it may be appropriate to use parametric models. However, when more information becomes available and better estimates are developed, such as FSs, Engineering Estimates/Cost Assessments (EE/CAs), or other detailed government estimates, it is appropriate to include these estimates in the CTC costs. These estimates can be entered into the CTC module as a user-defined cost. These can range from a single line item cost of a certain project to an entire government cost estimate. This critical function provides the estimator with the flexibility to use other tools to improve an estimate.

The CTC estimates should include only those costs associated with tasks that are eligible for ER,N funding and reflect the current environmental restoration strategy that the RPM intends for the site. Through the site characterization process, more information becomes available at each site and project requirements are continually refined. Through this process, the RPM is able to improve the basis of the site estimate. CTC estimates represent the most reasonable and probable estimate given the level of information available at the time.

CTC estimates include all anticipated costs required to effect the restoration of the site, including the costs of complying with applicable legal and regulatory requirements, and are calculated by totaling the cost estimates for all remaining phases of a cleanup program. CTC estimates:

- Consider the current or reasonably anticipated land use of the site based on technologies that are currently available, and include the cost of completing all remaining studies, removal or remedial actions (including operations and maintenance [O&M] of remedial systems);
- Include costs in the Long-Term Management (LTMgt) phase prior to completion of response action requirements (as a matter of policy, DoD components were directed to use a period of 30 years for estimating and disclosing long-term monitoring [LTM] costs, unless specific information suggests use of a shorter period);
- Are reported as specific amounts (i.e., point estimates);
- Are maintained in a current-year cost basis and reflect the impact of annual inflation escalation/de-escalation; and
- Are not based on the availability of funds, but rather reflect unconstrained actual requirements.

The *NAVFAC Quality Assurance in Cost-to-Complete for the Environmental Cleanup Program* document provides an overview of NAVFAC processes and systems for developing auditable CTC estimates for the ER Program. (This document currently is in draft mode; please consult the NAVFAC ERB Web site [https://portal.navfac.navy.mil/go/erb] or contact NAVFAC HQ for information about how to obtain a copy.)

The NORM system is used for developing CTC estimates for both the ER,N and BRAC programs. However, the budgeting process differs and is discussed for each of the programs in the following two sections.

4.1.4 ER,N Budgeting

DON submits an annual budget to Office of the Secretary of Defense (OSD), which includes funding estimates for the ER Program. The cost estimates generated as discussed in Section 4.1.3 form the basis of the DON budget for the ER Program. The ER Program budget requirements and Program Objective

Memorandum (POM) documents pass through the DON Chain of Command as part of the PPBS, which is used by DoD to analyze the Future Year Defense Plan (FYDP) and to make any adjustments before the next budget is prepared. Within this process, each RPM estimates the funding needs for the FYDP based on actions required to protect human health and the environment, maintain progress on existing remedial efforts, and meet legal obligations, including agreements with states and U.S. EPA.

For the ER,N program, NAVFAC issues budget allocations to the FECs for certain fiscal years, and the FECs build their programs within these allocations. If the FEC is unable to fund a critical project within its control, it can submit an unfunded issue to NAVFAC for review.

NAVFAC then analyzes the consolidated requirements and determines whether to adjust spending plans to stay within FYDP targets, or develop a POM funding issue. Numerous factors are considered, including Congress's position on funding a given program. A POM issue will compete with hundreds of other DoD issues for additional funding and therefore requires detailed and convincing justification. NAVFAC defends its budgets through responses called reclamas and through budget hearings. At the end of the review, new funding levels are established, and in September DON submits a new budget to OSD. OSD then goes through a similar review process and another round of new funding levels are established. DON submits a new budget in January of the following year, and the budget is forwarded from the President to the Congress in February.

Congress holds hearings, makes adjustments, and passes the appropriate Authorization and Appropriation bills before the beginning of the next fiscal year. Otherwise, Congress passes a continuing resolution that allows the government to continue to operate until the time that they pass the appropriate bills. The bills then are sent back to the President for his signature or veto.

The annual federal budget process timeline, including concurrent budget cycles, is illustrated in Figure 4-1. These activities are performed during any given fiscal year, so although the figure shows activities for FY2007, the same activities are performed year after year.

4.1.5 BRAC Budgeting

NAVFAC RPMs are forward deployed to the BRAC PMO for BRAC environmental support. RPMs, together with BRAC PMO environmental personnel, are responsible for developing BRAC environmental budget submission data, which are submitted (along with various other budget submission data) to the BRAC PMO. The BRAC PMO reviews and approves the budget data for final submission. The BRAC PMO directs the release of BRAC environmental funds to the appropriate performing organizations, such as NAVFAC.

4.2 Environmental Restoration Program Eligibility Criteria

The following subsections define criteria to determine which response actions are eligible for ER,N or BRAC funding and the specific work elements which are eligible for funding. Several lists are presented to help clarify eligibility issues; however, these lists are not exhaustive; for specific project considerations, RPMs should consult with their respective ER Managers.

4.2.1 Response Action Eligibility Criteria

For response actions to be eligible for ER,N or BRAC funding, first the facility or site must meet eligibility requirements, and then the contamination that prompts the response action must have been caused by a release that meets eligibility requirements. Ineligible releases on active installations must be funded by the installation.

Budget Year	<==========Activities Performed During FY2007==========>											
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
FY2007 Budget	Start Execution Using FY2007 Funding					Mid-year Adjustment of FY2007 Budget						End Execution Using FY2007 Funding
FY2008 Budget		FY2008 Budget to OMB		FY2008 Budget to Congress		Hearings for FY2008 Budget		Hearings for FY2008 Budget		Summer Adjustment for FY2008 Budget		FY2008 Budget Appropriation
FY2009 Budget		POM FY2009 Requirements Due		POM FY2009 Assessment				Program Review FY2009 Decisions		FY2009 Budget Preparation		FY2009 Budget to DoD
	<====Calendar Year 2006====>			**<==========Calendar Year 2007==========>**								

Figure 4-1. Annual Federal Budget Process Timeline with Concurrent Budge Cycles

For a facility to be eligible for funding, at least one of the following criteria must be met:

- The facility or site is owned by, leased to, or otherwise possessed by the United States and under the jurisdiction of SECDEF;
- The facility or site was formerly owned by, leased by, possessed by, or otherwise under the jurisdiction of SECDEF or the military services, including governmental entities that are the legal predecessors of the services, after 17 Oct. 1986; or, the property accountability rested with DoD but the activities at the property were conducted by contractors (i.e., government-owned/contractor-operated [GOCO] properties);
- Areas where materials released at a facility or site covered under the three previous items have migrated or come to be placed; or
- The site was grandfathered to the program prior to 1998 per Navy guidance, *DON Policy on Availability of ER,N Funding for Response Actions* (CNO, 04 June 2001) (not applicable to the MRP).

For facilities or sites that meet any one of the above criteria, Table 4-1 provides the eligibility criteria for ER,N and BRAC funding under the Installation Restoration or Munitions Response programs based on various factors, such as the nature and date of the release.

The following activities shall not be conducted with ER,N or BRAC funds:

- IRP category activities to address releases or spills that occurred after 17 Oct. 1986, unless that release or spill occurred between 17 Oct. 1986 and 30 Sep. 2000, and the site was identified and included in the NORM database prior to 30 Sep. 2000.
- IRP category activities at solid or hazardous waste treatment, storage, or disposal units located on a DoD installation, where the installation sought (or should have sought) interim status or an operating permit under RCRA.
- MRP category activities at operational ranges.
- MRP category activities at a DMM treatment or disposal unit (permitted Open Burning/Open Detonation [OBOD] facilities) that operate after 30 Sep. 2002.
- MRP category activities to address releases that occur after 30 Sep. 2002, at locations that are not on or associated with operational ranges, active munitions demilitarization units, or active waste military munitions (WMM) treatment or disposal units.
- IRP or MRP category activities to address releases that are a result of an act of war.
- Building Demolition/Debris Removal program category activities to address unsafe buildings or other structures at non-FUDS where the building or structure has been unused since 17 Oct. 1986, and where the requirement to demolish the building and remove the debris is not integral to activities under the Installation Restoration or Military Munitions Response program categories, and DUSD(I&E) has not formally approved the use of ER funds for this activity.
- The payment of environmental fines or other penalties without specific Congressional approval to do so.
- The upgrade or improvement of the condition of buildings, structures, or other infrastructure (e.g., installation of electrical service) at facilities slated for transfer from DoD control.

Table 4-1. ER,N and BRAC Eligibility Criteria

Activity	ER.N		BRAC	
	IRP	MRP	IRP	MRP
IRP category activities at sites where the release occurred prior to October 17, 1986, including: • A release of CERCLA hazardous substances or CERCLA pollutants and constituents, or • A release of petroleum, oil, or lubricants (POL) other than from an UST; or • A release of low-level radioactive materials or low-level radioactive wastes, or • Munitions and explosives of concern (MEC), including unexploded ordnance (UXO) or discarded military munitions (DMM), and munitions constituents (chemical residues of munitions); or • The correction of other environmental damage which creates an imminent and substantial endangerment to public health or welfare or to the environment; or • The demolition and removal of unsafe buildings and structures, including buildings and structures at sites formerly used by or under the jurisdiction of SECDEF.	E	NE	E	NE
IRP category activities at sites where the release occurred between October 17, 1986, and September 30, 2000, and where the site was identified and included in the NORM database prior to September 30, 2000.	E	NE	E	NE
IRP category activities where the release occurred after October 17, 1986, and where the site was not identified and included in the NORM database prior to September 30, 2000.	NE	NE	NE	NE
IRP category activities involving MEC or the chemical residues of munitions activities where: • The release occurred prior to September 30, 2000; and • The site release is not at a FUDS, operational range, active munitions demilitarization facility, or active WMM treatment or disposal unit; and • The site was identified and included in the NORM database prior to September 30, 2000, and was not classified as "response complete."	E	NE	E	NE
IRP category activities where contamination is from an UST that was installed prior to 22 Dec. 1988 if it was either abandoned prior to January 1984 or discovered during initial integrity testing conducted prior to 22 Dec. 1993.	E	NE	E	NE
MRP category activities where: the release occurred prior to September 30, 2002; the release is not at a FUDS, operational range, active munitions demilitarization facility, or active WMM treatment or disposal unit that operated after September 30, 2002, and the site was not identified or included in the NORM database prior to September 30, 2000.	NE	E	NE	E
MRP category activities at operational ranges, active munitions demilitarization facilities, active WMM treatment or disposal units, or at non-range locations where the release occurs after September 30, 2002.	NE	NE	NE	NE

Notes:
1. E – Eligible; NE – Not Eligible
2. MRP eligibility criteria are presented in Navy *Munitions Program Guidance* (30 Jun. 2005).
3. The Building Demolition/Debris Removal category, which provides for the demolition and removal of unsafe buildings or structures, has been conducted by DON in the past but the current and projected DON plan has no funds budgeted for this category. DoD approval is required prior to proceeding in this category. Thus eligibility criteria are not included herein but can be found in the *Management Guidance for the DERP* (28 Sep. 2001).

- Any routine management and maintenance that is not a part of an environmental restoration activity at operating DoD facilities and sites, including range maintenance, clearance, and sustainment activities at operational ranges.
- Activities under the IRP or MRP or Building Demolition/Debris Removal program categories at State National Guard properties not formerly owned by, leased by, possessed by, or otherwise under the jurisdiction of SECDEF or the Components, including governmental entities that are the legal predecessors of DoD or the Components.
- Activities under the IRP or MRP or Building Demolition/Debris Removal program categories at properties outside the United States or outside those districts, territories, commonwealths and possessions over which the United States has jurisdiction.
- Activities under the IRP or MRP or Building Demolition/Debris Removal program categories at Defense Plant Corporation and similar properties for which successor agencies and departments other than Defense are responsible for environmental restoration activities.
- Activities under the IRP or MRP or Building Demolition/Debris Removal program categories at properties for which there are no records showing that the property was formerly owned by, leased by, possessed by, or otherwise under the jurisdiction of SECDEF or the Components, including governmental entities that are the legal predecessors of DoD or the Components or where there is no documentation showing that accountability rested with DoD.
- Activities under the IRP or MRP to address facility operations resulting in an indoor release.
- Activities under the IRP or MRP to address munitions that are covered by water deeper than 120 feet or that is either a designated water disposal site, a maritime wreck or an artificial reef (this does not include sites that contain munitions located in waters between high and low tide, as these are considered terrestrial sites).
- Activities under the IRP or MRP at FUDS.

4.2.2 IRP versus MRP Site Eligibility

Sites meeting the above criteria and that primarily address responses to MEC and MC are recorded as new sites under the MRP and funded under the MRP element within the ER,N account. Any incidental COCs are incorporated as part of the response under the MRP.

For IRP sites with a sizeable MEC component discovered as part of the IRP response, it is necessary to differentiate between the two response actions. The munitions response that addresses MEC and MC will be captured as a new site under the MRP using funding programmed under that data element. The remaining work will continue to be captured under the original site as part of the IRP. If the only work remaining is the MRP component, the IRP site should be closed and coded as Response Complete in the NORM database.

For IRP sites where small quantities of MEC are encountered, they should be incorporated into the overall IRP response. The portion of the response attributable to MEC is considered incidental and does not need to be separately identified under the MRP.

Response actions to address outdoor small arms ranges (less than or equal to .50 caliber) under the IRP can be conducted where:

- The release occurred prior to 30 Sep. 2000; and

- The release is at a site that is not an operational range, an active munitions demilitarization facility, an active DMM treatment or disposal unit, or a FUDS;
- The site was identified and included in the NORM database prior to 30 Sep. 2000, and was not classified as Response Complete.

There may also be some sites being addressed in the ER program that do not appear to meet the criteria above. As a result of changing eligibility criteria in the 1990s, a number of sites were identified by regulatory agencies, included in agreements between DON and the agencies, and had proceeded with response actions. These sites were "grandfathered" into the program in 1998, per direction from CNO via the *DON Policy on Availability of ER,N Funding for Response Actions* (CNO, 4 June 2001). This was a one-time fix to maintain good faith with the agencies regarding these sites. The specific ER Program funding eligibility criteria in this chapter shall be followed for all potential new sites.

4.2.3 Adding New Installations and Sites to the ER,N Program

For all "new" sites identified by new DON studies, regulatory documents, etc., it must be clearly shown and documented that the contamination is attributable to the installation's actions at the site that meet the eligibility requirements outlined in Table 4-1 before those sites will be considered eligible for ER,N funding. The term "installation's action" means a function or operation that occurred at a base or installation.

Determination of Site Eligibility

Before a new site can be added to the ER Program, the RPM, through FEC Management or with FEC Management authorization, shall submit justification data using the appropriate Installation and Site Approval forms (i.e., Installation Approval Form, Site Approval Form, and the Pick List) to NAVFAC HQ for approval. The RPM should obtain the latest forms from NAVFAC HQ at the time the request is to be made. The justification shall include proof that contamination is attributable to installation's actions and that the installation's actions that caused the contamination meet the eligibility requirements in Table 4-1.

Acquisition of Contaminated Properties

When a DON activity acquires land, it shall conduct due diligence as set forth in U.S. EPA's "All Appropriate Inquiry" regulations (40 CFR Section 312). The acquiring activity shall use command or installation operating funds, not ER,N funds, to perform all investigations as part of the due diligence process prior to land purchase or transfer. The results of this process may find contamination (known contamination) and may miss other contamination (unknown contamination). As DON wants to limit its future environmental liability on future property acquisitions, responsibility for both known and unknown contamination, as well as appropriate indemnifications, shall be incorporated in the purchase agreements and deeds. A variety of options address future site contamination based on the source of the property acquisition (i.e., from another military service, from another federal agency, from private sector, etc.). Therefore, NAVFAC HQ shall be consulted during the proposed property acquisition process to ensure that the appropriate steps are taken to reduce future DON liability.

4.2.4 Adding New Sites to the BRAC Program

ER Program costs on real property that is to be disposed of as a result of BRAC are eligible for BRAC funding. These costs are charged to the environmental restoration category under the BRAC environmental line of the BRAC account. All new site additions must be approved by the BRAC PMO.

4.2.5 Eligibility of Specific Work Elements for ER,N or BRAC Funding

During the execution of the ER Program at eligible sites, various work elements are performed, some of which are eligible for ER,N or BRAC funding and some are not. This section is intended to clarify which of those work elements are considered eligible for ER,N or BRAC funding. The lists of eligible and non-eligible work elements are not exhaustive. RPMs should consult with their managers for site-specific considerations.

The following work elements are considered eligible for ER,N or BRAC funding:

- Investigations to identify, confirm, and determine risks to human health and the environment; FSs or EE/CAs; remedial action plans and designs; and removal or remedial actions;
- Expenses associated with cooperative multi-party cleanup plans and activities including litigation expenses;
- Remedial actions to protect or restore (not enhance) natural resources impacted by contamination from past hazardous waste disposal activities, to include short-term losses;
- Cleanup of low-level radioactive waste sites that have been identified as IRP sites;
- Management expenses associated with the ER Program, which are those overhead costs required for adequate program oversight and management, including salary support for installations;
- O&M and optimization costs for remedial and monitoring systems;
- Immediate actions necessary to address health and safety concerns, such as providing alternate drinking water supplies or treatment of contaminated drinking water when the hazard results from an ER Program eligible release from DON property;
- Studies to locate abandoned underground tanks, to determine whether a release has occurred and to clean up the ER Program eligible contamination;
- Response to releases from in-service tanks discovered during initial integrity testing (leak detection monitoring) in accordance with 40 CFR Section 280, where testing was conducted and the failure occurred prior to 22 Dec. 1993;
- CERCLA response actions and eligible RCRA Corrective Actions identified in FFAs or IAGs;
- Support services provided by another federal agency (such as the U.S. Fish and Wildlife Service, U.S. Geological Survey, and Agency for Toxic Substances and Disease Registry) in accordance with 10 USC Section 2701(d) (2004), provided that the FEC has identified why the services of an outside agency are required and prepared an Economy Act Determination and Finding before formalizing inter- or intra-agency acquisitions as required by 31 USC Section 1535. The requester shall identify the servicing agency, contract vehicle, and service desired, attach the executed Determination and Finding to the order, and make appropriate arrangements for payment. The Determination and Finding must be endorsed and approved in accordance with NAVFAC's Memorandum *Procedures for Federal Interagency Acquisition* (18 Sep. 2002);
- Support services provided by state agencies for their involvement or oversight of ER Program projects in accordance with 10 USC Section 2701(d) (2004), through either the Defense and State Memorandum of Agreement (DSMOA) or the Navy Cost Reimbursement Cooperative Agreement (NCR CA) programs;

- Fines and penalties imposed by regulatory agencies assessed under the authority of the Federal Facilities Compliance Act associated with ER Program activities (all fines and stipulated penalties issued against any Navy ER Program actions, must be submitted via the chain of command by ASN to Congress for approval);
- Corrective Actions at ER Program eligible SWMUs required by RCRA, Sections 3004(u) and 3008(h), 42 USC Sections 6924(u) and 6928(h) (2005).
- Any needed investigations of eligible areas of concern for relative risk site evaluations. An area of concern is a discrete area of suspected contamination that has not been entered into the NORM database;
- Five-year reviews and Long-Term Management costs for up to 5 years after the date that the last site achieved Response Complete at the installation;
- Salary and support funding at an installation for certain tasks as specified in the memorandum *FY06 Environmental Restoration Salary/Support Funds* (CNO, 26 Sep. 2005). This memo indicates that many Region/Installation ER functions will transfer to NAVFAC cognizance either under the ER program or as a part of the overall NAVFAC support to the CNI organization; and
- Cost recovery actions from GOCOs and other third party responsible parties.

The following work elements are not considered eligible for ER,N or BRAC funding:

- Expenses associated with the defense and settlement of claims against the United States under the Federal Tort Claims Act, 28 USC Sections 1346(b), 2671-2672 and 2674-2680 (2001);
- Environmental restoration activities in foreign countries;
- State-supported services that:
  - Were provided prior to 17 Oct. 1986,
  - Are past state costs not reasonably documented,
  - Are in support of non-ER Program funded cleanup activities,
  - Were provided where neither a FFA, nor a DSMOA nor any other cooperative agreement relationship exists.
- Costs of testing, storing, disposing of, or replacing PCB transformers;
- Costs of spill prevention and containment measures for currently operating equipment and facilities;
- Cleanup costs of spills associated with current operations;
- Construction of hazardous waste storage, transfer, treatment, or disposal facilities, except when part of an ER Program response action;
- Testing or repair of active underground tanks and costs of replacing leaking underground tanks;
- Costs of operation, maintenance, or repair to hazardous waste treatment, storage, and disposal (TSD) facilities which are currently in use (i.e., regulated or permitted), except when part of a DERP response action;
- Costs of hazardous waste disposal operations, including associated management and operational costs, unless the costs result from implementation of an ER Program eligible response action;

- Actions (contingency response and closure) at regulated TSD units which meet standards under 40 CFR Section 264 (1999) and which have been issued a final operating permit under 40 CFR Section 270 (1999);
- Facility improvements to meet RCRA operating standards at TSD units;
- MEC clearance or scrap removal/disposal from operational test and training ranges;
- Radiological Release Surveys for any construction or repair projects; and
- Any routine operation, management, or maintenance at an operating facility or site that is not part of an environmental restoration activity, including routine military range maintenance and sustainment activities at operational ranges.

The following work elements are not considered eligible for ER,N funding, but may be eligible for BRAC funding. RPMs and BRAC PMO personnel should check with BRAC PMO policy and management before proceeding:

- U.S. EPA oversight costs;
- Efforts to prepare real estate action documents (e.g., Environmental Baseline Survey [EBS], finding of suitability to transfer [FOST], finding of suitability to lease [FOSL]);
- Costs of asbestos and lead-based paint surveys, containment, removal, or disposal;
- Closing or capping sanitary landfills unrelated to a hazardous waste cleanup action;
- Remediation and/or closure of Open Burning/Open Detonation/Static Firing sites which are or were included in a RCRA hazardous waste treatment permit or permit application, or portions of prior permitted sites on which actual treatment operations have been conducted since interim status was obtained;
- Actions at RCRA SWMUs that are Hazardous Waste Management Units (HWMUs), that do not meet other eligibility criteria, unless contamination from the HWMU is commingled with contamination from another ER,N- or BRAC-eligible CERCLA, UST, or RCRA Corrective Action site and occurred from operations which ceased prior to the unit being regulated as a HWMU. Part of the operational requirement to operate a HWMU is to close it (i.e., remove or decontaminate all residues, liners, subsoil, etc., that are contaminated as a result of the operation). These closure actions should be included in the O&M requirements for the unit and should not be funded by ER,N or BRAC; and
- Cleanups within buildings (e.g., PCB-contaminated floor cleanups, etc.).

4.2.6 ER,N Funding Consideration: Planning and Construction at or Near Contaminated Sites

All efforts should be made to ensure that projects are not constructed on contaminated sites. However, there may be times when the project is being planned or is underway and contamination is discovered. In such instances, the following applies:

- If contamination is discovered or suspected at the location of a proposed project before design begins, ER,N funds may be used to investigate the nature and extent of contamination to determine the necessary cleanup or control measures and to fund the environmentally acceptable alternative. This may be accomplished by adding the site to an ongoing ER study or initiating a study if one is not already underway at the installation. The proposed project requirements do not affect the ER Program's existing priority. If the project cannot be

relocated, project funds may be used for limited response action as part of site preparation to meet environmental remediation goals but not to support cleanup for construction;

- If site contamination is discovered between project design authorization and start of construction (usually award of contract), ER,N funds may be used to accomplish the necessary response action. The lowest-cost, environmentally acceptable response is eligible for ER,N funding; i.e., project funds pay for any additional costs required by the project that are above normal environmental cleanup standards. The planned project's response action funding requirements do not take precedent over the existing ER Program's priority;
- If previously undetected contamination is discovered during the course of construction, cleanup of the contamination should be funded using the same appropriation being used for the construction. ER,N funds may be available depending on eligibility and availability for the cleanup of the contamination if construction funds are not available. In this situation, if the site is eligible, the priority for using ER,N funds for cleanup of the contamination during construction will be determined based on the relative risk approach, with the construction project site being compared to other sites needing funding. The schedule of the ongoing construction project will not determine the cleanup effort's priority for ER,N funding but it will be taken into consideration. ER,N funds can be used after the start of construction only to the extent required to satisfy CERCLA. If, as a result of contamination, the project is relocated or terminated, ER,N funds may be used to complete the investigation and cleanup the site at a later date.
- Special attention should be given to anticipated future use and risk assessment scenarios evaluated throughout the environmental restoration process. These scenarios may or may not be based upon assumptions consistent with site-specific planned construction activities and future land use. Several examples are as follows: (1) a determination of no unacceptable human health risk to a construction worker in a HHRA may be based on a duration of six months and actual construction will exceed this duration; (2) exposure may be concentrated in the area of highest concentration and not spread over the entire site; (3) exposure to future building tenants may not have been evaluated; and (4) future land use may include recreational exposure which was not evaluated for an industrial scenario.

In cases where contamination exists at sites within a POL facility where Defense Logistics Agency (DLA)/Defense Energy Support Center (DESC) is programming military construction (MILCON) projects to upgrade the facility, DESC has requested that Navy sign "Agreement/Commitment to Clean" letters. As stated in CNO-N45 memorandum *Remediation Costs Associated with Defense Logistics Agency/Defense Energy Support Center MILCON Projects on Navy Installations* (CNO, 15 Nov. 2005), these letters breakout the costs between Navy and DESC concerning site contamination associated with the MILCON projects. These letters should be prepared and signed out by the Region after coordination with the FECs to ensure proper accounting of Navy costs. Also, the letter should state, "that nothing in this letter shall require the Navy to obligate or expend funds in violation of the anti-Deficiency Act."

4.3 Site Prioritization

The ER Program is a complex program with approximately 5,000 sites. DON is performing response actions at all sites, but it is not able to remediate every site simultaneously. This means that careful consideration and planning are required to prioritize sites so that resources are used efficiently to maximize reduction in risk and to progress toward environmental restoration goals.

For the IR sites, DoD developed the Relative Risk Site Evaluation Model (RRSEM) to reduce risk and complete restoration requirements on a worst-first basis (i.e., IR sites that pose the greatest risk to human health and the environment take precedence). DON uses RRSEM to determine the risk posed by each site

relative to other sites in the inventory so that funding can be allocated to achieve the greatest risk reduction. For MRP sites, DoD has a formal prioritization protocol to address specific issues related to MEC and MC, entitled *Final Rule for Munitions Response Site Prioritization Protocol* (70 FR 192, 05 Oct. 2005). For BRAC sites, prioritization is driven largely by property transfer needs. More detail regarding site prioritization under the ER,N and BRAC programs are presented in the following subsections.

4.3.1 ER,N IRP Site Prioritization

It is the task of the RPM to review data necessary to rank the IR sites, to obtain missing data, and to determine the site priorities. DoD developed the RRSEM to systematically prioritize IR sites based on each site's potential risk relative to all other sites in the IRP. Using the RRSEM, DON ranks sites as high, medium, or low relative risk based on the nature and extent of contamination, the potential for contaminants to migrate, and the populations and ecosystems that could be impacted. The placement of sites into one of the three risk categories (high, medium, or low) is not a substitute for either a baseline HHRA or a baseline ecological risk assessment (BERA), or an ATSDR Public Health Assessment (PHA); nor is it a means of placing sites into a "no further action" category. The RRSEM is used for the purpose of relative risk ranking and prioritization.

The relative risk ranking considers the concentration of the contaminant, whether there is a pathway through which the contaminant can migrate, and whether there are people or ecosystems along that pathway which will be affected. The relative risk ranking is considered along with other program management factors to determine the sequencing of sites for cleanup within funding limits with worst cases first. Other management factors considered are requirements in legal agreements, military readiness, stakeholders' concerns, and availability of innovative technologies and packaging of cleanup actions for cost-effective contracting. The IRPs goals are directly linked to the RRSEM framework and DERP goals, focusing on addressing sites in higher risk categories first.

The RRSEM provides an evaluation of site information at a point in time based on three key factors: the contaminant hazard factor (CHF), the migration pathway factor (MPF), and the receptor factor (RF). Factor ratings are based on a quantitative evaluation of contaminants, a qualitative evaluation of pathways, and human or ecological receptors in the three media most likely to result in significant exposure; groundwater, surface water/sediment, and surface soils. The framework evaluates each media using the three factors (CHF, MPF, and RF) that relate to risk assessment. Each of the three factors is given a rating based on available site information for a given media. The framework combines the CHF, MPF, and RF ratings for each media at a site using a relative risk evaluation matrix to obtain a risk designation of high, medium, or low. The framework identifies the highest media designation as the risk designation for the site. Additional information may be obtained from DoD's *Relative Risk Site Evaluation Primer* (1997). The following definitions provide a general description of the site relative risk categories:

- **High Relative Risk Site:** Sites where contamination is present and conditions indicate a migration pathway is completed either to human or to sensitive ecological species receptors at concentrations presently posing public health or environmental threat, or contamination could easily and rapidly migrate to such a receptor population.
- **Medium Relative Risk Site:** Sites where human, ecological, or sensitive species receptors are present, a migration pathway exists, and evidence indicates that transmission of a contaminant to receptors is not expected to occur at levels of public health or ecological concern within the next 5 to 10 years.

- **Low Relative Risk Site:** Sites where contaminant presence does not currently pose a threat to human, ecological, or sensitive species receptors, and is not likely to pose a threat in the future because of low contaminant hazard, absence of a complete pathway scenario, or absence of human, ecological, or sensitive species receptors.

In the RRSEM, sites also can be designated as Not Evaluated. The Not Evaluated designation is for sites that have not been investigated thoroughly enough to determine a relative-risk ranking.

4.3.2 ER,N MRP Site Prioritization

DoD published the *Final Rule for Munitions Response Site Prioritization Protocol* on 05 Oct. 2005 (70 FR 192). The MRSPP is a methodology that uses available data to prioritize site response actions. It is not a full-scale risk assessment (as is conducted during the RI/FS or EE/CA phases of a CERCLA response) and does not require environmental sampling or geophysical surveys to be effective. The protocol is used for assigning a relative priority to each MRS for response activities related to MEC based on the overall conditions at the site.

The RPM is responsible for implementing the prioritization protocol in order to evaluate the relative risk. The detailed procedures for using the MRS prioritization protocol are provided within the above-cited rule and within 32 CFR Section 179. To follow this protocol, the RPM is required to determine the input factors in cooperation with the appropriate regulatory agencies and other stakeholders.

The protocol uses three risk evaluation modules to evaluate the relative risk. Two of the modules evaluate hazards from explosives and chemical munitions. One or both of these modules can be used, depending on the types of munitions used, suspected or known to be present at the site. DoD evaluates each MRS via the three modules:

- Explosive Hazard Evaluation (EHE) module, which evaluates risk posed by MEC;
- Chemical Warfare Material Hazard Evaluation (CHE) module, which evaluates risk associated with the physiological effects of chemical warfare material; and
- Health Hazard Evaluation (HHE) module, which evaluates risk to human health and the environment from munitions constituents.

Each hazard evaluation is constructed using these three categories, or factors, of information. This characteristic is important as it limits the influence of any one factor on the outcome. Although the specifics of the three factors vary for each of the three hazard evaluation modules, each module is comprised of standard factors, each of which contains several data elements, for source of hazard, pathways for exposure, and receptors.

The results of the evaluation include a hazard evaluation rating for each of the three modules. The ratings range from “A” to “G” with “A” representing the highest risk and “G” the lowest. The MRS priority is based on the module with the highest risk rating. For each of the three modules, the hazard evaluation rating has a corresponding numerical priority, with the lowest number indicating the highest priority. The numerical priorities range from 2 to 8 for the EHE and HHE modules, and from 1 to 7 for the CHE module.

The sequencing of MRSs for environmental restoration activities will be based primarily on the priority assigned using this protocol, but also may reflect other relevant information, such as stakeholder concerns, economic issues, and program management considerations.

4.3.3 BRAC Site Prioritization

Although the RRSEM described in Section 4.3.1 is a consideration in the prioritization of BRAC sites, an important objective at BRAC installations is to support reuse by making property environmentally suitable for transfer in accordance with CERCLA requirements. This means reuse needs and priorities, as well as property transfer and redevelopment plans, are normally the major drivers in sequencing cleanup activities at BRAC installations, along with relative risk.

CHAPTER 5

ER Program Response Actions

This chapter discusses the primary response actions associated with the ER Program and describes the management process that RPMs follow to achieve site closeout, including phases and milestones. In addition, this chapter describes the use of operable units (OUs) to more efficiently manage response actions at one site or across several sites. The activities that typically are performed to implement response actions under CERCLA are broadly categorized in two segments:

- **Removal actions:** Taken to address releases or threatened releases requiring prompt action. (Section 5.2 briefly describes removal actions, and Chapter 7 describes the various types of removal actions in detail.)
- **Remedial actions:** Taken to permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening. (Section 5.2 briefly describes various phases of remedial actions, and Chapters 8 through 11 describe the various types of remedial response activities in detail.)

5.1 Introduction and Types of Response Actions

The CERCLA definition of a response action encompasses removal actions and remedial actions, and includes any action to prevent or minimize the release of hazardous substances so that they do not migrate and cause substantial danger to present or future public health or welfare or the environment [CERCLA Section 101 (24)]. A response action includes any investigation, evaluation, decision-making, or implementation step in support of either a removal action or a remedial action. Implementation steps may include, but are not limited to, removing hazardous materials from a site for treatment or containment, containing the waste safely on-site, treating the waste on-site, identifying and removing the source of contamination, halting further migration of contaminants, monitoring, making provisions for alternate water supplies, and implementing measures to limit public access.

The actual sequence, timing, and scope of response actions are tailored to site conditions and ER,N funding priorities. Some guidelines include the following:

- A site consists of a single unit where hazardous substances have been deposited, stored, disposed of, or placed. A site is the basic unit for planning and implementing response actions;
- Multiple sites grouped according to type, potential for a common remedy, proximity, contamination of a common resource, or funding priority should be evaluated or remedied together as an OU (Section 5.4 provides information regarding OUs); and
- Funding priorities and the sites' relative risk rankings influence how many sites can be addressed together and in what time frame. ER Program funding and prioritization are discussed in Chapter 4.

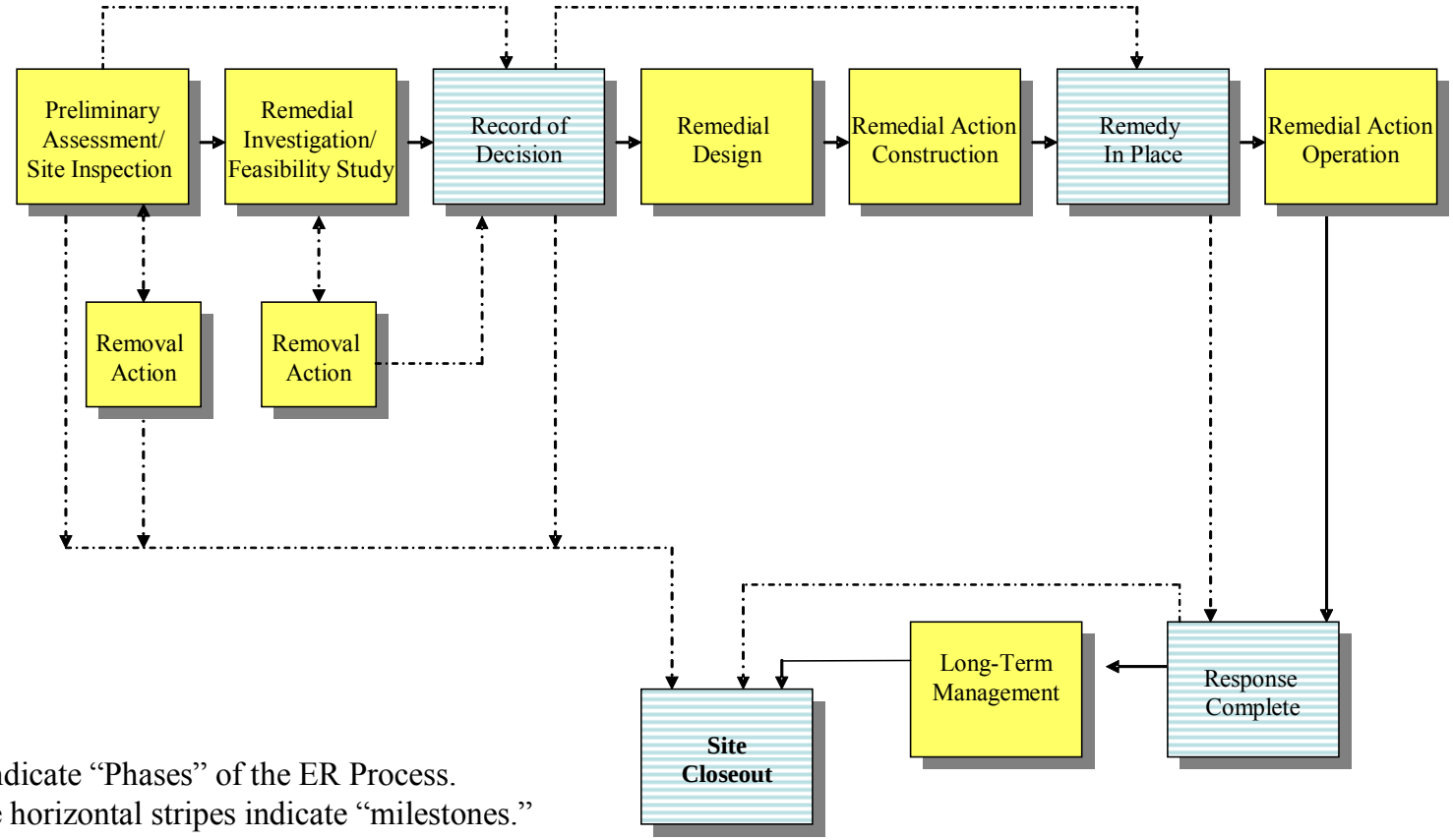
All ER response actions shall, to the greatest extent possible, be carried out in accordance with the provisions of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), codified in 40 CFR Section 300. The NCP addresses the methods for discovering, evaluating, remediating, and determining the criteria for appropriate cleanup, and for assuring that remedial action measures are cost-effective. It is DON policy to follow CERCLA processes for all ER Program sites; therefore, this manual is focused on CERCLA processes and requirements.

However, in cases where environmental restoration is governed by other regulatory programs such as RCRA or underground storage tank (UST), those regulations shall be complied with as applicable. Information regarding those programs is presented in Chapters 1 and 13. Section 1.3 includes a brief discussion of the RCRA program, and Figure 1-1 presents a side-by-side comparison of CERCLA response actions and RCRA corrective actions at federal facilities. Section 13.1 provides a more detailed discussion of the RCRA program, and Section 13.2 presents a discussion of UST programs. Also, Table 13-1 compares CERCLA response actions to RCRA corrective actions at federal facilities in more detail.

5.2 DON Environmental Restoration Process – Phases and Milestones

The DON ER process starts with identification and investigation of contaminated sites, followed by selection, design, and implementation of remedial actions to achieve remediation goals. This process is often referred to as the Site Closeout process, and is designed in accordance with CERCLA requirements. The phases and milestones in this process are shown in Figure 5-1, and are briefly described below:

- **Preliminary Assessment/Site Inspection (PA/SI):** This phase identifies contaminated sites based mostly on the review of the existing information about hazardous waste disposal practices at an installation. Limited field data may be collected to determine the nature of any releases and potential threat to any receptors. Sites that do not pose an unacceptable risk to human health and the environment are designated as "no further action" (NFA) sites. The NFA designation is also referred to as "no further remedial action planned" (NFRAP). Sites for which the PA/SI indicates a potential risk to human health and the environment either move into the RI/FS phase, or involve taking a Removal Action. Chapter 6 of this manual describes the PA/SI phase in detail.
- **Removal Actions:** In situations where prompt action is required to address releases or threatened release, the NCP allows for the implementation of a removal action to be performed in an expedited manner. U.S. EPA categorizes removal actions in three ways: (1) emergency removal actions, (2) time critical removal actions (TCRAs), and (3) non-time critical removal actions (NTCRAs) (*CERCLA/Superfund Orientation Manual*, EPA/542/R-92/005, Oct. 1992). These categories are based on the type of situation, the urgency of the threat of the release, and the subsequent time frame in which the action shall be initiated. A removal action could be either the final remedy or an interim action, followed by a longer-term remedial action as the final remedy. Chapter 7 of this manual describes the various types of removal actions in detail.
- **Remedial Investigation/Feasibility Study (RI/FS):** The remedial investigation includes a sampling and analysis program that is adequate to determine the nature and extent of contamination, and a baseline ecological and human health risk assessment. If it is determined that remedial action is necessary, the FS is conducted which includes initial screening of remediation alternatives, and detailed evaluation of remediation alternatives. The RI or FS also may recommend NFA sites. Chapter 8 of this manual describes the RI/FS phase in detail.
- **Record of Decision (ROD):** Following completion of the RI/FS phase, the preferred alternative is documented in a Proposed Plan for public comments. All required remedial actions for the site or OU are documented in the ROD. The ROD includes a summary of site conditions, selected remedy, remedial action objectives, and the rationale for selecting the remedy. For non-NPL sites, instead of a ROD, a Decision Document (DD) may be prepared with similar scope as a ROD, but with the state as the lead regulatory agency. Chapter 9 of this manual describes the preparation of RODs and DDs in detail.



Notes:
Yellow boxes indicate "Phases" of the ER Process.
Boxes with blue horizontal stripes indicate "milestones."

Figure 5-1. DON Environmental Restoration Process – Phases and Milestones

- **Remedial Design (RD):** This phase involves preparing the detailed design of the remedial action selected in the ROD. Chapter 10 describes the RD in detail.
- **Remedial Action Construction (RA-C):** The designed remedial system is constructed at the site during this phase. This phase also may include any construction related to implementation of LUCs. Chapter 10 describes the RA-C phase in detail.
- **Remedy In Place (RIP):** This milestone is achieved when the construction of a long-term remedy is complete and the remedy is operating as planned to meet project RA Objectives in the future, or a short-term remedy has been successfully implemented and the final documentation is being prepared. Determination of achieving the RIP milestone is a Navy decision and regulatory concurrence for this milestone is not needed.
- **Remedial Action Operation (RA-O):** This phase involves operation, maintenance, and monitoring actions for the remediation system and site. The RA-O phase may also include implementation, and management/maintenance of LUCs, if these were part of the selected remedial action in the ROD or DD. Periodic monitoring reports are routinely prepared during this phase to document performance of remediation systems. Chapter 10 discusses activities conducted during the RA-O phase.
- **Response Complete (RC):** This milestone signifies that the RA Objectives have been met and the RA-O phase, if required, has achieved cleanup goals specified in the ROD or DD. Formal documentation for the RC milestone is essential to ensure recognition of completion of cleanup goals at the site. Details about documenting completion of the remedial action are provided in Chapter 10. Prior to claiming completion of the RC milestone, regulatory concurrence of this documentation is required.
- **Interim Remedial Action:** An interim remedial action is a remedial action undertaken as a component of a larger remedy prior to the selection of the final remedy. The interim remedial action decisions are documented in an Interim ROD and are treated as a partial solution to a complex (e.g., multi-media) contaminant problem or as a remedial action at one site included within a multi-site OU. A summary of these interim actions is included in the final ROD. Because of the interim status, implementing an interim remedial action does not meet the RIP or RC milestones discussed in this section. However, if an interim action becomes the final action through a final ROD, then the remedy can meet the DoD metric for achieving RIP or RC.
- **Long-Term Management (LTMgt):** Following the RC milestone, this phase may be required to monitor long-term protectiveness of the remedy. Actions during this phase may involve groundwater monitoring, implementation and management of land use controls (LUCs), and preparation of five-year review reports. The LTMgt phase also is required when the cleanup goals do not allow unrestricted use. Chapter 11 describes the LTMgt phase in detail.
- **Site Closeout (SC):** This milestone signifies that DON has completed active management and monitoring at a site, the remedy is protective of human health and the environment, contaminant levels at the site allow for unrestricted use and unlimited exposure, and there is no expectation of expending additional ER,N or BRAC funds at the site. The SC milestone can occur at any stage during the response action, depending upon the remediation requirements, including at the completion of the PA/SI, Removal Actions, RI/FS, RA-O, or LTMgt phases. Further information on SC can be found in Chapters 6, 7, 8, 10, and 11 of this document, and in *DON Guidance to Documenting Milestones Throughout the Site Closeout Process* (Mar. 2006).

5.3 NPL Delisting

An installation can be deleted from the NPL if: (1) U.S. EPA believes that no further action is required (i.e., if after remediation, U.S. EPA wants to change the facility's status to NFRAP), (2) the state concurs, and (3) U.S. EPA still believes it is warranted after the public comments. In addition, U.S. EPA now allows portions of a facility to go through the deletion process, with the remainder of the installation staying on the NPL. This allows clean portions to be sold and developed. NPL delisting can be achieved without reaching the SC milestone. This may be the case where the RC milestone has been reached and the LTMgt phase is ongoing to maintain the protectiveness of the remedy. Criteria for NPL delisting are discussed in Chapter 10.

5.4 Operable Units (OUs)

An OU, as defined in the NCP, is a discrete portion of a remedial response that manages migration or eliminates or mitigates a release, threat of a release, or pathway of exposure (40 CFR Section 300.5 [2000]). The cleanup of a site can be divided into a number of OUs, depending on the complexity of the problems associated with the site. The OU is a part of a remedial action that can be implemented separately and may consist of any set of actions performed over time or any actions that are concurrent but located in different sites or parts of a site. An OU can include a single site, multiple sites, or a portion or specific media of multiple sites. Examples of OUs include:

- Contaminated groundwater from multiple sites;
- Areas with similarly contaminated waste materials or media;
- Areas in a similar geographic location;
- Areas that may be remediated using similar techniques or within a similar time frame; and
- Areas amenable to being managed in a single RI/FS.

CHAPTER 6

Preliminary Assessment/Site Inspection (PA/SI)

The Preliminary Assessment/Site Inspection (PA/SI) phase of the response action process evaluates potential ER Program sites at an installation to determine if a site should be considered for removal action or further response action. This determination is based on an assessment of whether there has been a release subject to CERCLA Section 104, defined as: (a) any hazardous substance (as defined under CERCLA; 40 CFR Section 302.4, Designation of Hazardous Substances) released or where there is a substantial threat of such a release into the environment, or (b) a release or substantial threat of release into the environment of any pollutant or contaminant which may present an imminent and substantial danger to the public health or welfare. Note that CERCLA Section 101(14) provides a "petroleum exclusion," which is the term used for U.S. EPA's exclusion of "oil" from the definition of a "hazardous substance." (The term "oil" here includes refined petroleum products such as gasoline, diesel, jet fuel, etc.). Therefore, spills and leaks of only such petroleum products are not considered in this chapter because these types of sites would not be addressed under the CERCLA process. However, some waste oil tanks may contain chlorinated solvents or other CERCLA hazardous substances, or the releases may be commingled with other CERCLA hazardous substances, in which case the petroleum exclusion does not apply (see Chapter 4 for eligibility).

The PA/SI is initiated when either U.S. EPA lists an installation on the Federal Facilities Agency Hazardous Waste Compliance Docket[1] (i.e., the Docket), DON discovers a waste disposal site or potential release, or a petition is made by an affected person. The discovery and notification[2] step initiates the processing of a newly discovered release or hazardous waste site under the ER Program. As part of the assessment, a screening-level risk assessment may be performed. In addition, the information gathered during the PA/SI may be used to determine the relative risk rank of a site to establish program funding priorities (see Chapter 4). The findings of the PA/SI are used to determine if the site should be eliminated from further consideration (i.e., no further action [NFA]), identified for a removal action to address actual or imminent threats to human health or the environment, or further evaluated through the performance of a RI/FS. U.S. EPA also uses the information gathered during the PA/SI to facilitate the evaluation of a release in accordance with the Hazard Ranking System[3] (HRS; see Section 6.3) to determine if a site should be listed on the NPL.[4] For additional information, see OPNAVINST 5090.1B CHANGE-2 Paragraphs 15-3.18, 15-3.31, 15-4.1.1 (1999); and MCO P5090.2A, Paragraph 14304.

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[1] Federal facilities where hazardous waste is managed or from which hazardous substances have been released are identified on the Federal Facilities Agency Hazardous Waste Compliance Docket. The Docket was established under CERCLA Section 120(c) and functions as a comprehensive record of the Superfund federal facilities program. It includes the compliance status of each federal facility. Information submitted to U.S. EPA on identified facilities is compiled and maintained in the docket, and then is made available to the public.

[2] The notification requirement for a newly discovered release is triggered if available information indicates that a Reportable Quantity (as enumerated in 40 CFR Section 302.4) has been released.

[3] The HRS is the principal mechanism U.S. EPA uses to place waste sites on the National Priorities List (NPL). It is a numerically based screening system that uses information from the PA and SI to assess the relative potential of sites to pose a threat to human health or the environment. HRS procedures are specified in 40 CFR Section 300, Appendix A.

[4] The NPL is used by U.S. EPA primarily for informational and management purposes. The NPL identifies for the states and the public those sites or other releases that appear to warrant remedial actions. The identification of a site for the NPL also guides U.S. EPA in determining which sites warrant further investigation to assess the nature and extent of the human health and environmental risks associated with a site.

6.1 Preliminary Assessment (PA)

A PA is required for an installation not already on the Docket if a release site is discovered, a hazardous waste site is discovered, or a person successfully petitions U.S. EPA for a PA. The purpose of a PA is to (1) eliminate sites that do not pose a threat to human health or the environment from further consideration, (2) determine if there is a potential need for removal action, (3) set priorities for site inspections, and (4) gather information for the HRS evaluation. A SI is needed if the PA finds that the release poses a potential threat to human health or the environment.

A PA is intended to be a relatively quick, low-cost compilation of existing information about a site. It should assess the following:

- Source and nature of a release;
- Potential contaminant migration via four pathways (surface water, groundwater, air, and soil); and
- Potential receptors (humans and ecological resources) that could be affected by the release or contaminant migration.

Sampling generally is not conducted during a PA. However, sampling may be appropriate when it could avoid the need for a SI (i.e., when a SI may be justified based on available information, but sampling is expected to find little evidence of a threat, in which case sampling during the PA could negate the need for a formal SI). U.S. EPA's guidance on performing combined sampling as part of the PA is discussed in *Improving Site Assessment: Combined PA/SI Assessments* (EPA/540/F-98/038; Oct. 1999). As described in this guidance, U.S. EPA encourages combining the PA and SI activities, or conducting Integrated Assessments (IAs), to reduce repetitive tasks and, ultimately, costs. For information on IAs, see U.S. EPA's guidance *Improving Site Assessment: Integrating Removal and Remedial Site Evaluations* (EPA/540/F-99/006; Apr. 2000). As is the case with its individual components, a combined PA/SI assessment is performed to determine what steps, if any, need to occur next at a site.

Information Included in a PA

The types of installation information presented in a PA are dictated by U.S. EPA data requirements. The following are key types of information and resources considered in preparing the PA:

- Installation description (physical inspection, interview, maps);
- Evidence of a release or potential release (physical inspection, interviews, record searches);
- Site description and characterization (physical inspection, record searches, photo analysis, previous sampling or studies);
- Identification of potential receptors (e.g., drinking water wells and intakes, sensitive environments, populations);
- Description of hazardous waste generation, storage, and disposal, both past and present (interviews and record searches);
- Hydrology (literature searches, previous studies, Federal Emergency Management Agency flood maps);
- Hydrogeology (literature searches, previous studies);

- Soil characteristics (United States Department of Agriculture soil survey, previous boring records);
- Prior regulatory actions such as permits, inspections, violations, removals (interviews, record searches); and
- History of land use/ownership (interviews, record and literature searches).

An annotated bibliography should be provided in a PA to allow information to be easily located for review.

Assessment Included in a PA

The RPM uses information in the PA to recommend whether a further response action is justified. Factors to consider are the probability of release to a pathway, the probability that receptors are being or will be exposed, and the probable health risk due to this exposure.

In addition, the information gathered during the PA should be used to formulate a preliminary conceptual site model (CSM). As detailed in Chapter 8, a CSM is a useful engineering management tool which helps to manage site information and guide decision making through the ER process. The CSM summarizes the site conditions, the distribution of contaminants of potential concern (COPCs), potential receptors and exposure pathways, and land use data available for a given site.

Conducting PAs

U.S. EPA guidance on PAs is found in *Guidance for Performing Preliminary Assessments Under CERCLA* (EPA/540/G-91/013, Sep. 1991) and *Improving Site Assessment: Abbreviated Preliminary Assessments* (EPA/540/F-98/037; Oct. 1999). This guidance is intended for industrial facilities, and should be applied, as applicable, to DON installations.

The servicing FEC provides a draft PA to the installation Commanding Officer/Commanding General (CO/CG). Following completion of the PA, the RPM sends a copy of the PA to the U.S. EPA Regional Office. U.S. EPA may request modification, additional information, or completion of a SI following review of the PA.

The RPM, in coordination with the installation, determines whether newly discovered sites at installations with ongoing ER Program work will be considered new sites or will be remediated as part of existing sites. To do this, the installation and the RPM will consider the following factors:

- Whether the origin and type of contaminant are similar;
- How compatible the investigation techniques are for the sites;
- How integration would affect the cost, scheduling, and management of ongoing activities;
- How human health and environment would be impacted; and
- How regulators may respond to the RPM's approach.

The PA may result in one of the following outcomes.

- NFA – If no significant threats are identified, no further action would be taken;

- Site Inspection (SI) – If there is insufficient information to reach a NFA decision, the SI is normally the next step (see Section 6.2);
- Removal action – If a significant threat to human health or the environment exists or is imminent, the contamination may have to be physically removed immediately or otherwise controlled (see Chapter 7); and
- Remedial Investigation/Feasibility Study (RI/FS) – If DON determines that a site warrants remediation, the SI can be skipped and the site can go directly to RI/FS (see Chapter 8)[5].

6.2 Site Inspection (SI)

The SI is an on-site investigation intended to gather more information needed in determining whether there is a release or potential release, and to characterize the nature of the release and associated threats or potential threats to human health and the environment.

Prior to implementing field sampling activities as a part of the SI, a Sampling and Analysis Plan (SAP) and a Health and Safety Plan (HASP) must be developed (see Section 6.2.1 for information on the SAP, and Chapter 16 for information on preparing the HASP). In addition, a Quality Assurance Project Plan (QAPP) must be prepared to define the quality assurance/quality control (QA/QC) procedures that apply to the collection of any field or laboratory data collected during the SI to ensure data meet project data quality objectives (DQOs), and are adequate for use in the site evaluation and the U.S. EPA's HRS activities (see Section 6.3 for additional information on U.S. EPA's HRS program).

In particular, RPMs need to ensure environmental data quality in accordance with the *Uniform Federal Policy for Quality Assurance Project Plans Manual* (UFP-QAPP Manual; EPA/505/F-03/001, Mar. 2005). The UFP provides requirements and guidelines to federal agencies for implementing acceptable environmental quality systems to ensure that: environmental data are of known and documented quality and suitable for their intended uses, and environmental data collection and technology programs meet stated requirements (see Chapter 8 for information on QA/QC procedures).

Often the SI can be structured to test the critical PA conclusions that resulted in the recommendation for a SI. The information developed may be sufficient for DON to determine if a NFA determination is warranted. These decisions require that sufficient information be collected to define present and past site waste operations and site conditions resulting from waste operations.

Upon completion of the SI, a report is prepared that documents the findings of the SI. At a minimum, the results documented in the report should do the following:

- Define the source and nature of the release;
- Describe pathways for contaminant migration;
- Identify human and ecological receptors; and
- Conclude whether a NFA determination, a removal action, or a RI/FS is warranted.

The documents used and reviewed in carrying out the SI should be referenced as a part of the SI report. Documentation of the background information is critical for a NFA decision or to substantiate the

[5] Decisions to eliminate the SI phase of work and proceeding directly to the RI/FS are typically reserved for sites with known significant environmental issues. Skipping the SI phase may make it difficult to subsequently obtain a NFA.

recommended action to be followed after the SI. The information contained with the report also should be used to update/refine the CSM initiated during the PA phase.

6.2.1 Sampling and Analysis Plan (SAP)

The SI phase provides the first opportunity to generate current site characterization data by collecting and analyzing samples. The SI consists of a visual inspection of the site and usually includes sample collection and analysis. This sampling may be performed both on-site and off-site as necessary to determine the presence and nature of potential contamination in the soil, groundwater, surface water, and air. The objective of the SI sampling effort is to verify the presence of contamination, not to determine the extent of contamination. A sampling strategy should be developed based on this objective, and documented in the Statement of Work (SOW) and SAP. This strategy will ensure that the appropriate data will be collected to make decisions supporting project objectives.

- **On-Site Sampling:** On-site sampling should determine the nature of any releases of disposed or stored wastes (source identification). Appropriate soil, air, groundwater, surface water, and sediment samples should be collected in the vicinity of any suspected source and along expected migration pathways to determine the existence of contamination.
- **Off-Site Sampling:** Off-site sampling may need to be carried out to assess the potential for migration of contamination to off-site receptors. Off-site sampling may consist of air, soil, groundwater, surface water, and sediment samples.
- **Off-Site Surveys:** Off-site surveys, which may include off-base areas, may be conducted to assess the population, land use, and operation that may be affected by releases from the site. These surveys should identify adjacent land ownership, land use, water supplies, waste disposal practices, and potential receptors of any wastes that may migrate off the site.

Prior to conducting sampling during the SI, a SAP containing a Field Sampling Plan (FSP) and a QAPP are prepared.

- **Field Sampling Plan (FSP):** The FSP describes the number, type, and location of samples; the sampling methods, the types of analyses; and decontamination procedures. It also identifies the personnel to perform each task. The plan should be based on the type of release being investigated, the types of hazardous materials expected, and their potential off-site migration routes.
- **Quality Assurance Project Plan (QAPP):** The QAPP presents the policies, organization, objectives, functional activities, and specific QA/QC activities to ensure the validity of analytical data generated during project execution.

U.S. EPA guidance on SIs is found in *Guidance for Performing Site Inspections Under CERCLA* (OSWER 9345.1-05, Sep. 1992). Additional information on the preparation of a FSP and UFP-consistent QAPP is provided in Chapter 8 of this manual.

6.2.2 Screening Risk Assessment

As part of the response action, the NCP requires that the nature and extent of site risks to human health and the environment be characterized through human health and ecological risk assessments. The Navy has defined a three-tiered approach that follows U.S. EPA guidance for both the human health risk assessment (HHRA) and ecological risk assessment (ERA) process for assessing risks at a site. Although typically done in the RI phase of the ER process, a Tier 1 screening risk assessment (SRA) should be completed as part of the SI to identify any potential contaminants of concern (COCs) that may pose unacceptable human health or ecological risks. The SRA is a conservative evaluation consisting of a

review of existing information and current data about a release, including the source and nature of the release, pathways of exposure, and potential receptors, as documented in the CSM developed during the PA/SI. Further details on the Tier 1 SRA process can be found in Chapter 8. Detailed guidance on conducting risk assessments also can be found on the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb).

If an actual or imminent threat to human health or the environment is identified as a result of the SRA, then a removal action may be warranted. Alternatively, if the SRA determines that there are no unacceptable human health and ecological risks, then the results are documented in the SI Report and the site can be closed out at the end of the SI. Otherwise, the site is further addressed in a RI/FS. This information also may be used by DON to determine which sites need cleanup action the soonest (i.e., "worst first").

6.2.3 Data Management and Visualization

NAVFAC has developed the Web-based Naval Installation Restoration Information Solution (NIRIS) to manage all ER data and ensure data quality. The NIRIS system is described in Chapter 14, including how data that are collected during a PA or SI shall be submitted, and the tools available for data analysis and visualization using Geographic Information Systems (GIS). These tools help Navy RPMs and contractors correlate large volumes of data, effectively analyze spatial data distributions, and generate maps during a PA/SI.

6.3 Hazard Ranking System and NPL Determination

After the PA/SI is completed and the findings are sent to the Federal Facilities Docket Coordinator of the cognizant U.S. EPA region, U.S. EPA determines whether the PA/SI is acceptable or whether additional information is required. Once U.S. EPA considers the PA/SI to be acceptable, it determines whether a site should be eligible for the Federal Facilities Section of the NPL based on the results of the HRS score. U.S. EPA generates the official HRS score using HRS *Superscreen*, which uses the information from the PA and the SI to generate a score based on the level of the facility's potential threat to human health and the environment for each of four migration and exposure pathways (groundwater, surface water, soil, and air). If the site's HRS score exceeds a predefined threshold value, it is eligible for the NPL. U.S. EPA proposes new NPL sites in the Federal Register. After receiving and responding to stakeholder comments on the proposed NPL additions, U.S. EPA determines whether the available information still supports the addition of a site to the NPL. Most identified DON installations have already been evaluated using the HRS and added to the NPL as appropriate.

6.4 Site Closeout at the End of the PA/SI

The investigations and data evaluation conducted during the PA and SI may determine that a site does not pose an unacceptable risk to human health and the environment. These sites do not require further investigation or response and are designated as NFA sites, and achieve Site Closeout at this stage of the process. Designation as a NFA site requires that the supporting information be documented and concurrence received from the regulatory authority. Technical reports prepared for the PA/SI should provide sufficient information to support the NFA conclusion for these sites. Concurrence from regulators shall be documented in the form of concurrence letters or a signature page of the technical report(s) that provides information about the relevant sites.

The sites designated NFA from the PA/SI may also be included in a Record of Decision (ROD) for the relevant operable unit (OU), or in other RODs at the same installation, if acceptable to the stakeholders. This approach provides an additional level of concurrence and documentation beyond the concurrence

letters based on the PA/SI technical reports. Although some additional costs will be required to include these sites in a ROD, such costs may be justified. In particular, including these sites in a ROD provides additional assurance that the site cannot easily be reopened because the ROD is a legally binding document. The RPM should evaluate the costs and benefits of adding these sites in a ROD on a site-specific basis.

Additional information on documenting Site Closeout can be found on the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb).

CHAPTER 7

Removal Actions

A removal action is a response implemented in an expedited manner to address releases or threatened releases that require prompt action. CERCLA Section 104 provides that removal actions and subsequent remedial actions should occur whenever there is a release or the threat of a release of a hazardous substance or any pollutant or contaminant that presents a substantial danger to the public health and welfare (42 USC Section 9604 (a)(1) [2002]).

This chapter discusses how to determine whether a removal action is required, the different types of removal actions, and how removal actions should be considered as part of the long-term remedy for a site.

7.1 Determining the Need for a Removal Action

In determining the appropriate extent of a response action for a given release, DON first reviews current site conditions as well as any information produced by a study or investigation of a site, including a Preliminary Assessment/Site Inspection (PA/SI), or a Remedial Investigation (RI) if any has been completed previously. At sites where results indicate that a threat exists to human health or the environment, a removal action may be warranted to "abate, prevent, minimize, stabilize, mitigate, or eliminate the release or the threat of a release" (40 CFR Section 300.415). The following factors are considered in determining the need for a removal action:

- Actual or potential exposures to nearby human populations, animals, or the food chain from released hazardous substances;
- Actual or potential contamination of drinking water supplies or sensitive ecosystems;
- Hazardous substances, pollutants, or contaminants in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release;
- High levels of hazardous substances, pollutants, or contaminants in surface soils that may migrate;
- Weather conditions that may cause hazardous substances, pollutants, or contaminants to migrate or be released;
- Threat of fire or explosion; and
- Other situations that may pose threats to human health or the environment.

DON also considers the following criteria for determining if a removal action is appropriate:

- Whether the source of the contamination can be removed quickly and effectively;
- Whether access to contamination can be limited (human exposure is substantially reduced); and
- Whether a removal action is the most expeditious manner of remediating the site.

The removal action should be compatible with future remedial actions and should strive to achieve applicable or relevant and appropriate requirements (ARARs). Compliance with ARARs depends on the urgency of the situation, and the scope of the removal action to be conducted (40 CFR Section 300.415).

7.2 Strategic Considerations

When evaluating the need for a removal action, an additional consideration is the potential economic benefit if the removal action reduces risk and long-term threats sufficiently to serve as the final remedy. Although removal actions are not intended to circumvent the normal Remedial Investigation/Feasibility Study (RI/FS) process, in some cases, a removal action can be used to achieve the objective of a protective site close-out at a cost far less than performing a RI/FS and related risk assessment. However, in other cases, particularly for larger and more complex sites, more specific site characterization, risk screening/risk assessment, and evaluation of remedial alternatives may result in a lower cost for achieving protective site close-out. In these cases, the more extensive work performed as part of a RI/FS may indicate that: the site does not pose an unacceptable risk (i.e., no further action [NFA] is appropriate); the site can be remediated more efficiently by alternate, perhaps innovative, technologies; or site conditions and contamination are so complex that the proper course of action is to manage the risk with containment, monitoring, and land use controls (LUCs).

Economics play an important role in determining whether to conduct a removal action or proceed to the RI phase. Economic considerations also may impact the extent of the action that is taken. In some cases, expanding the scope of the removal action may allow the remedial action to be the final remedy. The following should be considered when deciding whether the removal action should be an interim or final action:

- The cost of remobilizing to conduct the final action;
- The level of uncertainty of site conditions and remedy performance and the estimated life-cycle costs of the additional work that may be required to achieve final cleanup levels, including appropriate contingencies for such uncertainties;
- The potential to reduce total life-cycle costs following the initial threat elimination by reducing uncertainties related to the site conditions and remedy performance, i.e., performing more detailed site characterization, risk assessment, and evaluation and selection of a potentially more optimal remedial alternative for the final cleanup;
- The uncertainty associated with acceptance of cleanup levels as final; and
- The availability of funds to conduct the action.

When implementing a removal action, whether it is an interim or final action, it is recommended that the site is characterized in enough detail to perform risk screening, define the limits of the removal action in advance, and develop a risk-based exit strategy. See Chapter 8 for information regarding site characterization (including development of necessary documentation) and the development of risk-based exit strategies. Open-ended removal actions involving cleanup of successive areas based on analysis of individual samples that exceed specified criteria such as preliminary remediation goals (PRGs), should be avoided as this could result in escalating and non-controlled cost. In any case, both removal actions and remedial actions are subject to the DON policy *Optimizing Remedial and Removal Actions under the ERP* (23 Apr. 2004) to help ensure that the response action is performed in a cost-effective manner.

7.3 Types of Removal Actions

Removal actions that may be used to respond to a release or potential release are listed below but this list is not exhaustive and does not prevent DON from taking any other actions deemed necessary under CERCLA.

- Fences, warning signs, or other security or site control precautions put in place if humans or animals have access to the release;
- Run-off or run-on diversion controls used to prevent the further spread of contamination where precipitation or run-off from other sources may enter the release area;
- Capping of contaminated soils or sludges to reduce migration of hazardous substances into soil, groundwater, and air;
- Use of chemicals, absorbents, and other materials to retard the spread of the release or mitigate its effects;
- Stabilization of berms, dikes, or impoundments or drainage/closing of lagoons to maintain the integrity of these structures;
- Excavation, consolidation, or removal of highly contaminated soils from drainage areas or other areas to reduce the spread of or direct contact with contamination;
- Removal of drums, barrels, tanks, or other bulk containers that contain or may contain hazardous substances or contaminants to reduce the likelihood of spillage; leakage; exposure to humans, animals, or the food chain; or fire or explosions;
- Containment, treatment, disposal, or incineration of hazardous materials to reduce the likelihood of human, animal, or food chain exposure; and
- Provision of an alternative water source to reduce exposure to contaminated water until a permanent remedy can be implemented.

Removals implemented in response to an imminent threat are not required to be compatible with future remedial actions, to be cost-effective, or to achieve ARARs if the urgency of the situation precludes fulfilling these goals. However, these goals should be considered prior to implementation of a removal if time allows.

If DON determines that the removal action will not fully address the threat or potential threat posed by the release, DON will ensure an orderly transition from removal to remedial response activities. All decisions to implement removals under CERCLA authority shall be documented. Documentation may follow the decision to implement the action, or even the action itself, depending on the urgency of the situation. A removal may or may not be the final action for a site, depending on whether any hazardous substances, pollutants, or contaminants remain after the removal.

U.S. EPA categorizes removal actions in three ways: (1) time critical removal actions (TCRAs), (2) emergency removal actions, and (3) non-time critical removal actions (NTCRAs) (see the *CERCLA/Superfund Orientation Manual*, EPA/542/R-92/005, Oct. 1992). These categories are based on the type of situation, the urgency of the threat of the release, and the planning period that exists in which the action is initiated. TCRAs are those for which the planning period is six months or less before field work is initiated. Emergency removal actions are necessary when there is a release that requires on-site activities to begin within hours or days. NTCRAs are taken when a removal action is determined to be appropriate, but a planning period of at least six months is available before on-site activities shall begin.

7.3.1 Time Critical Removal Actions (TCRAs)

TCRAs are those for which the planning period is six months or less before field work is initiated. In this case, an Engineering Evaluation/Cost Analysis (EE/CA) is not required, although it is still important to have an appropriate work plan to implement the removal action to mitigate the threat. TCRAs are

normally small-scale, interim actions but they can be large-scale, final actions. With TCRAs, RPMs are responsible for the following:

- Coordinating actions to be taken with the affected installation;
- Ensuring that an AR File, including the Action Memorandum (AM) (see Section 7.6 for information regarding Action Memoranda), has been established for the action to be taken at the site, and the public has been informed of its existence by publishing notice of the proposed action in a major local newspaper within 60 days of the initiation of the on-site removal activity;
- Providing for a 30-day comment period following publication;
- Preparing written responses to significant comments for inclusion in the AR;
- Ensuring that information relating to the removal is added to the record and that the public is informed of this addition; and
- Commencing the on-site removal action.

For removal actions where on-site action is expected to extend beyond 120 days from initiation of on-site activities, the NCP requires community involvement activities (40 CFR Section 300.415(n) [2003]). A detailed discussion of community relation requirements is presented in Chapter 15.

7.3.2 Emergency Removals

Emergency removal actions are types of TCRAs that must be conducted immediately. Emergency removal actions can be initiated using verbal authorization. Upon becoming aware of the need for an emergency removal, the RPM shall do the following:

- Notify the chain-of-command, including NAVFAC who in turn will notify the Chief of Naval Operations, Environmental Readiness Division (CNO-N45) and/or the Commandant of the Marine Corps, Land Use and Military Construction Branch [CMC(LFL)];
- Notify U.S. EPA, state, and local officials as soon as practicable;
- Prepare documentation briefly summarizing the conditions at the site and identifying the selected removal action and the rationale for the selection (if there is sufficient time);
- Begin on-site removal action;
- Following initiation of the removal action and preparation of documentation, prepare and publish a notice of availability of the Administrative Record (AR) File, including the AM, in a local newspaper within 60 days of initiation of removal action;
- Provide for a 30-day comment period on the AR File;
- Include written responses to significant comments in the AR File;
- Ensure that a formal Community Relations Plan (CRP) is in effect if the emergency removal action is expected to extend beyond 120 days from the initiation of the on-site removal action as per the procedures discussed in Chapter 15; and
- For situations where there is insufficient time to prepare documentation prior to initiating removal action, obtain verbal approval from the installation Commanding Officer/Commanding General (CO/CG) or their designee. For such a situation, prepare documentation following the removal action (40 CFR Section 300.415 [2003]).

7.3.3 Non-Time Critical Removal Actions

An NTCRA has a planning period of at least six months before on-site activities can be initiated. RPM responsibilities for NTCRAs include all actions required for a TCRA as well as the following:

- Preparing an EE/CA, or its equivalent, that gives a brief analysis of the removal alternatives for the site. Recommended criteria for evaluating potential removal alternatives include effectiveness of the action to minimize or stabilize the threat to public health, risk to the environment (through a streamlined risk evaluation analogous to the baseline risk assessment conducted during the RI phase (discussed in Chapter 8), consistency with anticipated final remedial action, consistency with ARARs, cost-effectiveness, and implementability;
- Developing a Sampling and Analysis Plan (SAP) with both field sampling and quality assurance/quality control (QA/QC) components, and forwarding the plan to U.S. EPA for National Priorities List (NPL) sites or the state for non-NPL sites for review and comment.
- Developing a Health and Safety Plan (HASP) and forwarding it to the regulators if requested or required by negotiated agreements.
- Continuing with the removal program activities if the regulator does not provide timely review of the SAP and HASP, noting in the AR File that DON formally provided the regulator with an opportunity to review the plans;
- Preparing a notice of availability and a brief description of the EE/CA, along with the AR File, for publication in a major local newspaper of general circulation, providing at least a 30-day comment period, and preparing written response to significant comments (40 CFR Section 300.820). The FEC has the responsibility to publish the notice of availability and a brief description of the EE/CA; and
- Preparing an AM for the removal action.

7.4 Cleanup Standards for Removals

It may be necessary to establish cleanup standards for the removal action. In order to establish cleanup levels for removal actions, a wide variety of technical, legal, economic, and public involvement issues shall be considered. Sources of cleanup standards include:

- Statutes and Regulation – Environmental statutes and regulations often provide cleanup levels for removal actions through the ARAR identification process. For example, RCRA, Clean Water Act (CWA), and Safe Drinking Water Act (SDWA) provide cleanup levels for various response action scenarios;
- Risk-Based Levels – Standard risk assessment procedures can be used to calculate cleanup levels not only for those contaminants that do not have regulatory cleanup levels but for all contaminants in order to control the scope of the removal action (see Section 8.2.3 for risk assessment information including a discussion of the Tier 1 screening risk assessment that is typically performed as part of the Site Inspection [SI]); and
- Cleanup levels used in previous CERCLA Records of Decision/Decision Documents (RODs/DDs) – Other CERCLA removal and remedial action decision documents and RODs can be used to select cleanup levels for similar situations and similar contaminants.

In some cases, a removal action may not be intended to achieve a cleanup level; therefore, a cleanup level may not even be established for the removal. This could be the case where a removal is implemented for

source control or for limiting exposure. This situation requires a permanent remedy, so the removal should be compatible with any remedial action that may be selected or be cost-effective enough to be considered a reasonable short-term expenditure.

7.4.1 Future Land Use

Future land use assumptions play an important role in establishing removal action cleanup levels. Anticipated land use assumptions are typically made before completing any CERCLA investigation as the future land use assumed is directly linked to the stringency of cleanup levels. Information regarding land management, including land use planning, is provided in Chapter 13. In addition, the following guidance on land use assumptions is available:

- *U.S. EPA Reuse Assessment Guide* (OSWER 9355.7-06P, June 2001). Provides guidance for determining future land use assumptions for CERCLA response actions.
- *DoD Responsibility for Additional Environmental Cleanup after Transfer of Real Property* (25 July 1997). Provides specific guidance on how to incorporate future land use into the environmental restoration process.
- *DON Policy Memorandum 99-02; Land Use Controls, Interim Final* (25 May 1999). Establishes requirements for development and use of land use controls at active and closing bases.
- *DoD Guidance on Land Use Control Agreements with Environmental Regulatory Agencies* (Mar. 2001). Provides a template for land use controls agreements.
- *DoD Policy on Land Use Controls Associated with Environmental Restoration Activities* (17 Jan. 2001). Provides framework for implementing, documenting, and managing land use controls. As stated in this document, land use assumptions are generally based upon numerous factors, "...including statutory land use designations, contractual arrangements for transfer of property, zoning, community reuse plans, and installation master plans."
- *Land Use in the CERCLA Remedy Selection Process* (OSWER 9355.7-04, 25 May 1995).

7.5 Site Closeout or Response Complete Following Removal Actions

A removal action could be either the final remedy or an interim action followed by a remedial action as the final remedy, based on the extent to which the threats are mitigated by the action. A removal action, when implemented as the final remedy, can be used for fast and significant reductions in risk and to mitigate long-term threats.

In cases where the removal action is the final remedy, the removal action may lead to either Response Complete (RC) or Site Closeout (SC). If the removal action was conducted during the PA/SI phase and achieves SC, this should be documented by obtaining a NFA determination as part of the PA/SI. If the removal action achieves RC but requires Long-Term Management (LTMgt), the LTMgt requirements should be documented in a ROD. If the removal action was accomplished during the RI/FS phase, any final determination of RC and/or SC must be documented in the ROD. If a ROD is required, whether it is because LTMgt is needed or because the removal action was done during the RI/FS phase, the NCP nine criteria (see Table 8-2 in Section 8.3.3 for information regarding the NCP nine criteria) must be addressed. If it were not addressed as part of the EE/CA or AM, a focused FS would be needed, followed by a ROD.

The NFA determination may be applied at both NPL and non-NPL sites based upon appropriate investigation. For NPL or proposed NPL sites, U.S. EPA concurrence is required; for non-NPL sites, U.S. EPA and state concurrence is recommended. The investigative reports documenting the decision should be forwarded to U.S. EPA and state regulators for concurrence.

The NFA determination should be substantiated with an assessment of risk to human health and the environment taking into consideration health and environmental impacts if NFA is taken. The assessment, usually more qualitative than quantitative, should be based on known characteristics of the contaminants (toxicity, persistence, and mobility), potential pathways of contact/transport (direct contact, air, groundwater, or surface water routes, fire or explosion), types and number of targets, and maximum concentration levels of exposure (as contained in ARARs). This assessment is not a health assessment, which is part of the overall risk assessment process, nor does it have to involve highly analytical procedures such as modeling.

PA and SI reports created during the investigation or remediation of the site along with U.S. EPA concurrence at NPL sites and state concurrence (or a copy of the letter to the regulator which requested concurrence) are to be included in the Administrative Record to document the NFA decision and actions taken to substantiate the NFA decision.

7.6 Decision Documents for Removal Actions

For emergency removals, TCRAs, and NTCRAs, the RPM prepares an AM. For NTCRAs, the AM is supported by an EE/CA. The AM for an interim action specifies what threat is being addressed and how long the action will remain effective. The AM should state what type of final action may be conducted and how the removal action contributes to the implementation of the final action. The AM for final actions should specify the performance standards or cleanup levels to be reached by the actions. Both time critical and non-time critical removal actions can be final actions, but emergency removals are seldom final actions.

Action Memoranda and NFA documents shall be signed by the installation CO/CG for active installation sites. For BRAC sites, in accordance with an *Assignment of Responsibilities to the BRAC PMO and Delegation of Authority Memorandum* (15 Nov. 2004), the Directors of BRAC Field PMOs may delegate signature authority as appropriate. Upon signature, the installation or the BRAC PMO should forward the decision documentation to appropriate regulatory agencies for information and/or for their concurrence. The concurrence requirements for DDs are presented in Chapter 9.

CHAPTER 8

Remedial Investigation/Feasibility Study

The purpose of the Remedial Investigation/Feasibility Study (RI/FS) is to determine the nature and extent of the threat presented by a release of a hazardous substance and, if sufficient need is documented by site sampling and a risk assessment, to evaluate proposed remedies. DON generally performs the RI phase concurrently and in an integrated manner with the FS as shown in Figure 8-1. Integrating the development of the RI and FS is important to ensure that data obtained in the RI is appropriate to evaluate likely remedial alternatives during the FS. However, in some cases, the RI is completed with the objective being to support a risk management decision but not to support remedy development. In this case, if the RI determines that a remedy is necessary, a supplemental investigation can be performed as part of the FS.

The RI is the investigative phase of the response action and is designed to achieve the following:

- Characterize site conditions and nature and extent of risk posed by contamination;
- To the extent required, obtain data for the evaluation of remedial alternatives if the site poses an unacceptable risk; and
- Provide a basis for decisions on further response actions or no further action (NFA).

The RI provides information to refine the conceptual site model (CSM) and forms the basis for the development of Remedial Action (RA) Objectives and remedial strategies that will comprise the FS. A description of the various elements of the RI is presented in Section 8.2.

The primary focus of the FS is to ensure that appropriate remedial alternatives are developed and evaluated in such a manner that the information can be presented to a decision-maker and an appropriate remedy selected. Development of remedial alternatives is fully integrated with the site characterization activities of the RI, and the combined RI/FS leads to the selection of an optimal method for remediating the site.

The overall objectives of the FS are to:

- Develop and evaluate potential remedies that permanently and significantly reduce the threat to public health, welfare, and the environment;
- Select a cost-effective remedial action alternative that mitigates the threat(s); and
- Achieve consensus among DON, U.S. EPA, state, and local authorities regarding the selected response action; and, in the case of NPL sites, obtain concurrence from U.S. EPA.

During the development of the FS, it is important to follow DON policy and guidance documents related to optimization. DON policy for *Optimizing Remedial and Removal Actions under the ERP* (23 Apr. 2004) requires that optimization guidance documents be followed throughout the remedial process. The policy states that during certain phases, specific guidance documents must be followed. It specifically states that the *Navy Guidance for Optimizing Remedy Evaluation, Selection and Design* (Apr. 2004) must be followed during the development of a FS (and/or Engineering Evaluation/Cost Analysis [EE/CA]).

The end product of a RI/FS is the comparison of remedial strategies supported by valid site data and a risk assessment, which allows decision-makers to ultimately select the most appropriate remedy or

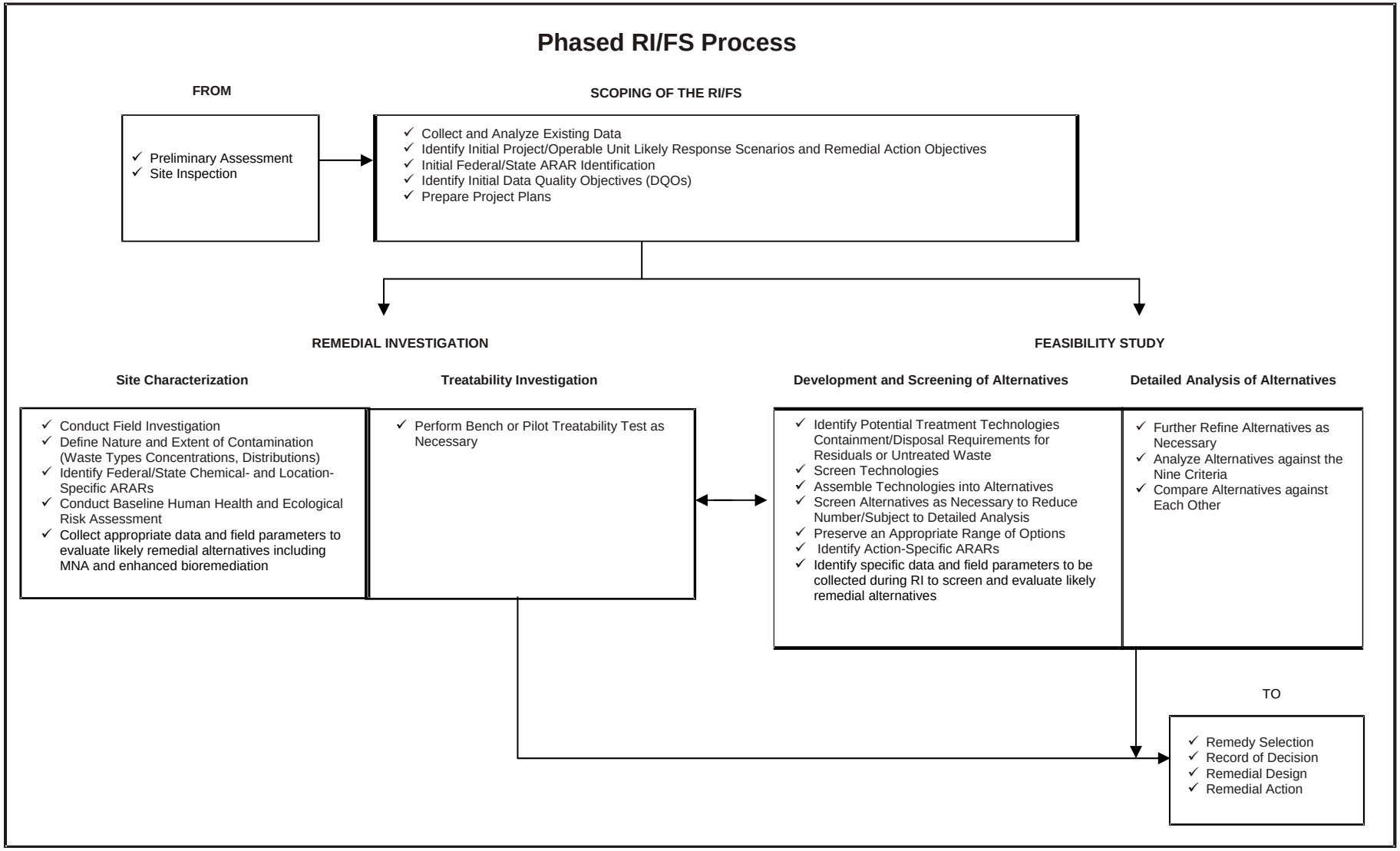


Figure 8-1. Phased RI/FS Process

combination of remedies for a site. The RI/FS evaluates the remedial actions based on the following nine criteria [40 CFR Section 300.430 (f)(1)]:

- Overall protection of human health and the environment;
- Compliance with applicable or relevant and appropriate requirement (ARARs);
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume through treatment;
- Short-term effectiveness;
- Implementability;
- Cost;
- State acceptance; and
- Community acceptance.

A discussion of these nine criteria and the relative importance of each is presented in Section 8.3 of this document. The nine criteria also are described in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and the *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA/540/G-89/004, Oct. 1988).

When a decision is made that a RI/FS is needed, an AR File shall be established. For information concerning the AR File and Information Repositories, see Chapter 14 of this document. Documents that should be kept in the AR File for remedial actions, including documents related to the RI/FS, are listed in Table 14-1.

A Community Relations Plan (CRP) is an important element developed during the RI/FS phase to:

- Provide the public an opportunity to express comments on and provide input to technical decisions;
- Inform the public of planned and ongoing actions; and
- Identify and resolve conflicts.

The guidance document for community involvement is the *U.S. EPA Superfund Community Involvement Handbook* (EPA/540/K-01/003, Apr. 2002). For details regarding CRPs, see Chapter 15 of this document.

8.1 RI/FS Scoping

Scoping is the first step in the RI/FS phase. Figure 8-2 shows how key RI/FS scoping elements are related. The goals of RI/FS scoping are to:

- Describe the type and content of studies needed to initiate response actions and determine nature and extent of contaminants of concern (COCs) and risk;
- Determine if there is a need for removal actions;
- Determine appropriate response mechanisms and authorities; and
- Identify preliminary study areas.

Flow Diagram for RI/FS Scoping

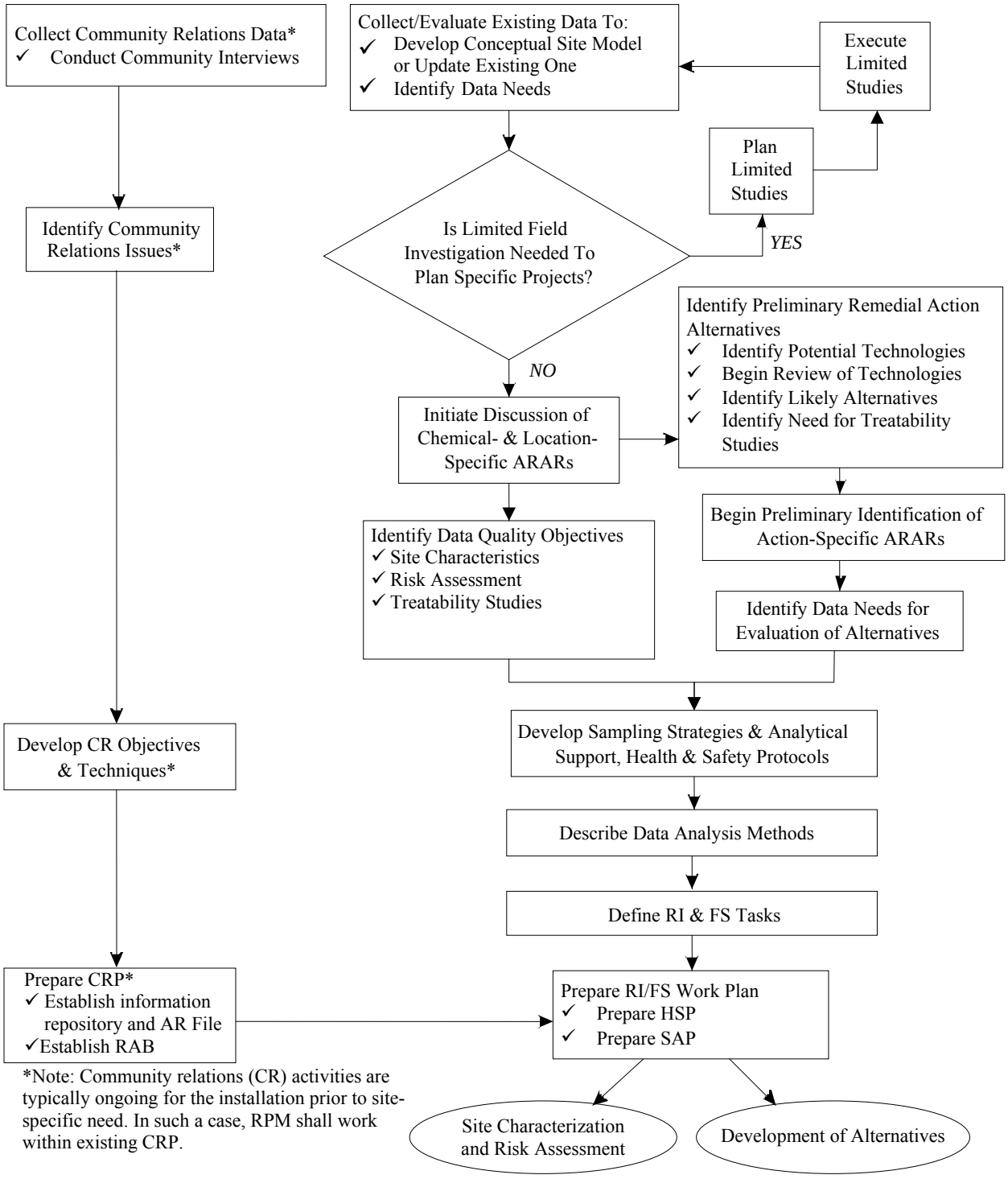


Figure 8-2. Flow Diagram for RI/FS Scoping

The RI/FS study area identification process includes analyzing the media that may be contaminated and the populations and resources that may be exposed to the contamination. Additionally, adjacent properties, transportation routes, treatment and disposal facilities, and any environmental resources that may be used or are directly impacted by potential remedial actions should be identified as the basis for evaluating location-specific ARARs and the environmental impacts of alternatives. During the RI/FS scoping step, the objectives of the RI/FS shall be considered. FECs shall determine what information is needed to meet those objectives and scope the RI/FS accordingly. Information needs may include, but are not limited to:

- Population, environmental, and public welfare concerns including human and environmental receptors and rates of exposure;
- Amount, concentration, hazardous properties, environmental fate and transport (e.g., ability and opportunities for bioaccumulation, persistence, mobility, and monitored natural attenuation (MNA) and enhanced bioremediation potential), and chemical composition of substances present;
- Hydrogeological factors (e.g., soil permeability, depth to saturated zone, hydrogeological gradients, proximity to a drinking water aquifer, and flood plains and wetlands proximity);
- Current and potential groundwater use (e.g., the appropriate groundwater classes under the system established in the U.S. EPA groundwater protection strategy, and any groundwater classifications developed by the state agencies);
- The extent to which the source can be adequately identified and characterized;
- Whether substances at the site can be reused or recycled;
- The likelihood of future releases and their impacts to human health and environment if the substances remain on the site;
- The extent to which natural or artificial barriers, including biodegradation and other natural attenuation processes, currently contain the substances and the adequacy of the barriers;
- The extent to which the substances have migrated or are expected to migrate from the area of the original location or new location, if relocated, and whether future migration may pose a threat to public health, welfare, or the environment;
- The extent to which the federal environmental requirements are applicable or relevant and appropriate to the specific site and the extent to which other federal criteria, advisories and guidance, and state standards are to be considered in developing the remedy;
- The extent to which contamination levels exceed criteria and standards that could be considered as ARARs or as to be considered (TBC);
- Impact of the contamination on sediments (see DON's *Installation Restoration Policy on Sediment Investigation and Response Action* [Ser 453E/2U589601, 08 Feb. 2002]);
- Impact of the contamination on air, land, water, and/or the food chain; and
- The ability to implement and maintain the remedy until the threat is permanently abated.

The FEC also performs the following tasks (not an exhaustive list):

- Develop an RI/FS Work Plan, which documents decisions made during the scoping process, describes the tasks needed to conduct the RI/FS, and presents a CSM based on data existing at the time of the scoping process;

- Identify the need for conducting treatability studies and schedule. These studies should be completed in time to provide the relevant information for the technology/remedy selection, as discussed in Section 8.3.3.4;
- Develop a Community Relations Plan (CRP), if needed, as discussed in Chapter 15;
- Develop a Sampling and Analysis Plan (SAP), which includes a Field Sampling Plan (FSP), as discussed in Section 8.1.2.5;
- Develop a Quality Assurance Project Plan (QAPP), as discussed in Section 8.1.2.3;
- Develop a Health and Safety Plan (HASP), as discussed in Chapter 16;
- Identify the need and set priorities for removals, interim land use controls (LUCs), operable units (OUs), and continuing monitoring requirements while the RI/FS is being conducted;
- Perform a preliminary review of contaminant- and location-specific ARARs (see Section 8.3.1.1 for detailed information regarding ARARs) based on available and confirmatory data, if collected, and identify impact on project Data Quality Objectives (DQOs) (as discussed in Section 8.1.2.2); and
- For sites proposed or listed on the National Priorities List (NPL), begin Federal Facility Agreement (FFA) negotiations.

8.1.1 Conceptual Site Model (CSM)

The CSM is updated during the RI/FS scoping phase and included in the RI/FS Work Plan. The CSM is a useful engineering management tool that is essential for successful management and decision-making throughout the ER process. Naval Installation Restoration Information Solution (NIRIS), including Geographic Information System (GIS) and other visualization tools, provide an effective way to maintain, update, and visualize the CSM throughout the life-cycle of the project. These tools help support continual optimization efforts towards achieving site closeout.

Elements of CSM

The CSM summarizes the site conditions, the distribution and concentration of contaminant of potential concern (COPCs), potential receptors and exposure pathways, and land use data available for a given site. The CSM is first developed during the PA/SI phase, but should be updated continually as new information becomes available (e.g., during the RI and field treatability studies) to enhance remedy selection and design. Similarly, during the RA and Long-Term Management (LTMgt) phases, the CSM should be updated as performance and monitoring data are collected and analyzed to optimize the remedy as necessary. The CSM is the basis for defining the RA Objectives, and it also can be used to expose data gaps and aid in development of a SAP and design of the monitoring network. It is very important that the CSM be updated during the RI/FS scoping phase.

A CSM is useful in the initial and ongoing description of all parameters relevant to contamination at a site. A good CSM addresses the following elements:

- Nature and extent of contamination
- Geology
- Hydrogeology
- Biological and geochemical conditions
- Potential transport pathways of contamination

- Potential monitoring points
- Potential receptors and potential receptors
- Potential exposure scenarios and pathways
- Potential areas of unacceptable risk to be addressed
- Potential target treatment zones
- Historical uses
- Other factors relevant to the understanding of contamination and related risk to human health and the environment.

Fate and Transport

Understanding contaminant fate and transport is an important element of the CSM. In many cases, the remedial action to address contamination in soil is based on the potential to impact groundwater quality or surface water quality due to the leaching potential. The transport of contaminants via leaching and migration through groundwater can be a very complex process. In order to develop a quantitative predictive tool, the CSM must include geological, geochemical and hydrogeological data, including an understanding of seasonal and historical fluctuations in hydrogeological conditions. Similarly, an understanding of the fate and transport behavior of site contaminants and related degradation products, particularly in groundwater, is critical to understanding the potential for contaminants to attenuate without risk of migrating to a receptor and the nature and extent of any remediation that may be required to supplement such natural processes. These data can become very useful in performing the risk assessment and developing risk-based remedial action objectives.

Additional information on CSMs can be found in the American Society for Testing and Materials *E1689-95: Standard Guide for Developing Conceptual Site Models for Contaminated Sites* (ASTM, 1995).

8.1.2 Systematic Planning

All ER projects require a comprehensive approach including quality assurance/quality control (QA/QC) measures in order to obtain data of appropriate quality for the intended purpose.

Systematic planning (as applied to ER projects) is a process based on the widely accepted "scientific method". The scientific method involves investigation, information acquisition, and results assessment, which are key elements of all successful Navy ER projects.

U.S. EPA's Triad Approach and DQOs Process are examples of systemic planning, and are discussed in more detail in Sections 8.1.2.1 and 8.1.2.2, respectively. Documenting project requirements and the use of systematic planning is discussed in Section 8.1.2.3.

8.1.2.1 Triad Approach

When performing a scoping investigation either prior to or as part of the RI/FS, it is recommended that the Triad Approach be considered for site characterization and remediation. The Triad Approach is a proven and technically defensible methodology that leverages less expensive field screening/characterization tools and mobile laboratories/analytical equipment in conjunction with an appropriate amount of data from fixed laboratories, in order to manage overall decision uncertainty. The use of field screening methods can extend sampling coverage and reduce "sampling error" while data from monitoring wells and fixed laboratories reduce analytical error.

Triad refers to three primary components: (1) systematic planning, (2) dynamic work strategies, and (3) real-time measurement systems. Systematic planning includes the identification of decision endpoints needed to support site goals. Implementation of the Triad Approach allows project managers to obtain real-time data to support rapid decision-making. The collection of real-time data also is a necessary element to allow sampling to be continued without a delay and remobilization. The term "real-time" often includes rapid turnaround time (i.e., minutes to hours) that can only be obtained by having analytical instrumentation available in the field, or nearby.

The Triad Approach can be applied to any media, including soil, groundwater, surface water, and sediment, and is endorsed by the U.S. EPA. Its use has the greatest impact on subsurface soil, sediment, and groundwater sampling as these media have high sampling cost and a high degree of variability.

Further information regarding Triad can be found at the following Web sites: www.triadcentral.org; and http://clu-in.org/.

8.1.2.2 Data Quality Objectives

The DQO process is consistent with the Triad approach, as both are methods to structure the project planning processes in order to manage uncertainty. The DQO process is best applied when critical environmental decisions need to be made (e.g., final decision-making, or compliance with a standard).

The DQO process integrates the work of a multidisciplinary team for planning action-oriented environmental data collection activities. It encourages thoughtful consideration of the following: what decisions need to be made; what data type, quality, and quantity are needed to support the decisions; what portion of the environment (and/ or what time frame) shall be represented by data; how data will be used to support the decision; and what level of decision certainty (and therefore data quality) is desired.

The DQO process is iterative and the final outcome is a design for collecting data (e.g., the number of samples to collect, and when, where, and how to collect samples), together with limits on the probabilities of making decision errors. The full DQO process is described in U.S. EPA's *Guidance for the Data Quality Objectives Process* (EPA QA-G4, Feb. 2006) and includes the following steps:

1. State the Problem
2. Identify the Goal of the Study
3. Identify Information Inputs
4. Define the Boundaries of the Study
5. Develop the Analytic Approach
6. Specify Performance or Acceptance Criteria
7. Develop the Plan for Obtaining Data.

8.1.2.3 UFP QAPP Manual - Documenting the Systematic Planning Process

A QAPP is a formal document describing in comprehensive detail the necessary quality assurance (QA), quality control (QC), and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria. A QAPP integrates technical and quality control aspects of a project throughout its life cycle, including planning,

implementation, assessment, and corrective actions. More specifically, the document details the activities that are implemented to ensure that:

- Results of the work performed will satisfy the stated performance criteria;
- Data generated are of the correct type and quality required for the specific decision or use, and will be able to withstand judicial scrutiny should such a need arise; and
- Specified methods generate data that are reliable and scientifically valid.

A QAPP also presents an organized and systematic description of the ways in which QA and QC should be applied to the collection and use of environmental data. QA (as it applies to data generation) is generally an oversight function, and involves a system of activities including planning, quality control, quality assessment, and quality improvement to generate accurate and defensible data. QC consists of the technical activities required to measure and control the quality of the data generated, so that it meets user needs; examples of QC "checks" include field blanks, duplicates, and audits.

The *Uniform Federal Policy for Quality Assurance Project Plans Manual* (*UFP-QAPP Manual*; EPA/505/F-03/001, Mar. 2005) shall be used to document project information and requirements. It provides standardized instructions for preparing UFP-QAPPs for environmental data collection, using a systematic planning approach. Specifically, the Manual:

- Provides standardized instructions for preparing QAPPs for environmental data collection.
- Is consistent with U.S. EPA requirements for preparing QAPPs (EPA QA/R-5 and EPA QA/G-5).
- Incorporates the Data Quality Objectives (DQO) process.
- Is applicable to U.S. EPA's Triad Approach.
- Has been endorsed by Deputy Under Secretary of Defense for immediate implementation as documented in the memorandum signed on April 11, 2006.

The UFP-QAPP is applicable to all types of environmental projects (i.e., it can be used when critical or non-critical decisions are being made), as it incorporates the DQO process, and is consistent with the Triad Approach. In March 2005, the Under Secretary of Defense formally adopted policy for using UFP-QAPPs at federal facility hazardous waste sites. SECDEF Instruction *Environmental Quality Systems* (Feb. 2006) implements policy for establishing environmental quality systems for DoD activities and programs involving the collection, management, and use of environmental data. This instruction assigns responsibilities and prescribes procedures regarding the implementation of the UFP-QAPP. This was followed by a memorandum from the Deputy Under Secretary of Defense (April 2006) to DoD components requesting immediate implementation of the UFP-QAPP. Related documents, instructions, and training references on the UFP-QAPP, data quality objectives, and the systematic planning process, can be found at the following Web sites:

- http://www.clu-in.org/char1_edu.cfm
- http://www.navylabs.navy.mil/training.htm
- http://www.hanford.gov/dqo/training/cover.html
- http://www.qe3c.com/dqo/training/cover.html.

The level of detail and format required for individual QAPPs will depend on the complexity of the project. However, each QAPP incorporates the following elements:

- **Project Management and Objectives:** The QAPP shall include information that outlines the project history and objectives (including DQOs), and roles and responsibilities of participants.
- **Measurement/Data Acquisition:** The QAPP shall detail how project data will be collected, measured, and documented. In addition, the QAPP shall identify the QC activities that will be performed during each phase of data collection and generation.
- **Assessment/Oversight:** The QAPP shall define actions to be taken to ensure that planned project activities are implemented properly, and the protocols are employed to identify and document conformity and nonconformity (e.g., management reports, laboratory and field audits).
- **Data Review:** Data Review is the process by which data are examined and evaluated. The QAPP shall detail the project data review requirements. The level of review will vary, and will depend on project needs. In addition, reviews are conducted by a variety of personnel who have different responsibilities within the data management process. The data review process includes:

  Verification: Confirms that the specified requirements (sampling and analytical) have been completed (i.e., a completeness review).

  Validation: The process of evaluating compliance with method, procedure, or contract requirements. The purpose of validation is to assess the performance of the sampling and analysis processes to determine the data quality.

  Usability Assessment: The process of assessing whether the process execution and resulting data meet project objectives (including the identification of limitations on data usability).

Information and resources regarding specific content to be included in QAPPs is available at the U.S. EPA's *Quality System* Web site, which includes links to the following documents:

- *Intergovernmental Data Quality Task Force – Uniform Federal Policy for Quality Assurance Project Plans* (*UFP-QAPP Manual;* EPA/505/F-03/001, Mar. 2005).
- U.S. EPA's *Requirements for Quality Assurance Project Plans (QA/R-5)* (EPA/240/B-01/003, Dec. 2002)
- U.S. EPA's *Guidance for Quality Assurance Project Plans (QA/G-5)* (EPA/240/R-02/009, Nov. 2002)
- U.S. EPA's *Guidance on Environmental Data Verification and Data Validation (EPA G-8)* (EPA/240/R-02/004, Nov. 2002)
- U.S. EPA's *Guidance for Data Quality Assessment (EPA G-9)* (EPA/600/R-96/084, July 2000).

Training specific to quality assurance as it applies to environmental restoration is available through the Civil Engineer Corps Officers School (CECOS), https://www.cecos.navy.mil.

8.1.2.4 Laboratory QA/QC

QA (as it applies to data generation) involves a system of activities including planning, quality control, quality assessment, and quality improvement to generate accurate and defensible data. QA is generally an oversight function.

QC consists of the technical activities required to measure and control the quality of the data generated, so that it meets user needs. Examples of QC "checks" include field blanks, duplicates, and audits.

Fixed Laboratories

Laboratories that are used for ER Program sites are responsible for ensuring that their data collection and reporting activities comply with Navy's QA/QC requirements. All laboratories shall:

- Successfully complete a laboratory assessment, as described later in this subsection;
- Meet the laboratory requirements specified in the latest versions of the *Navy Installation Restoration Chemical Data Quality Manual* (IR CDQM) and in DoD's *Quality Systems Manual For Environmental Laboratories*;
- Comply with the proficiency test program specified in Appendix D of the IR CDQM;
- Allow the Navy to perform follow-up assessments on an announced or unannounced basis;
- Designate staff members as the responsible party of record; and
- Provide Naval Facilities Engineering Service Center (NFESC) and the FECs with written notification of significant changes to the laboratory within 30 days (details regarding what is meant by significant changes are included in Section 1.1.4 of the IR CDQM).

Laboratory assessments are performed to determine if laboratory practices conform to Navy ER QA program requirements presented in the IR CDQM. Basic protocols associated with laboratory assessments and the process for accepting a laboratory for use on ER projects have been established and are presented as follows (see the IR CDQM for more details):

- Contractors who plan on using a laboratory for Navy ER projects shall nominate the laboratory for assessment;
- An assessment will be performed to determine conformance with Navy ER QA program requirements. The FEC determines who will execute the assessment (NFESC or FEC contractor); and
- Laboratories will be accepted or not accepted for use based on the outcome of the assessment.

NFESC is the ER QA/QC program manager and will serve as a central agency for QA/QC program administration. In this capacity, NFESC functions as the central repository for information pertaining to laboratory assessments.

Mobile Laboratories

Some ER projects may require the use of a mobile laboratory and/or the use of field-deployed analytical devices to obtain important site characterization data. This is particularly important when the Triad Approach is used for rapid site characterization (see Section 8.1.2.1 for information on Triad).

It is recognized that mobile laboratories or field analysis will not have the same QA/QC protocols and systems as fixed laboratories. Therefore, protocols must be established prior to mobilization in order to promote data quality and usability. These protocols should be communicated and agreed upon upfront with regulators and stakeholders to promote acceptance of results. The following issues should be addressed in project planning documents (when using a mobile laboratory or field deployed analytical devices):

- Record keeping and documentation of protocols (e.g., Standard Operating Procedure [SOPs]), and analytical results;
- Personnel training and qualifications;
- Sample preparation, preservation, storage, contamination control, and analysis; and
- QA policies and QC procedures, including the use of split or duplicate samples (the number of samples sent to a fixed laboratory will depend on the nature and complexity of the sampling.), and the performance of field assessments.

The intensity or frequency of QC activity can change over time based on various factors, such as the following:

- Increased knowledge of site conditions and sources of analytical variability, which may allow the frequency of QC samples (such as matrix spikes and matrix spike duplicates) or protocols (source checks, calibration checks, etc.) to be reduced;
- Changing needs of characterization or remediation work (e.g., hot spot sampling has lower QC needs than site closure documentation);
- Correlation between field measurements and duplicate samples sent to a fixed laboratory (better and more consistent correlation allows percent duplicate to be reduced); and
- Specific site conditions or data results, which may allow the QC program to be adjusted to be more effective, such as running matrix spikes at levels closer to the actual results.

The Statement of Work (SOW) for mobile laboratories should reference U.S. EPA's *Good Laboratory Practices* (40 CFR Sections 160 and 792) and *Good Automated Laboratory Practices* (10 Aug. 1995). Additional guidance regarding QA/QC protocol can be found at the Triad Web site, http://www.triadcentral.org, and in the *Navy Installation Restoration Chemical Data Quality Manual* (IR CDQM).

Laboratory Data Validation

Data validation involves review and critique of the analytical procedures used to generate data. This includes the calibration of the analytical instrument(s), QC samples analyzed with the field sample, the calculation of the results, and many other checks. It is recommended that a minimum of 10% of analytical data be validated at level IV (full validation). Data sets for risk assessment and site closure should be validated at 10% level IV and 90% level III (cursory validation). Guidance on data validation is available from the following sources:

- U.S. EPA's *Guidance on Environmental Data Verification and Data Validation (EPA G-8)* (EPA/240/R-02/004, Nov. 2002)

- *Navy Installation Restoration Chemical Data Quality Manual* (Sep. 1999): Appendix H of the IR CDQM presents guidance on conducting data reviews and data validation. The information is applicable to Contract Laboratory Program [CLP] and non-CLP methods.

- *National Functional Guidelines for Organic Data Review* (EPA/540/R-99-008, Oct. 1999); and *Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses* (EPA/540/R-04/004, Oct. 2004). These Functional Guidelines are designed for use with data packages generated under CLP SOWs for analytical methods. (CLP is a national network of U.S. EPA personnel, commercial laboratories, and support contractors whose mission is to provide analytical data of known and documented quality.) However, they can be applied to analytical methods other than those identified as CLP. It is noted that non-CLP methods may not specify the same QC and documentation requirements that CLP does; therefore, the Functional Guidelines cannot be followed explicitly. Software packages are available through U.S. EPA to conduct portions of the data validation process electronically.

8.1.2.5 Sampling and Analysis Plan (SAP) and Field Sampling Plan (FSP)

The SAP documents the details of all field activities and laboratory analyses before the site work is initiated. In addition to ensuring consistency in the sampling and analytical methods, it provides a mechanism for review and approval by regulatory agencies and stakeholders. The SAP describes the objectives and locations of sampling activities; field methods and procedures for sample collection; procedures for analyzing collected samples; and data management and reporting procedures. The SAP includes a FSP (described in this subsection) and a QAPP (described in Section 8.1.2.3).

The purpose of the FSP is to detail a "plan of action" for the field sampling effort to ensure that proper sampling techniques are employed to obtain samples that retain their scientific integrity and are legally defensible. The person writing the plan must be very familiar with the site-specific conditions and those implementing the plan must be very familiar with the plan's contents. A properly prepared FSP that is correctly implemented will allow the sampling objectives to be met, help avoid confusion in the field, preserve health and safety, and ultimately save time and money. Chapter 3 of the *UFP-QAPP Manual* (EPA/505/F-03/001, Mar. 2005) provides guidance for developing a FSP. Topics that should be addressed in a FSP include:

- Sampling Process Design (Experimental Design);
- Sampling Methods;
- Equipment Required;
- Sampling Locations;
- Sample Handling and Custody;
- Sample Containers and Preservation;
- Decontamination Procedures;
- Disposal of Residual Materials;
- Analytes of Concern and Analytical Methods;
- Quality Control;
- Instrument/Equipment Testing, Inspection, and Maintenance;
- Instrument/Equipment Calibration and Frequency;

- Inspection/Acceptance of Supplies and Consumables;
- Non-direct Measurements; and
- Data Management.

8.2 Remedial Investigation (RI)

This section describes the RI process including site characterization, considerations of background chemical concentrations, risk assessments, and data management and visualization. Figure 8-3 presents a flow diagram of the RI process.

The goals of the RI are to:

- Determine the nature and extent of COCs and potential threat to human health and the environment; and
- Provide a basis for determining whether or what types of response actions are required.

Before RI site work begins, the RPM ensures that the required plans are in place as discussed in Section 8.1, including the RI Work Plan, SAP, FSP, QAPP, and HASP. The RPM also ensures that project personnel at the FEC and installation, as well as contractors working on the RI, are familiar with these documents. Once the scoping process is complete and work plans established, the site characterization process (including site work) can begin.

8.2.1 Site Characterization

During the site characterization stage of the RI, the SAP is implemented. Field data are obtained and analyzed to assess the nature of any threats the site poses to human health or the environment and to refine the CSM and design of potential response actions. Field data analyses and interpretation should be based on the DQOs and QA/QC requirements outlined in the QAPP. QA/QC is an important element in site characterization because critical decisions are made based on data generated from field and laboratory activities. A QAPP is developed prior to initiating field activities to ensure effective QA/QC during field activities as well as laboratory analysis and data review. See Section 8.1.2 Systematic Planning for information and resources on the Triad Approach, DQOs, QAPP, and Laboratory QA/QC. This will ensure that data are of appropriate quality and are legally defensible.

The development and implementation of a successful remedial strategy is directly related to acquiring valid site characterization information pertaining to the nature of the contaminants, mass distribution and volume estimation of each contaminant phase, and an accurate understanding of the geologic and hydrogeologic processes affecting the disposition of contaminants.

The major steps in site characterization typically include:

- Collecting of field samples including soil, sediment, groundwater, surface water, biological, and air samples as specified in the SAP;
- Making field observations and measurements of the physical nature of the site, including topography, surface and groundwater hydrology, meteorology, lithology, ecology, and other observed physical parameters of the matrices which may include:

Flow Diagram for the RI

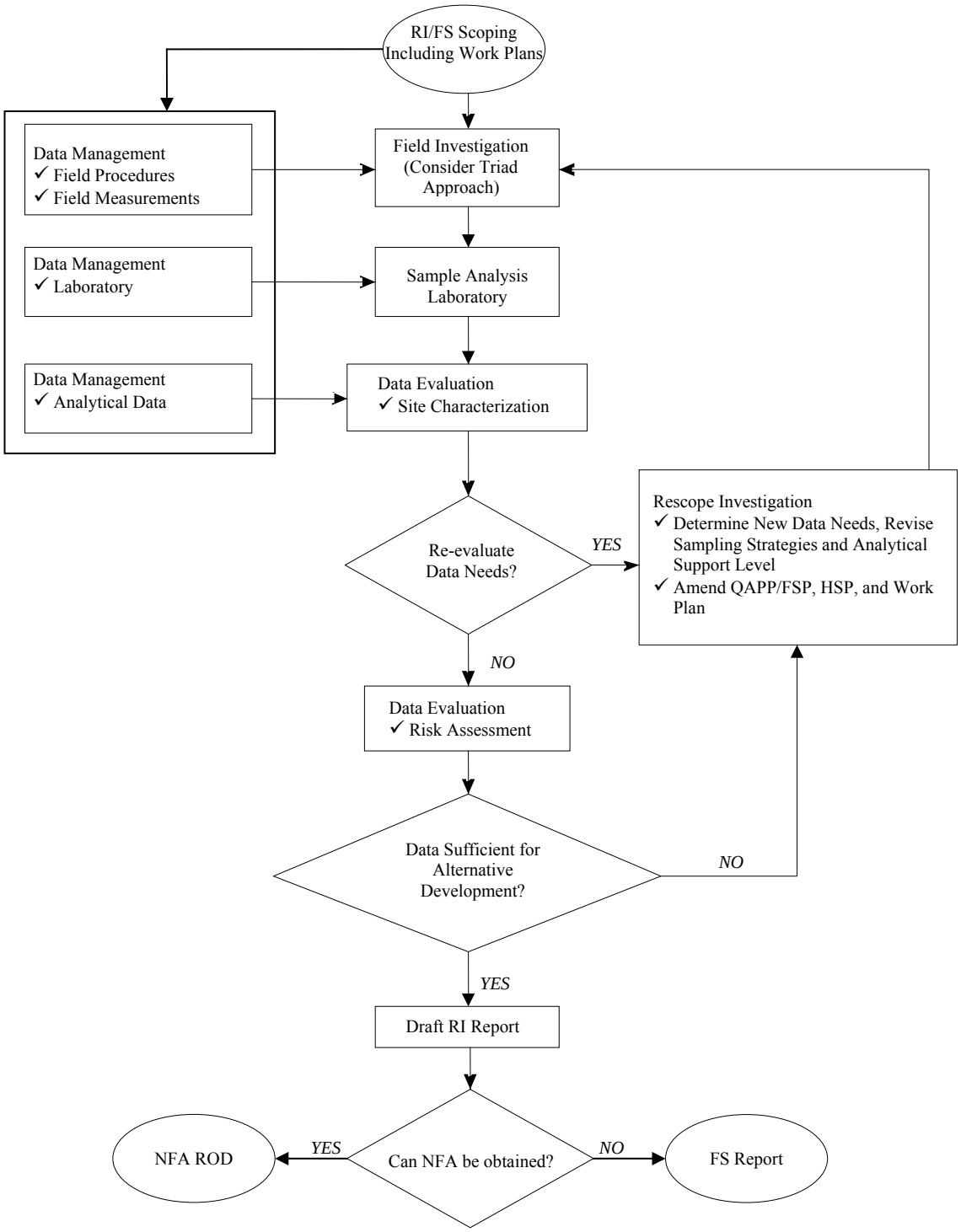


Figure 8-3. Flow Diagram for the RI

- — Hydrogeologic parameters obtained from field tests such as a pump test or slug test.
- — Field measurements of matrix parameters including depth to groundwater, groundwater temperature, pH, conductivity, redox potential, color, and presence of nonaqueous-phase liquid (NAPL)
- — Soil classification, and lithology;

- Analyzing samples in the laboratory or using field screening techniques;
- Using data management and visualization tools to aid in the evaluation of laboratory results and field observations to characterize the site;
- Determining the adequacy of data for deciding whether the site poses an unacceptable risk and for the development and evaluation of remedial alternatives; and
- Refining the CSM.

The results of field observations or laboratory analyses may show that site conditions are significantly different from what was anticipated during initial scoping efforts. Rescoping and additional sampling may be necessary (e.g., in the case of a high concentration of contaminant on the boundary area of the study, step-out sampling may be required to delineate the boundary of the contaminant mass).

Results also may indicate that the threat is more immediate than previously understood, in which case an interim removal action may be initiated. If one portion of the site needs more immediate attention than others, separating the site into operable units will facilitate addressing the highest priority area or media first.

8.2.1.1 Sampling

A critical element of site characterization is the collection of samples from various media. Samples may be analyzed either in the field, using instruments, test kits, or visual observation; or in a laboratory by any of numerous analytical techniques. When collecting samples it is crucial that the samples are:

- Representative of typical conditions of the location and media of interest; and
- Collected using the appropriate protocols for the media sampled and the parameters to be analyzed.

The SAP, which includes the FSP and QAPP (as discussed in Section 8.1.2.5), is a tool to accomplish these sampling objectives.

Collecting Representative Samples

In any natural geologic formation, there is a degree of heterogeneity; thus one sample is not expected to be representative of a larger area of the site. Concentrations of contaminants as well as natural properties of the media can vary spatially and with depth, sometimes in an unpredictable manner. To address this issue, it is necessary to obtain a sufficient number of samples to gain enough confidence that the sample set as a whole provides a reasonably accurate characterization of the site. In general, the number of samples required to meet the project objectives depends on the extent of contamination as well as the degree of variability. Thus, the factors that determine the number of samples required can only be determined through sampling and analysis. The SAP is developed before these data are available; therefore, uncertainty will exist regarding the number and locations at which samples should be collected.

To manage the uncertainty discussed above, the SAP should including systematic planning to allow it to be dynamic in nature. In addition, the use of field screening and instruments for real-time measurement can expedite the process, making site characterization more rapid and efficient. The **Triad Approach**, discussed previously in Section 8.1.1, is a proven methodology for accomplishing these objectives. It has been successfully applied for the characterization of many hazardous waste sites, including many within the ER Program. The Triad Approach can be applied to any media, including soil, groundwater, surface water, and sediment. Additional information regarding field screening techniques is presented in Section 8.2.1.2.

In addition to the Triad Approach, geostatistical methods are an effective means to manage site uncertainties. Geostatistics and related computer-based exploratory data analysis tools, including GIS, can be used to determine whether site contamination data is spatially correlated, which is often the case with contaminant releases. If the data is spatially correlated, classical statistical estimation methods are not appropriate. Instead a geostatistical variogram can be developed as a model of the contaminant spatial variability (correlation) and used in point kriging to estimate contaminant concentrations at unsampled locations. The results can be used to iteratively identify significant data gaps where additional samples should be collected to reduce uncertainty to acceptable levels. Geostatistics is also a useful tool in risk assessment and determining areas requiring remediation, particularly for soil and sediment sites. Using block kriging, geostatistics can be used to estimate the average exposure concentration of a contaminant over respective exposure units to a specified confidence level (e.g., 95% UCL). Similarly, if the exposure concentration exceeds acceptable risk levels, geostatistics can be used to define "hot spot" areas within an exposure unit that should be remediated to achieve acceptable risk levels. For additional information on the application of geostatistics to environmental restoration projects, see the CECOS training course Geographic Information Systems and Geostatistics at https://www.cecos.navy.mil/.

Sampling Protocols/Methods

To obtain reliable and defensible data, it is essential that the appropriate sampling methods are followed. Sampling methods depend on the matrix being sampled, the parameters to be analyzed, and the physical characteristics of the sample location (i.e., sample depth). Specific sampling methods for various matrices and analytes can be found in the document *Sampling Methods in Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM)* (U.S. EPA Region 4, Nov. 2001). Also, *Appendix D of the FRTR Field Sampling and Analysis Guide* (Mar. 1998) is a matrix of sampling techniques for various media and analyses. U.S. EPA guidance on sampling and analysis for monitored natural attenuation (MNA) assessments can be found on the U.S. EPA MNA Documents Web site (http://www.epa.gov/swerust1/oswermna/mna_epas.htm).

Individual states and U.S. EPA regions may have certain requirements that must be followed. The RPM ensures that the sampling protocols meet all applicable requirements. Some common sampling issues to be considered include:

- Obtaining spatial information regarding sample location (x, y, and z), and the datum or benchmarks used;
- Determining the type and number of QA/QC and confirmation samples required;
- Record keeping (i.e., field measurements, sample location, date, time, personnel collecting the sample, and field conditions);
- Tracking when sampling equipment is both used and calibrated;
- Decontaminating the sampling equipment; and

- Handling the samples, including preservation, field preparation (e.g., compositing, filtering) storage, shipping, and custody of samples.

Innovative Sampling Methods

RPMs should consider the use of innovative sampling methods to reduce costs, increase reliability, or offer other advantages over conventional methods. What is considered innovative today may not be tomorrow. Because new sampling methods are continually under development, RPMs should periodically identify and evaluate new methods.

DON has had good success with the use of passive diffusion samplers for collecting groundwater samples from permanent monitoring wells; however, the applicability of this method depends on both site-specific conditions and types of contaminants. Advantages include better sample quality, discrete sampling points, minimal wastewater from the elimination of decontamination water and purge water, and less sampling labor. While this method is not appropriate for initial site characterization, it may be useful during the RI, and particularly during the RA-O and LTMgt phases, if results are determined to be consistent with results from traditional sampling methods. It has been used effectively to monitor a variety of volatile organic compounds (VOCs), including trichloroethylene (TCE) and its breakdown products and benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds; however, it is currently not to be used for metals or other inorganics and some VOCs. Site conditions that may affect the applicability of this technology include fluctuation of the water table, groundwater velocity, hydraulic conductivity, and hydraulic gradient. Information for passive diffusion samplers can be found at the "Diffusion Sampler" page on the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb).

For groundwater sampling at multiple elevations, several equipment manufacturers have developed systems to obtain samples at various depths from a single borehole. For deep application where sampling is needed at many depths, these methods reduce the cost of well installation and also reduce sampling costs.

8.2.1.2 Field Screening Methods and Investigative Techniques

RPMs should consider the use of qualitative or semi-quantitative screening methods and innovative in situ approaches to reduce the collection of expensive samples to characterize an ER Program site. Field screening methods can be used to quickly and effectively evaluate the potential presence of contamination or features of concern at a site and target specific areas for further investigation. The use of screening methods is also critical for the implementation of the Triad Approach. A description of various field screening techniques that can be used for characterization of soil, sediment, water and NAPL, such as geophysics, direct push methods, membrane interface probes, and several field analytical method, are provided in Appendix B.1 of this manual.

The successful remediation of a site depends on properly identifying the vertical and horizontal extent of contamination and quantifying the mass distribution of each contaminant phase. Geophysical methods can be used to help define the physical and chemical properties of contaminants, the distribution of contaminants, and the subsurface hydrogeology and geology of a site. In situ and ex situ technologies are available that allow for the evaluation of the presence of petroleum hydrocarbons and/or other organic hydrocarbons (e.g., solvents). In situ techniques also are available that allow a rapid determination of subsurface contaminant distribution by measuring secondary characteristics (e.g., conductivity differences). Examples of such technologies are provided in both Appendix B.1 of this manual and at the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb).

It is generally advisable that when field screening methods are used, confirmatory samples also should be analyzed at an off-site laboratory as an independent check on the function and accuracy of these tools. Field analytical methods and in situ screening tools can be used to determine vertical and horizontal extent of contamination. However, it is advisable to perform confirmation sampling within and at the boundaries of an identified contamination area/zone using fixed laboratory analytical work. The frequency of confirmation sampling should be agreed upon with the appropriate regulatory agency and should also be flexible based on consistency of previous results and other factors related to QA/QC discussed in Section 8.1.2.4 (under the heading "Mobile Laboratories").

8.2.1.3 Data Management and Visualization

During the site characterization phase, the volume of data generated can become quite large and must be managed properly. The use of data management and visualization tools allow data to be stored in a manner allowing it to be easily retrieved, queried, tabularized, and shown graphically in many different formats. The data management and visualization tool used by the ER Program is NIRIS, which is used to manage all site data and directly receives electronic data deliverables that are generated by commercial laboratories. It supports tools for data analysis and visualization, including GIS tools, a document management system, a LUC Tracker tool, various statistical tools, and modeling tools. Further detail about NIRIS is provided in Chapter 14.

The use of these tools allows DON personnel and stakeholders to develop a greater understanding of site characteristics. This results in better decisions and a more effective and efficient response action.

8.2.1.4 Investigation-Derived Waste (IDW) Management

RI field activities may result in the generation of waste materials that may be regulated under RCRA or other ARARs and may pose a risk to human health and the environment. Common investigation-derived wastes (IDW) include drill cuttings from the soil borings or monitoring well installation and purge water from monitoring well development and sampling. IDW management shall ensure protection of human health and the environment and be in compliance with ARARs. U.S. EPA and state policy should be incorporated into the IDW Management Plan developed for each site investigation or remedial action. The state and U.S. EPA should review this plan as part of the work plan review.

In certain situations, IDW can be left on site, which is typically more cost-effective and in many cases results in lower overall risk than transportation and off-site disposal. U.S. EPA's *Guide to Management of Investigation-Derived Wastes* (OSWER 9345.3-03FS, Jan. 1992) presents an overview of possible IDW management options, discusses the protectiveness requirements and ARARs associated with these options, and outlines general objectives established for IDW management under Superfund.

8.2.1.5 Health and Safety Requirements

All activities completed at an ER site during the RI/FS stage shall be completed in accordance with applicable and relevant DON health and safety procedures and requirements, which have been developed to be compliant with federal regulations and other DoD guidance. All personnel engaged in the RI/FS activities shall be properly trained in accordance with DON health and safety training requirements, and shall be compliant with all medical surveillance required by DON. Personnel involved in ER Program activities shall be trained to a degree consistent with their involvement in ER project work. Health and safety requirements, including roles and responsibilities and health and safety plans are discussed in Chapter 16. DON health and safety training requirements are described in detail in Chapter 17.

8.2.2 Background Concentrations

An important step in the RI is the determination of background concentrations of chemicals of concern. Both natural processes (e.g., erosion of naturally occurring metallic mineral deposits) and anthropogenic processes (e.g., deposition of lead from internal combustion engine exhaust) may result in elevated concentrations of various chemicals, including hazardous substances. These background chemicals are derived from sources not related to site-specific DON activities or operations, and should not be considered DON releases. Failure to distinguish between DON releases and background conditions may lead to unnecessary remediation and delay property transfer and re-use.

Guidance on consideration of background chemical levels for ER Program sites is provided in the *Navy Policy on the Use of Background Chemical Levels* (30 Jan. 2004). According to the policy, cleanup efforts at DON sites should address only those risks associated with chemical concentrations that are elevated as a result of a site-related release.

Various methods are available for performing background analyses at a site. It is best to obtain concurrence from all stakeholders, especially the local regulatory agency, regarding which method to use prior to performing the sampling and analysis. NAVFAC has published a three-volume set of guidance documents to provide instructions for identifying background chemicals and estimating background concentration ranges at sites where past uses of the property have resulted in actual or suspected chemical releases to soil, sediment, or groundwater:

- *Guidance for Environmental Background Analysis Volume I: Soil* (UG-2049-ENV, Apr. 2002);
- *Guidance for Environmental Background Analysis Volume II: Sediment* (UG-2054-ENV, Apr. 2003); and
- *Guidance for Environmental Background Analysis Volume III: Groundwater* (UG-2059-ENV, Apr. 2004).

These three volumes provide step-by-step instructions for the background analysis techniques appropriate for the particular medium (soil, sediment, or groundwater). The methods and the media to which they apply are briefly summarized below.

- **Exploratory Data Analysis** can be used to determine background levels for soil and sediment. This method uses graphical techniques, such as histograms, boxplots, and probability plots of individual datasets to assess the similarity between datasets. The comparison between datasets is used to distinguish between sediment or soil data representing the background population and data representing contamination. Data from suspected sites of soil or sediment contamination usually represent both “impacted” and “non-impacted” areas; therefore, in most cases, no off-site (i.e., reference area) sampling is necessary.
- **The Geochemical Method** can be applied for soil and sediment. This method uses techniques based on geochemical principles to distinguish between data representing the background population and data representing soil or sediment contamination. Chemical concentrations in natural soil and sediment are controlled by the chemical composition of the parent rocks and geochemical processes (e.g., weathering) that occur during soil and sediment formation; therefore, concentration ratios of certain metals are often correlated. The Geochemical Method usually requires only data from the potentially impacted site.

- **The Comparative Method** can be used for soil, sediment, or groundwater. This method evaluates background by determining whether differences between the site and background datasets are statistically significant. The background data set should represent soil, sediment, or groundwater in a non-impacted reference area that is physically and geochemically similar to the potentially impacted area (for example, soil in both areas should be derived from similar parent rocks and formed in similar environments).
- **Hydrogeologic/Geochemical Analysis** is used to estimate groundwater background concentration ranges. This method employs a three-step process: (1) identify all actual or suspected on-site and upgradient contaminant sources and the geologic and hydrogeologic characteristics of the sampling areas, (2) evaluate the geochemical characteristics of the groundwater and aquifer matrix, and (3) construct post-plots and graphs to evaluate chemical concentrations with respect to space and time. After identifying concentration data that represent background conditions, chemical concentrations detected at the investigation site are compared to the estimated background range.

Ideally, background concentrations are expressed as ranges so sampling and analysis variability will not be significant in determining if environmental samples have elevated concentrations of contaminants.

Background chemicals should be evaluated during the SI in order to differentiate between the Navy's cleanup responsibilities and background sources. Cleanup levels should not be set lower than background levels.

8.2.3 Risk Assessment

As part of the RI/FS process, the NCP requires that the nature and extent of site risks to human health and the environment be characterized through risk assessments. Risk assessments are performed to evaluate the potential threat to human health and the environment in the absence of any remedial action under current and likely future conditions.

In addition, DON's *Policy on Natural Resource Injury and Damages in the Installation Restoration Program* (CNO, 21 Dec. 2001) states that the ecological risk assessment (ERA) process will assess natural resource injury (NRI) if there are natural resources potentially impacted by Navy or Marine Corps hazardous substance releases. Also, there may be some cases where NRI is addressed in the human health risk assessment (HHRA) such as when drinking water standards are exceeded.

The results of the human health and ecological risk assessments are used to make site-specific risk management decisions regarding the need for a remedial action.

The Navy has defined a tiered approach that follows U.S. EPA guidance for both the HHRA and the ERA process. Tier 1 is a conservative screening risk assessment (SRA) to identify any potential COCs that may pose unacceptable risks. Tier 2 is a more rigorous site-specific baseline risk assessment that provides a detailed characterization of risks posed by the site. Tier 3 is an evaluation of remedial alternatives with regards to effective risk reduction, potential impacts from remedy implementation and evaluation of residual risks. Tier 3 is only conducted if the results of Tier 2 are unacceptable risks requiring remedy evaluation.

The goal of the Navy tiered approach is to incorporate risk management into the decision-making process, minimize the level of effort, eliminate sites that are not of concern, and ensure that the level of effort expended to evaluate sites is commensurate with the magnitude and complexity of the site-specific issues. The Navy approach emphasizes frequent interactions and concurrence among the

Navy project team, including RPMs, Remedial Technical Managers (RTMs), regulators, stakeholders, and contractors to ensure that the risk assessments are scientifically based, defensible, and cost-effective.

In order to incorporate risk management into the decision-making process for the site, it needs to be considered throughout the risk assessment process. The RPM needs to ensure that the appropriate data are collected throughout the process to ensure that a decision can be made that is scientifically defensible. In addition, the RPM needs to consider other aspects of the ER Program including costs, schedules, stakeholder concerns, and the political climate throughout the implementation of the risk assessments as these may impact final decisions at the site.

Prior to conducting a risk assessment, it is important that the approach for the risk assessment, particularly the risk assessment design and input factors (such as methodology/protocol, toxicity criteria, exposure factors, and receptors), is planned and documented either within the remedial investigation work plan or other document submitted to the appropriate regulatory agencies. The proposed approach for the risk assessment should be presented to the regulators early in the process, and concurrence on this approach should be obtained before the risk assessment is initiated. Obtaining regulatory agreement upfront generally will decrease the number of comments that need to be addressed later in the risk assessment process and will ensure that the data collected will support risk assessment requirements. This is an important step, as in certain cases risk assessment approaches may vary based on differences in state and U.S. EPA regional guidance and policies (for example, selecting COPCs, evaluating background risk and selecting of toxicity criteria).

8.2.3.1 Human Health Risk Assessment (HHRA)

The approach to conducting HHRAs for ER Program sites is defined in the *Navy Policy for Conducting Human Health Risk Assessments Under the Environmental Restoration Program* (Ser N453E/10595168, 12 Feb. 2001). This policy specifies that a three-tiered risk assessment approach be implemented during the RI/FS process as outlined in Figure 8-4. The Navy approach closely mirrors U.S. EPA's *Risk Assessment Guidance for Superfund* process. NAVFAC has developed Web-based *Navy Human Health Risk Assessment (HHRA) Guidance* that provides details on what should be included and considered in each tier of a human health risk assessment and includes various case studies, discussion on technical issues, and description of tools available to assist in the completion of HHRAs. The Navy Environmental Health Center (NEHC) is available to provide technical, medical-based reviews of HHRA documents; Chapter 2 of this manual describes NEHC roles and responsibilities.

Tier 1: Screening Risk Assessment (SRA)

A Tier 1 SRA is conducted to identify COPCs that may pose unacceptable risks to human health, thus focusing efforts and funds on those constituents most likely to drive human health risks. The SRA is generally performed during the SI phase but in some cases is done during the RI. Important components of the Tier 1 SRA include a site visit, development or revision of the CSM, identification of complete pathways, and conducting problem formulation using the DQO process. In most cases, the Tier 1 SRA is performed using existing data from the SI. The Tier 1 SRA consists of two parts: Tier 1A, Risk-Based Screening, which is required and Tier 1B, Site-Specific Risk-Based Evaluation which is optional. Tier 1A shall be completed before continuing the HHRA process.

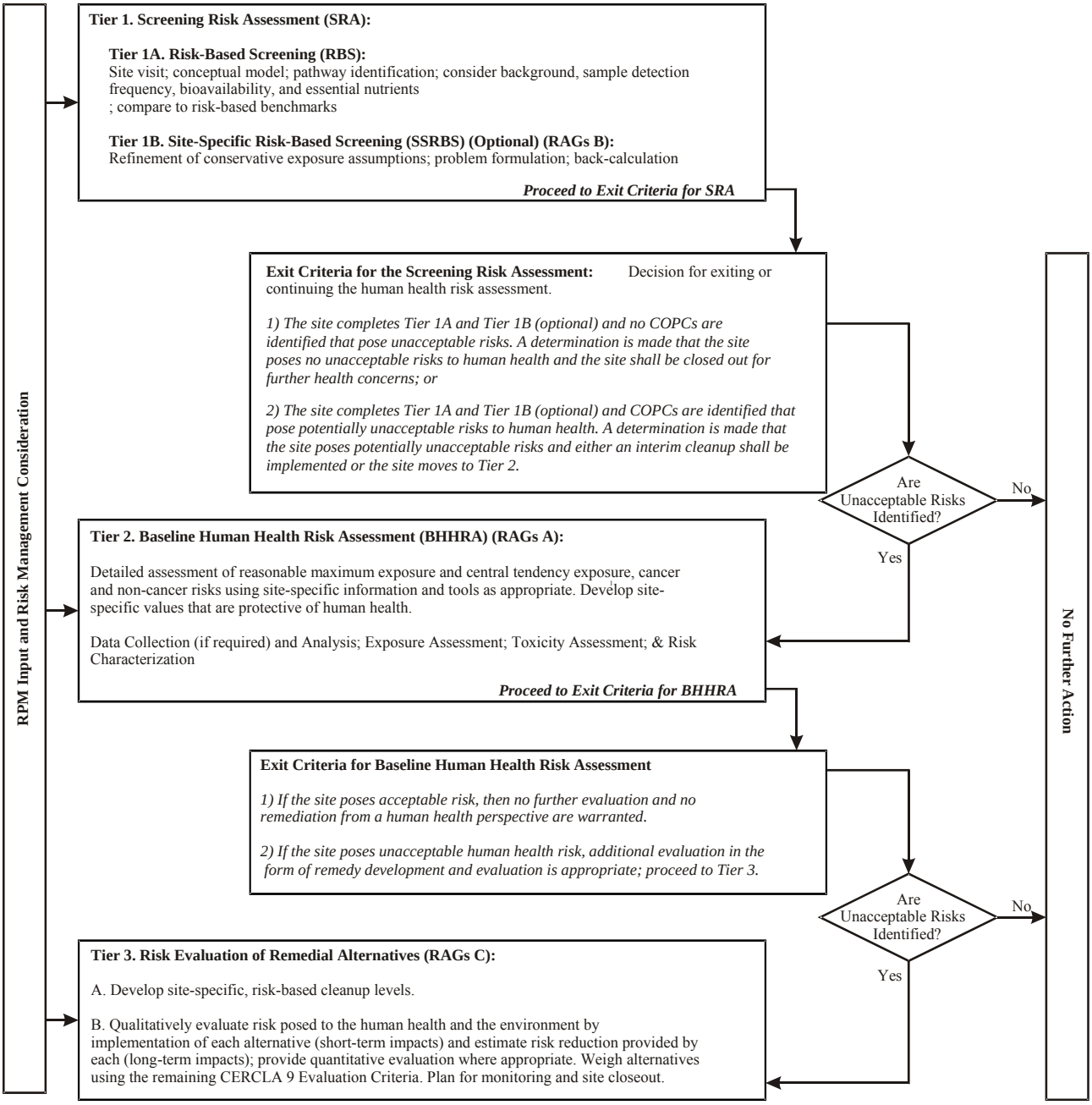


Figure 8-4. Navy Human Health Risk Assessment Tiered Approach

Tier 1A, Risk-Based Screening, is conducted by comparing the maximum concentration detected of each chemical with a completed pathway in each environmental medium (soil, surface water, and groundwater) to the appropriate risk-based concentration (RBC) benchmark. Chemical constituents having maximum concentrations that are below their benchmark values are eliminated from further consideration in the HHRA process, whereas chemicals exceeding the benchmark concentrations are retained for further evaluation. The screening RBCs selected for use in Tier 1A is agreed upon with the appropriate regulators.

Tier 1A also should evaluate each chemical constituent with regards to its background levels, detection frequency, bioavailability, and role as a nutrient. The product of Tier 1A should be a list of chemicals that will be eliminated from further consideration and a list of COPCs to be evaluated further in either Tier 1B or Tier 2. Chemicals consistent with background levels will not be carried through to Tier 2, consistent with the *Navy Policy on the Use of Background Chemical Levels* (30 Jan. 2004). Only chemicals attributable to a release from the site should be carried through for Tier 2 evaluation.

If no COPCs are identified, the site proceeds to the Tier 1 exit criteria, and a NFA decision is recommended for the HHRA.

Tier 1B, the Site-Specific Risk-Based Evaluation, may be initiated for any chemical that is retained following Tier 1A evaluation. Tier 1B further evaluates the COPCs by refining the conservative assumptions used in Tier 1A. This evaluation may take the form of a risk-ratio analysis. The risk evaluation may use the RBCs employed in Tier 1A or site-specific RBCs that have been back-calculated from existing site data. Tier 1B will have one of two outcomes: (1) COPCs will pose no unacceptable risk to human health, or (2) some or all COPCs potentially pose an unacceptable risk to human health. If COPCs are found to pose potentially unacceptable risks to human health, either an interim removal or remedial action is implemented or the HHRA moves to Tier 2, the baseline human health risk assessment, based on considerations described in Section 7.2.

Tier 2. Baseline Human Health Risk Assessment (BHHRA)

The purpose of a BHHRA is to determine if a site poses acceptable risk levels based on current or future land use and current (i.e., baseline) site conditions if no remediation or LUCs are applied at the site. BHHRAs also provide a basis for determining levels of chemicals that can remain on site and still be adequately protective of public health. The Tier 2 BHHRA is intended to be a more rigorous evaluation than the Tier 1 SRA and is to be conducted during the RI phase. Rather than relying on conservative assumptions and comparison to RBCs, Tier 2 incorporates site-specific information to calculate risk estimates. Based on the Navy's policy on background chemical levels, chemicals that are within background levels will not be evaluated in Tier 2. These chemicals will be compared to screening benchmarks and will be discussed in the risk characterization section of the risk assessment but will not be included in the site-related risk.

The information developed in the BHHRA provides the basis to:

- Determine whether or not additional remedial action is necessary at the site;
- Develop and evaluate remedial action alternatives;
- Justify the performance of a remedial action;
- Complete a detailed analysis of the "no further action" alternative, including potential public health impacts;

- Focus on the contamination problem associated with the site; and
- Document the site's baseline risk and the primary causes of that risk.

The BHHRA process can be divided into four components: (1) data collection and evaluation, (2) exposure assessment, (3) toxicity assessment, and (4) risk characterization.

a. Data Collection and Evaluation

A key aspect of the BHHRA is the study design. The DQOs developed in Tier 1 need to be re-evaluated to ensure the appropriate data are collected to permit risk characterization and support risk-based decision-making for the site. During study design, extensive communication among the Navy, the regulators, and stakeholders are needed to ensure that there is agreement on all key issues including current and future land use scenarios, data collection and analytical methods, exposure scenarios, exposure concentrations, and the statistical analysis to be used in the risk estimation. It is critical that the RPM fully understand the basis for all aspects of the BHHRA study design proposed by contractors or regulators and how the study results will be used to support the risk management decisions. All agreements should be documented in meeting minutes and the final report of the RI Work Plan. If agreements are not obtained, the RPM should document the positions and elevate the matter to upper management for resolution before proceeding in the process.

The Tier 2 assessment shall employ both the Reasonable Maximum Exposure (RME) and the Central Tendency Exposure (CTE) parameters to estimate risk and shall be calculated using realistic exposure assumptions. Tier 2 shall characterize risk under current and probable future land use scenarios. Tier 2 also should evaluate the scenario of having no LUCs applied at the site (i.e., unlimited use, unrestricted exposure).

b. Exposure Assessment

The goal of the exposure assessment is to quantify the dose, or the amount of a chemical absorbed. Exposure assessment consists of identifying the exposure scenarios, delineating the exposure pathways, and quantifying the exposure point concentration for each COPC. Because much uncertainty and variability is inherent in the exposure assessment process, the exposure point concentration is assessed carefully in order to accurately estimate the exposure without overestimating it. Exposure point concentrations should be developed for the reasonable maximum exposure and the average exposure scenario.

The fundamental components of the exposure assessment are developing and using a CSM, incorporating land use analyses to define receptors, defining the exposure area, and calculating the exposure point concentration.

c. Toxicity Assessment

The objective of the toxicity assessment in the risk assessment is to develop and use dose-response information in combination with the exposure assessment to estimate a human health impact. The quantification of dose and human response necessary for both carcinogenic and non-carcinogenic risk assessments has been conducted for many chemicals and is tabulated in database tables such as *U.S. EPA Region 9 Preliminary Remediation Goals (PRGs)* and *U.S. EPA Region 3 Risk Assessment and Risk-Based Concentration RBC) Tables*. Guidance on the hierarchy of human health toxicity values generally recommended for use in risk assessments is contained in the U.S. EPA's *Human Health Toxicity Values in Superfund Risk Assessments* (OSWER Directive 9285.7-53, 09 Dec. 2003).

d. Risk Characterization

The risk characterization step uses data collection and exposure and toxicity assessment information to quantify a risk estimate. The objective is to characterize the potential or actual carcinogenic and noncarcinogenic risks identified from the integrated information developed during the exposure and toxicity assessments. The risk characterization process serves as a key step in the ultimate site decision-making procedure and serves as the bridge between risk assessment and risk management.

Tier 3. Risk Evaluation of Remedial Alternatives and Risk Management

Guidance for both human health and ecological risk assessments specifies that Tier 3 be performed if a FS is conducted. Tier 3 is the evaluation of the remedial alternatives (including no action) with regards to: (1) the effectiveness of reducing risks to acceptable levels; (2) human health and/or ecological impacts related to remedy implementation; and (3) residual risks that will remain at a site. Residual risks that exceed acceptable risk levels will require implementation of LUCs. The need for LUCs will need to be determined by site-specific considerations and in consultation with the regulators. Tier 3 is conducted during the FS and is an important tier that should be considered in the remedy selection process.

Risk management integrates the results of the risk assessment with other considerations such as economic, technical, or legal concerns to select a remediation approach that is feasible as well as protective of human health and the environment, and in some cases, will support a "no further action" decision. More guidance on risk management can be found in U.S. EPA's *Rules of Thumb for Superfund Remedy Selection* (OSWER Directive 9355.0-69, Aug. 1997). 40 CFR Section 300.430(e)(2)(i)(A)(2) states "For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} using information on the relationship between dose and response. The 10^{-6} risk level shall be used as the point of departure [criteria] for determining remediation goals for alternatives when ARARs are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure." U.S. EPA's *Role of Baseline Risk Assessment in Superfund Remedy Selection Decisions* (OSWER Directive 9355.0-30, 22 Apr. 1991) provides additional guidance on interpretation of these risk levels. Generally, cumulative site risk below 10^{-6} does not require remedial action while cumulative risk above 10^{-4} usually does require action. The range between 10^{-4} and 10^{-6} is considered the risk management range and the need for remediation at sites falling within this range is generally a risk management decision determined by various considerations such as uncertainty or site-specific conditions. For noncarcinogens, U.S. EPA has established for regulatory purposes that, when the total hazard index for an exposed individual or group of individuals exceeds 1, there may be concern for potential non-cancer effects, such as respiratory illnesses.

For water contamination, it should be determined if the water could potentially be used for drinking water. States generally have water use classification standards in place and the drinking water use category is often based on factors such as total dissolved solids, concentrations of other naturally occurring chemicals, or the sustained yield from wells. For drinking water, maximum contaminant levels (MCLs) or non-zero MCL goals generally are the criteria used for determining the need for remedial action and are often ARARs. However, depending on the contaminant type and site-specific conditions, remediation to the MCLs is sometimes very difficult or even impossible to achieve. In these situations, if the groundwater is not currently being used for drinking water, the likelihood and the timeframe for its use as drinking water may be important considerations. Also, it may be possible to develop Alternative Concentration Limits (ACLs). ACLs are risk-based concentration limits that can be used to establish alternate groundwater protection standards. ACLs are outlined in CERCLA

Section 121(d)(2)(B)(ii) and NCP Section 300.430(e)(2)(i)(F). More information on ACLs can be found in U.S. EPA's *Alternate Concentration Limit Guidance* (OSWER Directive 9481.00-6C, July 1987) and *Interim Final, Alternate Concentration Limit Guidance Part II, Case Studies* (OSWER Directive 9481.00-11, May 1988). In addition, some states, such as Texas and Florida, have regulations and guidance on using ACLs or similar risk management options, depending on site-specific conditions, the stability of the plume, or technical practicability. The RPM should determine the specific regulations and guidance applicable to the site. In some states, groundwater may be broadly designated as drinking water even in areas where it does not meet the criteria for use as drinking water. In some cases, the RPM should consider requesting a basin plan exemption from the water resource agency, which would document an agreement that the groundwater is not useable for drinking water purposes. This would remove the requirement to meet non-zero MCL goals/MCLs.

If achieving MCLs/non-zero MCL goals is required but the groundwater is not expected to be used as drinking water in the near future, it is possible that the cleanup technology or combination of technologies using the treatment train and/or target treatment zone concepts (see Section 8.3.3.1) may be selected to focus on achieving the MCLs but only in the long-term. Also, the relationship of the groundwater to other water bodies such as through discharge to surface water may affect the criteria that will be applied to the site.

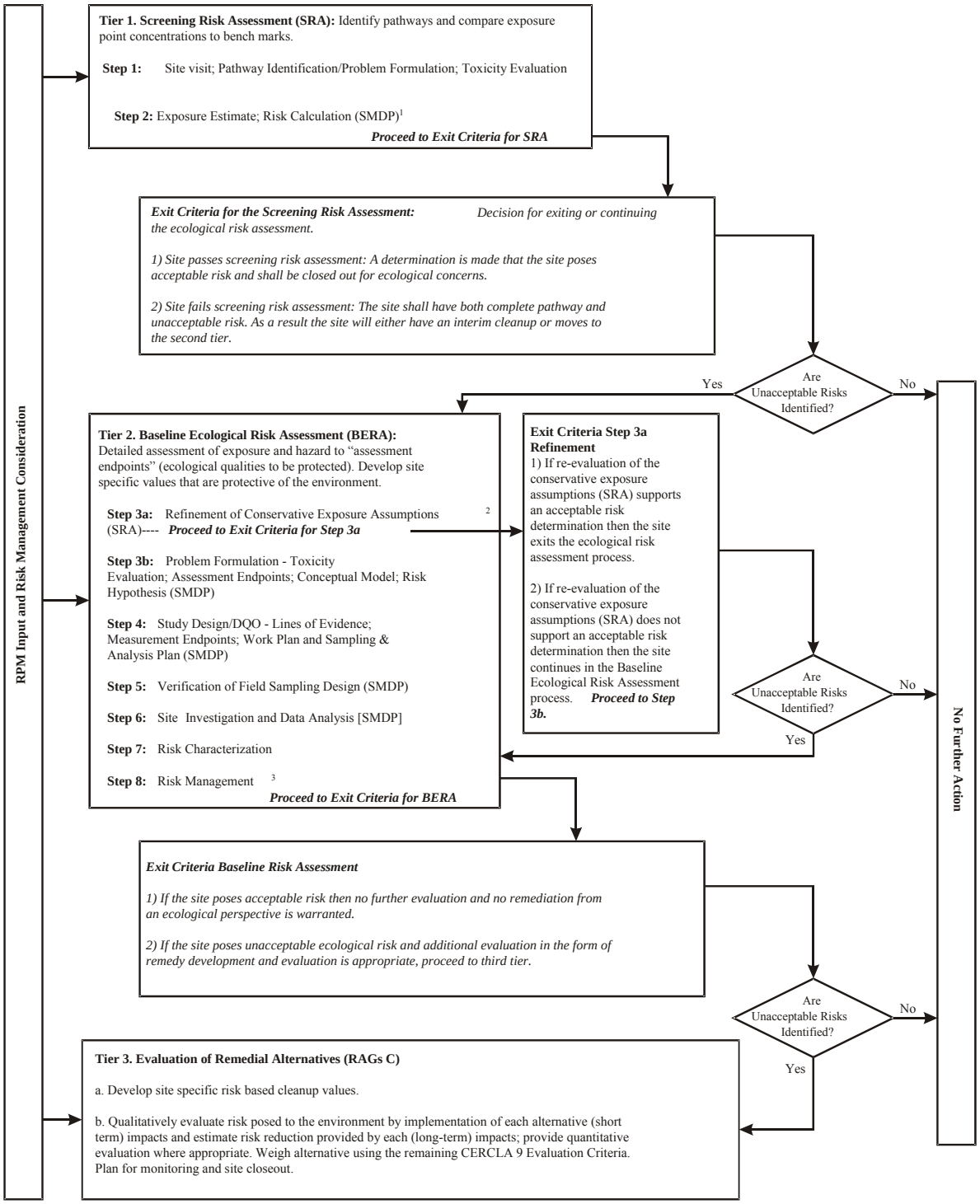
Along with the risk calculations, the BHHRA shall include an uncertainty analysis to place the risk in proper perspective and to identify areas where additional data may improve the basis for remedy selection.

If the results of the BHHRA indicate that the site does not pose an actual or potential risk to human health then a NFA decision for human health can be recommended. The RI shall still include an ERA, unless the site already has a Record of Decision (ROD) in place without an ERA. It should be noted that for HHRA in many cases Tier 1 screening is all that is necessary. Only if both the HHRA and ERA indicate that the site does not pose an unacceptable risk can the RI recommend NFA, which would then be documented in a ROD.

8.2.3.2 Ecological Risk Assessment (ERA)

An ERA evaluates the likelihood that an adverse ecological effect has occurred or may occur as a result of exposure to one or more stressors. Those stressors, as defined by U.S. EPA, are physical, chemical, or biological entities that can induce an adverse ecological response (such as toxicity, bio-accumulation, death, or reproduction impairment). Under the NCP (40 CFR Section 300.430), an ERA should be conducted to identify and mitigate adverse environmental impacts, as well as to select remedial actions that tend to protect organisms, populations, communities, and ecosystems. Adverse responses can range from effects on an individual organism to the loss of an ecosystem's function.

The Navy's approach to conducting ERAs for the ER Program is defined in the *Navy Policy for Conducting Ecological Risk Assessments* (Ser N453E/9U595355, 05 Apr. 1999) and specifies that a three-tiered risk assessment approach be implemented as outlined in Figure 8-5. This approach mirrors U.S. EPA's eight-step process defined in the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (EPA/540/R-97/006, June 1997). NAVFAC has developed Web-based *Navy Ecological Risk Assessment (ERA) Guidance* that provides details on what should be included and considered in each tier of the ERA and includes various case studies, discussion on technical issues, and description of tools available to assist in the completion of ERAs. NFESC can provide technical support and reviews of ERA documents.



Notes: 1) See EPA's 8 Step ERA Process for requirements for each Scientific Management Decision Point (SMDP).
2) Refinement includes but is not limited to background, bioavailability, detection frequency, etc.
3) Risk Management is incorporated throughout the tiered approach.

Figure 8-5. Navy Ecological Risk Assessment Tiered Approach

Tier 1: Screening Risk Assessment (SRA)

Similar to the HHRA, the ERA Tier 1 SRA is conducted to identify COPCs that may pose unacceptable risks to the environment, thus focusing efforts and funds on those constituents most likely to drive ecological risks. Important components of the Tier 1 SRA include a site visit, development or revision of the CSM, identification of complete pathways, and identification of representative ecological receptors (i.e., assessment endpoints).

The SRA is usually conducted during the SI phase using existing data and conservative assumptions, although in some cases it is performed during the RI phase. For each receptor/COPC combination that has a complete exposure pathway, the maximum concentration detected is compared to the appropriate RBC benchmark using the hazard quotient approach, and chemical constituents having maximum concentrations that are below their benchmark values are eliminated from further consideration. Examples of benchmarks include the *U.S. EPA's National Recommended Water Quality Criteria for Protection of Aquatic Life* and *U.S. EPA's Ecological Soil Screening Levels*. Also, the *Risk Assessment Information System* Web page maintains a database of ecological benchmarks for various types of biota and various environmental media.

Chemicals that are determined to be consistent with background levels will not be carried forward to the BERA, consistent with the Navy's policy on background chemical levels. These chemicals will be compared to the screening benchmarks and will be discussed in the risk characterization section of the BERA, but will not be included with the site-related risk.

It is important to include regulators and stakeholders in the identification of the appropriate assessment endpoints and RBCs and all agreements should be documented. If there are natural resources potentially impacted by releases at a site, then the designated natural resource trustees should be included during the ERA process to the extent practicable. Although trustee involvement is encouraged in the ER Program, only the DON, as lead agency, and appropriate parties (i.e., regulators) make the final decisions regarding cleanup and investigations.

The criteria for exiting the Tier 1 SRA include:

1. The site passes the SRA or an absence of complete exposure pathways to all ecological receptors exists. If either case exists, the site should be closed out for ecological concerns, and a NFA would be recommended for the ERA.

2. The site fails the SRA, thus determining that a potential exposure pathway and potential unacceptable risk exists. If the site fails the screen, then either an interim removal or remedial action or the Tier 2 Baseline Ecological Risk Assessment (BERA) should be initiated.

Tier 2: Baseline Ecological Risk Assessment (BERA)

Like the HHRA, the Tier 2 BERA is intended to be a more rigorous evaluation than the Tier 1 SRA and is to be conducted during the RI phase. Rather than relying on conservative assumptions and comparison to RBCs, Tier 2 incorporates site-specific information to calculate risk estimates.

The first component of the Tier 2 BERA is the Navy's Step 3a. The goal of this step is to refine the conservative exposure assumptions used in the Tier 1 SRA and recalculate the risk estimates. This re-evaluation includes considerations of background, sample detection frequency, bioavailability, and realistic exposure scenarios. It is important that regulatory concurrence is obtained on all assumptions in Step 3a.

If at the end of Step 3a, the re-evaluation of the conservative exposure assumptions supports an acceptable risk determination, then the results are documented and the site exits the ERA process. If re-evaluation of the assumptions still indicates an unacceptable risk, the process continues with the Tier 2 BERA problem formulation for those COPCs that did not drop from the list during the Step 3a evaluation.

The key components of the BERA are the CSM, project planning, and study design. These activities involve extensive communication between the Navy, regulators, natural resource trustees, and other stakeholders. It is critical that the RPM fully understand the basis for all aspects of the BERA study design proposed by contractors or regulators and how the study results will be used to support the risk management decisions. There should be concurrence from the regulators throughout the study design on assessment endpoints, measurement endpoints, risk questions, application and results of the DQO process, and specific study designs; also, all agreements should be documented. If agreements are not obtained, the RPM should document the positions and elevate the matter to upper management for resolution before proceeding to the next step. It is important to note that multiple iterations of the BERA are not warranted.

The completion of the study design results in a draft ERA Work Plan, SAP, and site-specific ecological QAPP. Prior to implementation of the Work Plan and SAP, it is important to verify the sampling design through simple pilot studies to ensure that the needed data can be collected using the methods identified in the SAP. If data collection problems arise, the RPM is responsible for discussing the problems with regulators, identifying alternate sampling approaches, and revising the draft Work Plan and SAP prior to initiating the field data collection. It is important to document any field changes to the Work Plan and SAP, and to review data and results relative to the assessment and measurement endpoints along with the DQOs in order to ensure that appropriate data are being collected to answer the risk questions and reach a risk management decision. The Work Plan, SAP, and QAPP should all be referenced in the final RI Report.

The data analyses and results are documented in the BERA risk characterization, which is ultimately referenced in the final RI document. For each assessment endpoint, the risk is characterized through a risk calculation using the methods identified during the study design. A discussion and summary of the uncertainties associated with the calculated risk is included as a part of the risk calculation. In addition to the risk estimation, a risk description is to be provided, which helps interpret the risk results and identifies a threshold for adverse effects for each endpoint.

At the conclusion of Tier 2, the BERA will characterize the ecological risk posed by the site, which then is used to make one of the following two risk management decisions:

1. No further evaluation and no remediation from an ecological perspective is warranted because the site does not pose unacceptable risk.

2. The site poses unacceptable ecological risks, and additional evaluation in the form of remedy development and evaluation (Tier 3) is appropriate.

Tier 3: Risk Evaluation of Remedial Alternatives

Details of the Tier 3 Risk Assessment Evaluation of Remedial Alternatives for the ERA are similar to Tier 3 for the HHRA. The ultimate goal of the remedy selection process is to choose a remedy that reduces, controls, or eliminates the risks to human health and the environment. Risk Evaluation of Remedial Alternatives (RERAs) is one component of this process. Information from RERAs is used in conjunction with other information–such as assessments of technical feasibility, identification of

ARARs, determination of costs, and implementability–to select a remedy for a site. Some remedial actions to address small ecological risks may cause more ecological harm than the existing site contamination. Consideration of the ecological impacts associated with the remedial alternatives is discussed further in Section 8.3.3.3. The process of evaluating remedial alternatives begins in the development and screening stage of the FS, and may extend to Long-Term Management and Site Closeout.

8.2.3.3 ATSDR Public Health Assessment (PHA)

CERCLA established the ATSDR (42 USC Section 9604(i) and 10 USC Section 2704) in order to conduct public health assessment activities at all sites on (or proposed for) the NPL. ATSDR also may perform health assessments for non-NPL facilities where individuals have been exposed to a hazardous substance for which the probable cause for that exposure was a release (42 USC Sections 9604(i)(6)(A) and 9604(i)(6)(B) [2001]).

DON interacts with ATSDR through NEHC, which is responsible for coordinating and assisting with PHAs and other legally mandated health-related activities as defined in *Navy Environmental and Natural Resources Program Manual* (OPNAVINST 5090.1B, 01 Nov. 1994) CHANGE-2, Chapter 15, Sections 15-4.1.1, 15-5.10 and 15-6.3 (see Chapter 2 for details on NEHC's roles and responsibilities). The purpose of a PHA is to assist in determining whether action to reduce human exposure to hazardous substances at a site should be taken and if additional information on human exposure and associated risks is needed. The PHA determines if a hazardous waste site has a past, present, or potential future adverse effect on human health. The FECs notify NEHC regarding any site visit or other interactions with ATSDR.

The two primary objectives of a PHA are:

1. To evaluate whether people in the community are contacting, have contacted in the past, or will contact in the future, hazardous chemicals that have been released into the environment.

2. To determine whether human contact with the chemicals might result in illness or other harmful health effects.

Types of Assessments

ATSDR prepares different types of written reports to document public health assessment activities, results of evaluations, recommendations, and public health action plans. The four main types of these reports are:

Public Health Assessment – A public health assessment document is written to report on the results of evaluation of all available information about a site and the communities that may be affected by it.

Health Consultation – A health consultation is written to respond to a specific question or request. The health consultation provides the results of data evaluation that answers the specific question.

Health Advisory – A health advisory is written to alert government agencies and the public about an immediate and significant danger to human health from the release of hazardous chemicals.

Exposure Investigation – An exposure investigation is written to report the results of analysis of environmental and biological samples that ATSDR has collected to verify human contact with a

chemical. Exposure investigations are conducted when no data are available to verify human contact with a chemical, but contact is suspected.

ATSDR also provides toxicological profiles for the most common hazardous substances found at DoD sites. These profiles may assist in evaluating human health impacts of contamination during the RI/FS. Toxicological profiles may be obtained by telephone at 888-422-8737 or by accessing the ATSDR Web site, http://www.atsdr.cdc.gov.

8.2.4 RI Report

The results of the site characterization are documented in a RI Report, which usually is provided in preliminary/internal draft for Navy review, draft for full regulatory review, and final after comments are addressed. The RI report can be combined with the FS report to form a RI/FS report, but the RI and FS reports also can be submitted separately. Details regarding the RI/FS report are presented in U.S. EPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA/540/G-89/ 004, Oct. 1988). Table 8-1 of this manual contains the recommended format for the RI report, and Table 8-3 in Section 8.3.4 contains the recommended format for the FS report. The RI report presents the methods used for the RI, the updated CSM resulting from the investigation, the results of the risk assessment, a determination of whether further remedial action is needed, and if so, recommended RA Objectives.

8.3 Feasibility Study (FS)

The primary focus of the FS is to ensure that appropriate remedial alternatives are developed and evaluated in such a manner that the information can be presented to a decision-maker and an appropriate remedy selected. Development of alternatives shall be fully integrated with the site characterization activities of the RI, and the combined RI/FS leads to the selection of an optimal response action for the site.

The overall objectives of the FS are to:

- Develop and evaluate potential remedies that permanently and significantly reduce the threat to public health, welfare, and the environment;
- Select a cost-effective remedial action alternative that mitigates the threat(s); and
- Achieve consensus among DON, U.S. EPA, state, and local authorities regarding the selected response action; and, in the case of NPL sites, obtain concurrence from U.S. EPA.

Decisions made during the FS phase have significant risk and performance implications. Each remedy evaluated should be developed in accordance with the NCP nine criteria (see Table 8-2 in Section 8.3.3) and the *Navy/Marine Corps Policy for Optimizing Remedial and Removal Actions Under the Environmental Restoration Program* (Ser N45C/N4U732343, 23 Apr. 2004), which requires continual optimization of remedies in each phase of the remedial process and that the Navy optimization guidance be followed (future guidance documents or revisions to existing documents should also be followed). The optimization policy and guidance documents are listed below. Although some of the optimization guidance is specifically related to later phases of the remediation, the concepts of all optimization guidance documents should be considered during the FS and design phase to "build-in" optimization into the remedial process.

Table 8-1. Recommended Remedial Investigation Report Format

Executive Summary

1. Introduction

    1.1 Purpose of Report

    1.2 Site Background
        1.2.1 Site Description
        1.2.2 Site History
        1.2.3 Previous Investigation

    1.3 Report Organization

2. Study Area Investigation

    2.1 Includes field activities associated with site characterization. These may include physical and chemical monitoring of some, but not necessarily all, of the following:
        2.1.1 Surface Features (topographic, mapping, etc.; natural and artificial)
        2.1.2 Contaminant Source Investigations
        2.1.3 Meteorological Investigations
        2.1.4 Surface/Water and Sediment Investigation
        2.1.5 Geological Investigations
        2.1.6 Soil and Vadose Zone Investigations
        2.1.7 Ground/Water Investigations
        2.1.8 Human Population Surveys
        2.1.9 Ecological Investigations

    2.2 If technical memoranda documenting field activities were prepared, they may be summarized in this section and referenced.

3. Physical Characteristics of the Study Area

    3.1 Includes results of field activities to determine physical characteristics. These may include some, but not necessarily all, of the following:
        3.1.1 Surface Features
        3.1.2 Meteorology
        3.1.3 Surface/Water Hydrology
        3.1.4 Geology
        3.1.5 Soils
        3.1.6 Hydrogeology
        3.1.7 Demography and Land Use
        3.1.8 Ecology

4. Nature and Extent of Contamination

    4.1 Presents the results of site characterization, both natural chemical components and contaminants in some, but not necessarily all, of the following media:
        4.1.1 Sources (lagoons, sludges, tanks, etc.)
        4.1.2 Soils and Vadose Zone
        4.1.3 Groundwater
        4.1.4 Surface Water

Table 8-1. Recommended Remedial Investigation Report Format (continued)

5. Contaminant Fate and Transport

    5.1 Possible Routes of Migration (i.e., air, groundwater, etc.)
    5.2 Contaminant Persistence - If they are applicable (i.e., for organic contaminants) describe estimated persistence in the study area environment and physical, chemical, and/or biological factors of importance for the media of interest.
    5.3 Contaminant Migration
        5.3.1 Discuss factors affecting contaminant migration for the media of importance (e.g., sorption onto soils, solubility in water, movement of groundwater, etc.).
        5.3.2 Discuss modeling methods and results, if applicable

6. Risk Assessment

    6.1 Human Health Evaluation
        6.1.1 Exposure Assessment
        6.1.2 Toxicity Assessment
        6.1.3 Risk Characterization
    6.2 Ecological Risk Assessment
    6.3 ATSDR Public Health Assessment, if applicable

7. Summary and Conclusions

    7.1 Summary
        7.1.1 Nature and Extent of Contamination
        7.1.2 Fate and Transport
        7.1.3 Risk Assessment

    7.2 Conclusions and Recommendations
        7.2.1 Conclusions
        7.2.2 Recommended Remedial Action Objectives

Appendices

    A. Technical Memoranda on Field Activities, if available
    B. Analytical Data and QA/QC Evaluation Results
    C. Risk Assessment Methods

Source: *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA/540/G-89/004, Oct. 1988)

- *Policy for Optimizing Remedial and Removal Actions Under the Environmental Restoration Program* (23 Apr. 2004);
- *Guidance for Optimizing Remedy Evaluation, Selection, and Design* (Apr. 2004);
- *Guidance for Optimizing Remedial Action Operation (RA-O)* (01 Apr. 2001); and
- *Guide to Optimal Groundwater Monitoring* (01 Jan. 2000).

The following sections describe the elements of the FS phase, including the process for establishing the RA Objectives, and then developing, screening, and evaluating remedial alternatives that are appropriate for meeting the established objectives.

8.3.1 Remedial Action Objectives

RA Objectives are site-specific goals that are formed based on the COCs, the impacted media, fate and transport of COCs, and those potential exposure routes, receptors, and PRGs identified in the CSM. The RA Objectives should provide a clear and concise description of what the remedial action should accomplish at a given site.

RA Objectives should express how to protect human health and the environment rather than requiring a particular remedial technology to be operated until final cleanup goals are achieved. For example, a RA Objective may be to limit human and ecological exposure to contaminated material rather than achieving a cleanup goal.

In some cases, DON may prefer to achieve cleanup levels that have been determined to be protective of human health and the environment in order to obtain unrestricted use of the property. Cleanup goals may be established based on regulatory standards, such as MCLs for groundwater used as a drinking water source or site-specific risk-based values that have been calculated using site-specific data as described in Section 8.2. If cleanup levels are used as RA Objectives, the wording should be flexible enough to respond to situations where it becomes impracticable to achieve those levels rather than relying on fixed quantitative cleanup goals. For example, at sites contaminated with light, nonaqueous-phase liquids (LNAPLs), RA Objectives should be based on goals that "remove LNAPL to the extent practicable" rather than on more static or fixed numerical requirements. This can be demonstrated by employing "best available technologies or presumptive remedies" for source removal/treatment, which significantly reduces further contaminant releases to sensitive receptors and/or environmental media.

The RA Objective may also specify a containment remedy or any controls put in place to be protective of human health and the environment. Some examples include: the use of LUCs, methods to prevent exposure via direct contact, controlling the migration of contaminant in groundwater, and preventing vapor migration from impacting indoor air quality.

An additional discussion about RA Objectives is included in the *Navy Guidance for Optimizing Remedy Evaluation, Selection, and Design* (Apr. 2004).

It is important that RA Objectives be revisited throughout the phases of the ER process as regulations, understanding of site conditions, and project requirements change. A review of the RA Objectives should be part of an optimization review that is performed during remedial action operation and long-term management as discussed in the *Navy Guidance for Optimizing Remedial Action Operation (RA-O)* (01 Apr. 2001).

The following subsections of this manual discuss the proper evaluation of ARARs and the need for negotiation of cleanup levels in order to develop appropriate RA Objectives that are protective of human health and the environment without being unnecessarily restrictive and onerous.

8.3.1.1 Applicable or Relevant and Appropriate Requirements (ARARs)

ARARs are federal and state laws and regulations that are evaluated when choosing removal and remedial actions. Part of the RI/FS scoping effort is to identify any preliminary federal contaminant-specific, action-specific, and location-specific ARARs from available data, and to define DQOs.

Under CERCLA Section 121(d), an important consideration in the RI/FS process is the requirement that remedial actions comply with federal ARARs and more stringent, state-issued ARARs.

U.S. EPA's *CERCLA Compliance with Other Laws Manuals, Part I* (EPA/540/G-89/006, August 1988) defines ARARs as follows:

> "A requirement under other environmental laws may be either 'applicable' or 'relevant and appropriate' to a remedial action, but not both. A two-tier test may be applied: first, to determine whether a given requirement is applicable; then, if it is not applicable, to determine whether it is nevertheless relevant and appropriate."

ARAR identification is a very critical step in the remediation process. Although the selection of ARARs in some cases can be subject to interpretation, once the ARARs are established and documented in the ROD, they become legally binding. In cases where is it unclear if a requirement is an ARAR, particularly if the requirement would be burdensome to meet, it is recommended that legal counsel be consulted.

Applicable Requirements

Applicable requirements are those cleanup standards, standards of control and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site.

Applicability implies that the remedial action or the circumstances at the site satisfy all of the jurisdictional prerequisites of a requirement. For example, the minimum technology requirement for landfills under RCRA would apply if a new hazardous waste landfill unit (or an expansion of an existing unit) was the selected remedy for a CERCLA site.

Relevant and Appropriate Requirements

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations issued under federal or state environmental law that, although not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, they address problems or situations sufficiently similar to those encountered at the CERCLA site so that their use is well-suited to the particular site.

The relevance and appropriateness of a requirement can be judged by comparing a number of factors including the characteristics of the remedial action, the hazardous substances in question, or the physical circumstances of the site with those addressed in the requirement. For example, although RCRA regulated unit closure regulations may not be directly applicable to the cleanup of undisturbed contaminated media, if capping is contemplated they may be relevant and appropriate requirements. A requirement that is determined to be relevant and appropriate shall be complied with to the same degree as if it were applicable. It is possible for only part of a requirement to be considered relevant and appropriate. When applying relevant and appropriate requirements as ARARs, it is important to prevent the misapplication that may result in an overly stringent requirement. Consider the example presented above where RCRA regulations for closure were applied to determine capping as an ARAR. If the material were merely debris rather than hazardous waste, it would not be appropriate to apply the required components of a cap that meet RCRA closure requirements.

Types of ARARs

CERCLA response actions may have to meet several different types of requirements as shown by the classification of ARARs below:

- **Chemical-specific:** Used to set health- or risk-based concentration limits or ranges in various environmental media for specific hazardous substances, pollutants, or contaminants. Examples include MCLs, Federal Water Quality Criteria, National Ambient Air Quality Standards, and RCRA Groundwater Protection Standards.

  These requirements may set protective cleanup levels for the chemicals of concern in the designated media or indicate an acceptable level of discharge (e.g., air emission or wastewater discharge), taking into account water quality standards, where chemical discharge occurs in a remedial activity. The more stringent ARAR should be complied with if the chemical has more than one such requirement. There are at present a limited number of actual ambient- or chemical-specific requirements. It may frequently be necessary to use chemical-specific advisory level, TBC requirements such as Carcinogenic Potency Factors or Reference Doses in order to achieve remedies that are protective of human health and the environment. (Additional information regarding TBCs is presented in Section 8.3.1.2.) TBC requirements are not ARARs and thus are not authoritative. However, in some cases, these chemical-specific advisory levels may be useful factors in establishing protective cleanup levels. Guidance for establishing such chemical-specific, health-based cleanup levels is found in the *Superfund Exposure Assessment Manual* (EPA/540/1-88/001, Apr. 1988). Publications pertaining to risk assessment can be found at the U.S. EPA's "Waste and Cleanup Risk Assessment" Web site, available at: http://www.epa.gov/oswer/riskassessment/policy.htm.

- **Performance, design, or other action-specific requirements:** Requirements used to set controls or restrictions on particular kinds of activities for management of hazardous substances, pollutants, or contaminants. Examples include: (1) RCRA regulations for closure of hazardous waste storage or disposal units, (2) RCRA incineration standards, and (3) Clean Water Act pretreatment standards for discharges to Publicly-Owned Treatment Works referenced in 40 CFR Section 403. These requirements are triggered not by the specific chemicals present at a site but by a particular activity that is selected to accomplish remediation. There are usually several alternative actions for any remedial site, so very different requirements can come into play. These action-specific requirements may specify particular performance levels, actions, or technologies as well as specific levels (or methodology for setting specific levels) for discharged or residual chemicals.

- **Location-specific:** Used to set restrictions on activities depending on the characteristics of a site or its immediate environs. Examples may include: (1) federal and state siting laws for hazardous waste facilities, and (2) sites listed on, or eligible for listing on, the National Register of Historic Places.

ARARs can only be identified on a site-specific basis. The RPM should consult local counsel or regulatory specialists to determine which ARARs apply. Every ARAR decision is a mixed technical/legal decision. This is especially true when dealing with state ARARs. CERCLA provides that in some instances state environmental laws that are even more stringent than federal cleanup standards may apply to remedial actions undertaken by the Navy. Any state ARAR which is more stringent than any federal ARAR, must be identified by the state seeking its application to a specific site in a timely manner [42 USC Section 9621(d)(2)(A)(ii)].

Administrative versus Substantive Requirements

Remedial actions that are conducted entirely on-site need only comply with the substantive aspects, and not the administrative or procedural aspects of ARARs, such as obtaining permits or administrative reviews. Remedial actions that are not conducted entirely on-site shall comply with sub-

stantive and administrative aspects including obtaining permits. An example of a remedial action that is not conducted entirely on-site would be the case where the action required the off-site disposal of hazardous waste (see Chapter 13 for additional information on the transfer of CERCLA wastes to off-site facilities). In that case, all permitting requirements, including administrative requirements, related to the transportation and disposal of hazardous waste must be met.

The RPM should work closely with U.S. EPA and the states to ensure that each is notified of the requirements the others have determined to be ARARs and to ensure that appropriate ARARs are identified and considered at critical steps in the response action. The RPM, in consultation with counsel and the installation, should negotiate with U.S. EPA and the state to resolve any differences of opinion regarding ARARs.

ARAR Waiver

A remedial action shall meet all federal and state ARARs upon completion unless one of the following waivers is found applicable under CERCLA Section 121(d)(4)(A-E):

- The remedial action selected is only part of a total remedial action that will meet the ARAR when completed;
- Compliance with the ARAR at the site will result in greater risk to human health and the environment than alternate options;
- Compliance with the ARAR is technically impractical from an engineering perspective;
- The selected remedial action will attain a standard of performance that is equivalent to that required under the otherwise applicable requirement through use of another method or approach; or
- For state ARARs, the state has not consistently applied (or demonstrated the intention to consistently apply) the ARAR in similar circumstances at other remedial actions within the state [42 USC Section 9621 (d)(4)(A-F) (2001); 40 CFR Section 300.430(f)(4)(ii)(C) (2000)].

If an ARAR is waived for a proposed remedial action, CERCLA requires that, at least 30 days prior to the publication of the ROD, DON shall provide the state with an opportunity to concur with or not concur with the proposed remedial action [42 USC Section 9621 (f)(3)(A) (2001)]. Should the state concur with the proposed remedial action or fail to object to the action within the 30-day period, the remedial action may proceed. On the other hand, if the state does not concur with the remedial action proposed and desires to have the remedial action conform to the ARAR, the state may bring an action in the U.S. District Court within 30 days of notification to determine whether the remedial action selected is supported by substantial evidence.

Removals shall, to the greatest extent practicable considering the emergency nature of the situation, attain federal and state ARARs. In cases where the attainment of ARARs is not practicable, documentation shall be produced that explains when the removal precludes the attainment of all ARARs. Additional guidance to identify and comply with ARARs can be found in CERCLA, *Compliance with Other Laws Manual: Interim Final, Part 1*, (EPA/540/G-89/006, Aug. 1988) and *Part 2* (EPA/540/G-89/009, 1990); *Compendium of Federal Facilities Cleanup Management Information* (EPA/505/B-03/002); U.S. EPA's *Clarification of the Role of Applicable, or Relevant and Appropriate Requirements in Establishing Preliminary Remediation Goals Under CERCLA* (EPA 540/F-97/008, OSWER 9200.4-23, NTIS: PB97-963246INX, August 1997); and U.S. EPA's "Applicable or Relevant and Appropriate Requirements" from the *CERCLA/Superfund Orientation Manual* (TIO, EPA 542/R-

92/005, NTIS: PB93-193852, Oct. 1992). This guidance provides a template to be used for the ARAR analysis that would be part of a FS and EE/CA along with instructions for performing the evaluation.

8.3.1.2 To Be Considered (TBC) Requirements

In certain instances, there may not be an ARAR that addresses a particular COC, action, or location. In those cases, the use of TBC requirements can be useful for guiding decisions. TBCs can be additional advisories, criteria, or guidance developed by U.S. EPA, or other state and federal agencies. As TBCs are not ARARs, they are not binding but rather are additional factors to consider in developing CERCLA remedies [40 CFR Section 300.400(g)(3)]. TBC requirements should be applied with caution because, although they have no legal status prior to ROD execution, once a TBC is included in a ROD as a remedial objective, it becomes legally binding.

8.3.1.3 Establishing Cleanup Levels

The establishment of appropriate cleanup levels is one of the most critical aspects of effective and expeditious CERCLA remedial actions. Under CERCLA there is an acceptable range of risk (10^{-4} to 10^{-6}) that allows for flexibility in establishing cleanup levels. When establishing the cleanup level, several factors should be considered, including ARARs, current land use, appropriate future land use considerations, LUCs, and site-specific assumptions used to develop the risk assessment.

The common goal of all parties involved should be to establish cleanup levels that are protective of human health and the environment. However, often there are differences between parties on how to accomplish this. The Navy's primary goal is to achieve site cleanup as expeditiously and cost-effectively as possible while ensuring full protectiveness. The ability of the Navy RPM to establish open and honest communications with regulatory and public counterparts becomes the key to negotiating reasonable cleanup levels. The RPM shall establish that the parties share a common goal, and then begin the negotiation process toward a reasonable solution. It is important that each party understands and considers the other's concerns and requirements throughout the negotiation process.

Prior to or during the initial phase of negotiations, it is critical to ensure that all parties have a good understanding of the CSM and the assumptions of the risk assessment used to determine the cleanup goal. If ecological risk is driving the cleanup levels, it is important that all parties understand the differences between ecological and human health risk assessments and the assumptions used to evaluate ecological endpoints. Another important factor to understand is the natural background levels of COCs. *Navy Policy on the Use of Background Chemical Levels* (30 Jan. 2004) states that background levels shall be evaluated during site investigations and requires that cleanup levels not be set below background levels. Further, cleanup levels should not be developed for chemicals that are not of concern.

Many regulators may show strict adherence to cleanup levels based on human health risk of 10^{-6} or hazard quotient of 1 and may be reluctant to negotiate cleanup levels that are less conservative, even if they are still protective of human health and environment. In many cases, guidance values have been developed and some regulators may be reluctant to consider any cleanup levels other than those values, so it may be helpful to explain that these are not promulgated standards, and therefore should not be considered as ARARs.

Information contained in the U.S. EPA directive *Land Use in the CERCLA Remedy Selection Process* (OSWER 9355.7-04, 25 May 1995) can be useful in establishing a basis for cleanup levels. The directive clarifies how land use assumptions influence the baseline risk assessment, the development of alternatives, and the CERCLA remedy selection process. As stated in the directive, "Remedial

action objectives developed during the RI/FS should reflect the reasonably anticipated future land use or uses." In addition, the U.S. EPA directive *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions* (OSWER 9355.0-30, 22 Apr. 1991) provides guidance on how to use the baseline risk assessment to make risk management decisions such as determining whether remedial action is necessary and selecting appropriate remedies.

The Navy values regulatory participation in its environmental restoration program. Navy project managers should maintain open and honest communications with regulators to the extent appropriate for a particular site. Ensuring that all parties understand the CSMs, risk assessment assumptions, and the Navy's desire to provide protective remedies as efficiently and expeditiously as possible will help foster a reasonable compromise when establishing cleanup criteria. If negotiations do not result in an acceptable solution, RPMs should elevate the issue within their command and possibly seek support from higher authority within DON. At no time should a compromise be made that may establish an unacceptable precedent for other Navy facilities or sites.

8.3.2 Identification and Screening of Remedial Alternatives

The process of identifying, evaluating, and selecting the appropriate remedy begins with a review of remedial technologies and methods that are appropriate to the site(s) and the threat it poses. Listings of common remedial technologies for the treatment of groundwater, free product/LNAPL, sediment, and soil are presented in Appendix B.2 of this manual. Information about the technologies listed can be found at the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb). Appropriate technologies and LUCs then are combined on a site-by-site basis to formulate complete, protective alternatives for permanent remediation.

The set of alternatives being developed for evaluation shall include a NFA alternative. Resources should not be expended on sites which pose little or no threat to humans or the environment.

Figure 8-6 presents a flow diagram showing the elements of the process of developing remedial alternatives and how these elements are interrelated. Tools available to assist in the development of alternatives are presented in Section 8.3.3.2.

Alternatives identified in the first step of the FS may need to be screened using three broad criteria in order to select a reasonable number of alternatives for detailed analysis. The short-term and long-term aspects of the following three criteria should be used to guide the development and screening of remedial alternatives as appropriate and to the extent sufficient information is available: effectiveness in reducing the threat; implementability; and cost.

Effectiveness

This criterion focuses on the degree to which an alternative reduces toxicity, mobility, or volume through treatment; minimizes risks and affords long-term protection; complies with ARARs; minimizes short-term impacts; and how quickly the alternative achieves protection. Adverse environmental impacts that are predictable at this stage also should be considered in evaluating effectiveness. Calculations, assumptions, and references supporting these evaluations will be documented in the FS.

Implementability

This focuses on the technical feasibility and availability of the technologies each alternative would employ and the administrative feasibility of implementing the alternative. Alternatives that are

Flow Diagram for the Development of Alternatives

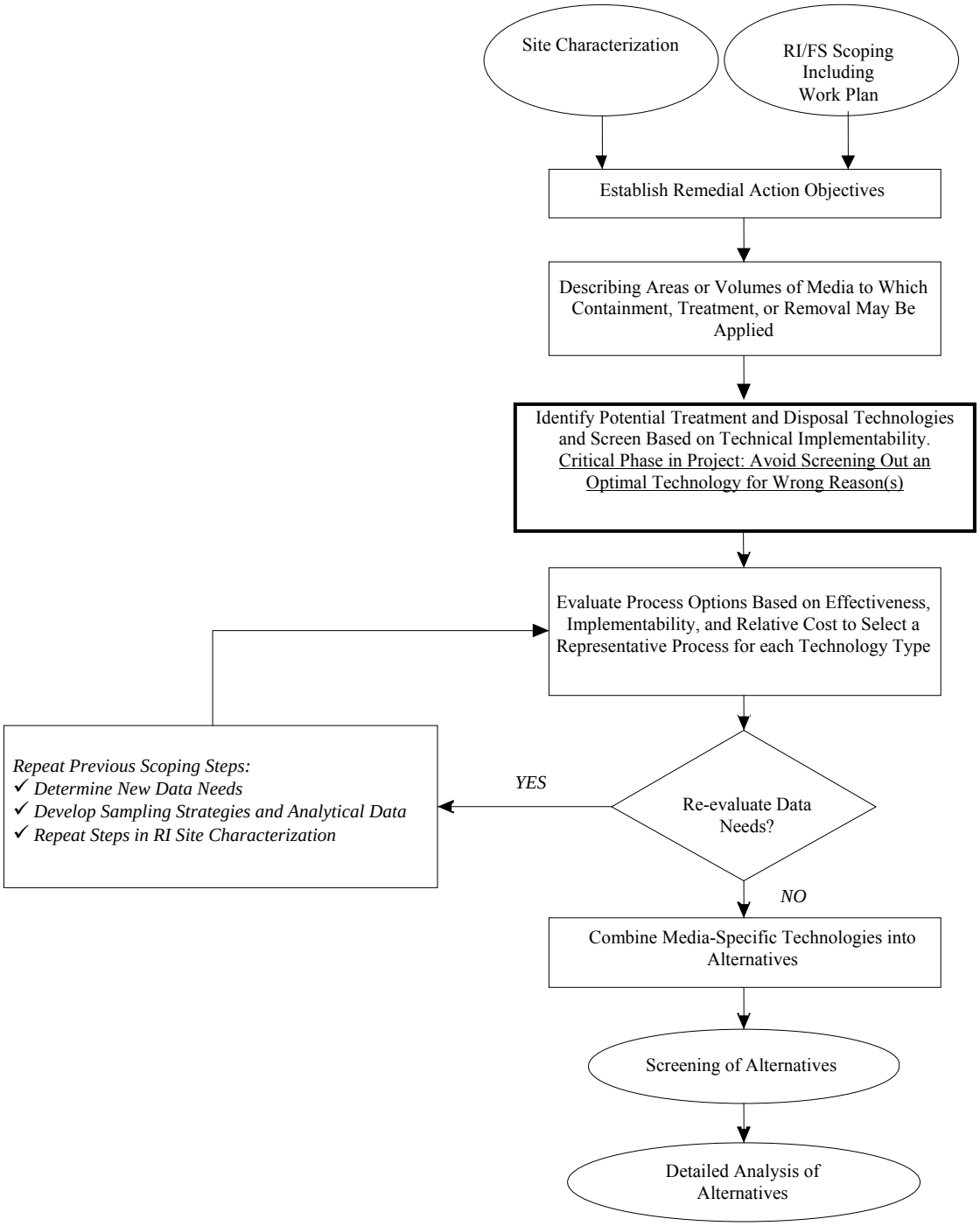


Figure 8-6. Flow Diagram for the Development of Alternatives

technically or administratively infeasible or that would require equipment, specialists, or facilities that are not available within a reasonable period may be eliminated from further consideration. Factors such as constructability, expected opposition from the public, impact on the installation's mission, compatibility with planned land uses, and availability of material, equipment, technical expertise, or off-site treatment and disposal facilities also may be considered in evaluating implementability.

Cost

When comparing alternatives, the life-cycle cost of each alternative shall consider the capital cost plus all future costs. Future costs include future single payment costs and recurring costs, such as long-term costs for operation, maintenance and monitoring. To allow the cost of multiple alternatives to be compared to one another, the life-cycle cost of each alternative shall be determined in terms of net present value (NPV) cost. To determine the alternative's NPV life-cycle cost, the time value of money shall be considered. The time-value of money can be thought of as the amount of money that, if invested now, would be needed to complete remediation, considering the rate of return on the invested amount.

The NPV cost is the sum of the capital cost plus the present value of all future costs (both single payment and recurring costs). For calculating the NPV cost, the following formula can be used to determine the present value of a single payment at some future year:

$$P = F * \frac{1}{(1+r)^n}$$

where P = the present value cost in today's dollars,
F = the future value in terms of dollars at n years into the future,
r = the rate of return per interest period, and
n = the number of compounding periods.

For recurring annual cost, the present value can be calculated by the following formula:

$$P = A * \frac{(1+r)^n - 1}{r * (1+r)^n}$$

where P = the present value cost in today's dollars,
A = the recurring cost for each compounding period,
r = the rate of return per interest period, and
n = the number of compounding periods.

The rate of return to be used in the above formulas is established by the Office of Management and Budget for projects funded by the federal government, and can be found at the following Web site: http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html.

It is important to note that the NPV cost is only considered for the purpose of comparing remedial alternatives and is not used for ER Program budgeting. Budgeting is based on actual total dollars following the procedures discussed in Chapter 4. The total cost of a remediation project may vary significantly from the NPV, especially at sites with long treatment durations.

Other Factors for Consideration

Alternatives that offer significant advantages by one criterion should be retained for detailed analysis even if they are inferior by other criteria. Once a set of alternatives subject to detailed analysis is

identified, they should be reviewed for ARARs. Descriptions of the alternatives and ARARs should normally be transmitted to state regulatory agencies for identification of any state ARARs that may be more stringent. If off-site activities require the submittal of permit applications, this may require considerable time and effort and should be identified as early as possible in the remedial process. The review of alternatives is required to determine if a permit is required for off-site activities and to initiate the appropriate action in a timely manner. This review also will determine whether any treatability studies are needed either to better define or cost an alternative or to provide information for predicting an alternative's effectiveness and environmental impacts. Tools available to assist in the screening of alternatives are presented in Section 8.3.3.2.

When making a decision during the screening process, it is crucial that the RPM carefully evaluates the merits of each technology to avoid screening out an optimal technology for the wrong reason. The RPM should keep in mind that in most cases, multiple technologies are applied as part of a treatment train. An example of a treatment train is the in situ treatment of a highly contaminated source area to reduce contaminant mass followed by MNA to polish residual concentrations in the source area and the remaining contaminant plume. For more information regarding treatment trains, see the Navy's *Guidance for Optimizing Remedy Evaluation, Selection and Design* (Apr. 2004).

The use of treatment trains allows technologies to be retained to address only a particular part of the site, media, COC, or project phase. Technologies that have been found to be effective at other sites under similar conditions, or have relatively low cost and risk of implementation, should be retained unless there is a valid reason for screening them out. In most cases, passive technologies such as MNA and LUCs should be retained either as a stand-alone remedy or as an important part of the overall remedy, particularly as part of an exit strategy in the latter phases of remediation to efficiently polish residual concentrations following implementation of other technologies such as biostimulation. Also, the Navy has had much success with in situ biological remediation technologies, including aerobic technologies such as biosparging and bioventing, as well as anaerobic bioremediation for a variety of COCs, including chlorinated VOCs and perchlorate. These technologies have been found to be effective and efficient. Thus, the RPM should consider biological treatment for at least part of a treatment train in the overall remedy, unless there are valid reasons for screening them out.

When reviewing the factors that resulted in the elimination of a technology, the RPM should keep in mind various issues that could cause an optimal technology to be screened out. (Note that an optimal technology can be one of several technologies that form the optimal overall treatment train.) Some of these factors include:

- The technology is either not suitable for initial site conditions, not capable of meeting cleanup goals, not effective for all COCs, or not effective for all media or all areas of a site but could be used as a component of the initial or subsequent treatment train remedy to reduce overall cost or risk;
- The technology is initially not acceptable to regulatory agencies or stakeholders as a result of past experience when it was misapplied or other political factors;
- The technology is believed to be too expensive due to inconsistencies in cost-estimating, overly conservative assumptions, or misapplication;
- The CSM is not developed or the site characteristics are not well understood causing an invalid assumption that application of the technology is infeasible;
- RA Objectives are not defined or not reasonable;
- Recent advances in technology are not known by the screener;

- Project life-cycle characteristics were not considered, which would allow the technology to be suitable at some time in the future; and
- Restrictions at the installation cause the technology to be eliminated without fully exploring all options with installation personnel.

To address the issues listed above, the RPM can:

- Ensure that the treatment train concept has been applied to allow appropriate use of technologies;
- Understand typical life-cycle behavior;
- Ensure costing for all technologies are based on realistic assumptions;
- Consider field testing rather than assuming a technology is not feasible based on rules-of-thumb;
- Communicate with regulators and stakeholders to understand where there was experience with failure, understand why it failed, and determine if the proposed applications would have the same issues;
- Not accept politics as a reason for screening out an optimal technology;
- Work with facility management to overcome implementation issues;
- Develop risk-based RA Objectives;
- Confirm that decisions are based on accurate and representative data properly interpreted and re-analyze data or go back to field if necessary;
- Obtain most up-to-date information on technological advances; and
- Review rationale for elimination to ensure reasons are valid and consider use of an optimization review team.

8.3.3 Detailed Analysis of Remedial Alternatives

Once a limited number of viable alternatives have been developed and ARARs have been identified, the alternatives are evaluated against nine criteria as specified in 40 CFR Section 300.430 and listed in Table 8-2. State and local community acceptance may not be evaluated fully until the Proposed Plan is published and public review is completed during Remedy Selection (see Chapter 9).

Figure 8-7 shows the key elements of the detailed analysis of alternatives step and the relationship of these elements in a flow diagram. More detailed information regarding the methods and criteria for evaluating and selecting the remedy is presented in the following subsection.

8.3.3.1 Remedial Technology Selection Criteria

Each remedy that is to undergo detailed evaluation should be developed in accordance with the *Navy/Marine Corps Policy for Optimizing Remedial and Removal Actions Under the Environmental Restoration Program* (Ser N45C/ N4U732343, 23 Apr. 2004). This memorandum references several guidance documents including the Navy's *Guidance for Optimizing Remedy Evaluation, Selection and Design* (Apr. 2004), which applies to the remedy development and evaluation phases of a project.

Table 8-2. Summary of the Nine NCP Criteria

Category	Criteria	Descriptions
Threshold Criteria	Overall protection of human health and the environment	Addresses whether or not a specific alternative will achieve adequate protection and describes how the contamination at the site will be eliminated, reduced, or controlled through treatment, engineering, and/or LUCs.
	Compliance with ARARs	Addresses whether or not a remedial alternative meets all related federal and state environmental statutes and regulations. An alternative shall comply with ARARs, or be covered by a waiver, to be acceptable.
Primary Balancing Criteria	Long-term effectiveness and permanence	Addresses the ability of a remedial alternative to maintain reliable protection of human health and the environment over time. It also considers the risk posed by treatment residuals and untreated materials.
	Reduction in toxicity, mobility, or volume through treatment	Addresses the preference for remedial actions that use treatment technologies that permanently and significantly reduce toxicity, mobility, and/or volume of contaminants.
	Short-term effectiveness	Addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy.
	Implementability	Addresses the technical and administrative feasibility of implementing a remedial alternative from design through construction and operation. Factors such as availability of services, materials, and operational reliability are considered.
	Cost	Addresses the total cost of a remedial alternative, including consideration of the capital costs, annual O&M costs, and net present value of these costs.
Modifying Criteria	State acceptance	Addresses the acceptability of a remedial alternative to state regulatory agencies.
	Community acceptance	Addresses the acceptability of a remedial alternative to the public.

This guidance document discusses each of the concepts, as listed below, that should be incorporated into the development of each remedial approach.

- Develop remedy based on an updated **CSM**.
- Identify clear, concise, and flexible **RA Objectives** and revisit them periodically to incorporate current regulations, standards, requirements, and other precedents. RA Objectives should be risk-based where appropriate.
- Identify the **target treatment zone(s)** based on the CSM and remedial action objectives. A target treatment zone is the volume or area at which the remedial action is determined to best apply. A typical example of a site divided into target treatment zones would be (1) a source area that includes active treatment to reduce contaminant mass, and (2) a downgradient dissolved phase plume that employs MNA to efficiently polish the lower concentration areas.

Develop remedial alternatives that include "**treatment trains**", as appropriate, for each target treatment zone, incorporating typical life-cycle behavior. The treatment train concept emphasizes that multiple remedial technologies, either simultaneously or sequentially over time, often are needed to achieve cost-effective remediation at a given site. As part of this step, conduct a **life-cycle cost analysis** to evaluate individual unit processes and the total cost for each remedial alternative. The cost analysis should be refined throughout the remedy selection and design process.

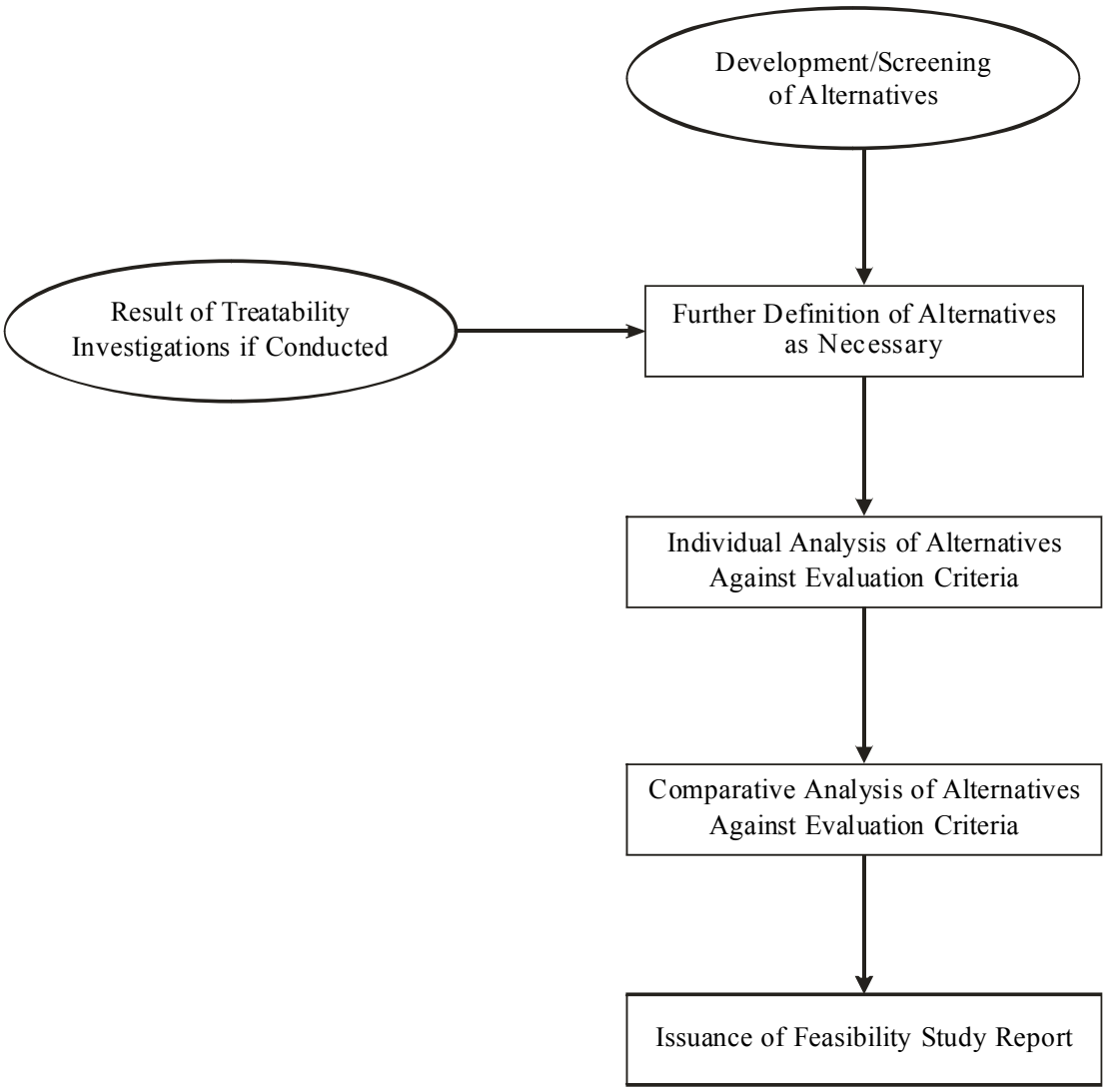


Figure 8-7. Flow Diagram for Detailed Analysis of Alternatives

Develop realistic system **performance objectives** for each component of the treatment train that account for technology applicability and limitations. Performance objectives are criteria that measure the operational efficiency and suitability of a particular remedial technology.

- Develop an **optimization and exit strategy** for each component of the treatment train and the remedy as a whole. Optimization and exit strategies are means of determining when it is time to stop, modify, or change a particular technology, or terminate all remedial actions, based on the achievement of previously established performance objectives. Their development and documentation during the FS, ROD, and Remedial Design (RD) phases is necessary for cost-effective site remediation, and ultimately for achieving timely Response Complete (RC) and Site Closeout (SC). This prevents the situation where a technology operates beyond its period of optimum usefulness.

The optimal remedial alternative likely will consist of a combination of remedial technologies applied in sequence. More aggressive or active treatment technologies (e.g., multiphase extraction, chemical oxidation, air sparging, and excavation) are generally more appropriate for source area remediation than for plume-wide remediation of lower concentration areas. However, numerous case studies indicate that active remedies alone often are not cost-effective in achieving final cleanup goals due to diffusion-limited mass transfer and hydrogeologic constraints. Aggressive, active technologies can be followed by biological treatment processes (e.g., enhanced bioremediation and/or MNA) to form a cost-effective treatment train solution. At many sites technologies, such as biostimulation, have been shown to be an effective treatment for reducing source area concentrations and establishing conditions conducive for MNA to polish residual source area contaminants. At many other sites MNA alone has been demonstrated to be an effective remedy. For remediation of lower concentration areas, such biological treatment processes are often the most effective and efficient remedy.

In most cases the final portion of the treatment train in both the source area and the rest of the plume will include MNA to efficiently polish residual concentrations and/or LTM to ensure that concentration levels continue to decrease or remain at or below the cleanup goals for the site. The Navy's Natural Attenuation Software can be used to assess the natural attenuation capacity of an aquifer and estimate the time of remediation depending on the amount of source reduction performed. This is a useful tool for the evaluation and design of treatment trains to optimize the overall remedy. This software can be downloaded at the following Web site: http://www.nas.cee.vt.edu.

The final step in the remedy development process is to identify performance objectives for each technology within the remedial technology train and then link these objectives to the exit strategy. Defining specific performance objectives is especially critical at sites with challenging features such as complex hydrogeology (e.g., very "tight" or impermeable geology) or certain contaminant types (e.g., dense, nonaqueous-phase liquid [DNAPL] or sites with continuing sources). These challenges and others may limit the ability of existing technologies to achieve stringent final cleanup goals. In many cases, due to diffusion-limited mass transfer, remedial alternatives may reach asymptotic mass removal levels before reaching final cleanup goals. Therefore, setting practical, technology-based performance objectives as part of a pre-determined decision-making framework is important. This approach allows for greater flexibility in operating the system and also in transitioning between different remedial technologies as remediation progresses. Examples of performance objectives include: (a) reaching asymptotic condition with respect to mass removal and/or concentration remaining; (b) exceeding a particular cost-per-pound removed; or (c) the cost-per-pound removed exceeds that of a less active or passive technology that would be the next phase of a treatment train. Other examples of performance objectives for active and passive technologies are presented in the *Guidance for Optimizing Remedy Evaluation, Selection and Design* (Apr. 2004).

The combined use of well-defined performance objectives with the treatment train approach allows for timely transitioning from one phase of the treatment train to the next. This allows the most efficient technology to be used at the appropriate time throughout the project, thus minimizing the time that a non-optimum technology is in use. This point is illustrated in Figure 8-8, which shows the cumulative project cost versus time, demonstrating how the use of a treatment train reduces overall project cost as compared to the continued use of a single technology (no treatment train). It also demonstrates that having well-defined performance objectives further reduces total project cost by transitioning between treatment phases in a timely manner, thereby preventing a technology from operating beyond the time when it is no longer functioning at its optimum effectiveness.

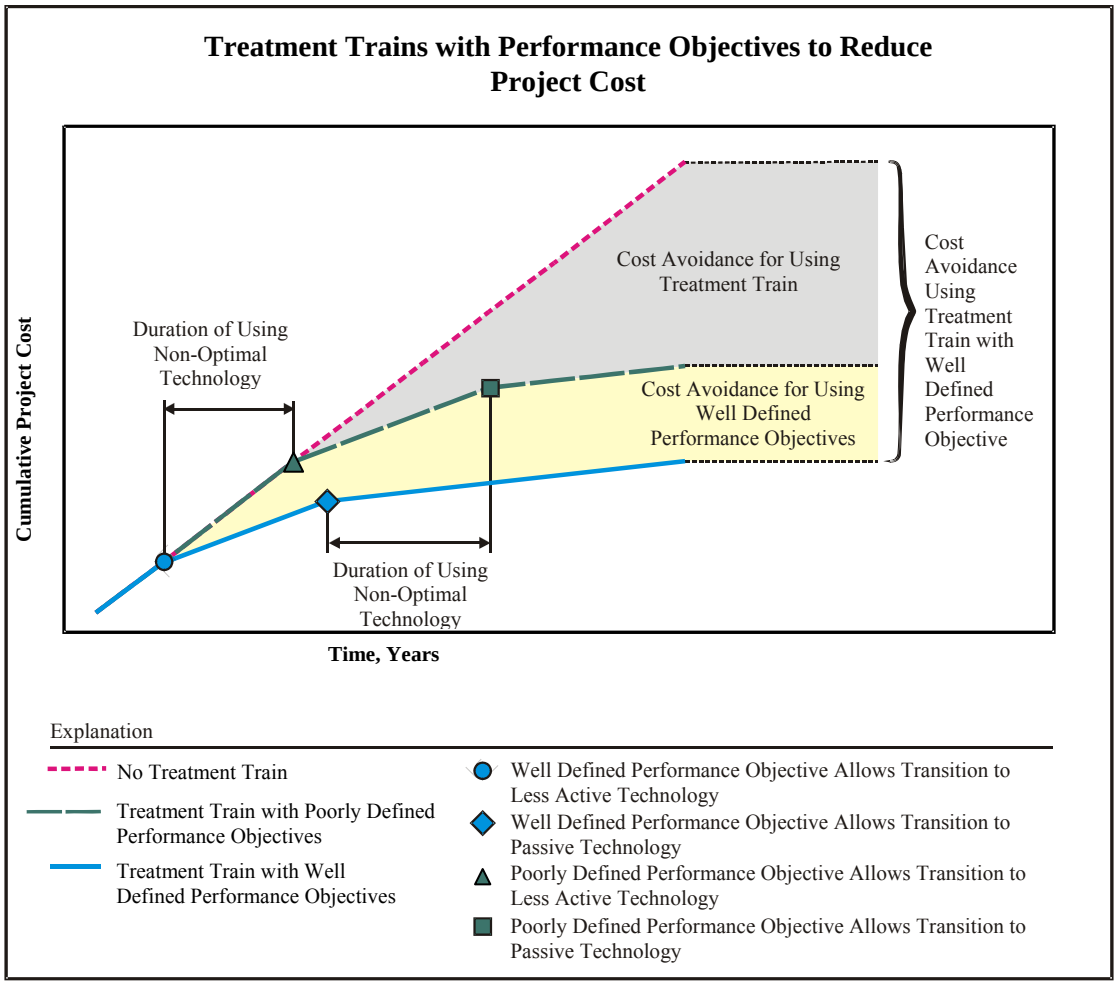


Figure 8-8. Cost Reduction from Treatment Trains and Performance Objectives

Each remedial alternative that passes the screening process and has been developed in an optimum manner will undergo a detailed evaluation. As stated in Section 8.3.3 and Table 8-2, the nine NCP-developed criteria are used for the objective assessment of the various remedial alternatives. This framework is a first step in the evaluation process, and allows a comparison of the relative advantages and disadvantages for each remedial alternative and helps to justify the selection of the most appropriate remedial action. These nine evaluation criteria are categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria. All threshold criteria must be satisfied for a remedial alternative to be eligible for selection. The primary balancing criteria are used to weigh major trade-offs among alternatives. The modifying criteria usually address public and regulatory acceptance of the alternatives. Again note that a remedial alternative may be a single technology, but more often it is a combination of technologies employed sequentially over time in a treatment train remedial system. Additionally, a combination of technologies may be employed concurrently to address different areas of the site.

The remedy evaluation process should consider effectiveness, site risk, the ability to implement the technology at a given site, and the cost to implement that technology. An analysis of short-term effectiveness should include an evaluation of any impacts on the installation's mission. The trade-off in overall risks should be considered, such as health risks associated with short-term versus long-term

exposure to COPCs. Other risks that are important but are often overlooked are those associated with potential accidents and physical injuries to remediation workers. Tier 3 of the HHRA and ERA risk assessment process described in Section 8.2.3 evaluates these risks which need to be considered during the remedy evaluation phase. Additional information regarding short-term remedy implementation risks is also provided in Section 8.3.3.3.

Another factor to consider during the remedy selection process is DON's *Policy on Natural Resource Injury and Damages in the Installation Restoration Program* (CNO, 21 Dec. 2001). This policy states that to the extent practicable, the alternative should be selected which best addresses NRI caused by past practices and which causes the least injury to natural resources during implementation.

During the remedy evaluation process, it may be necessary to compare the risk reduction with the incremental cost in order to identify the best remedial alternative. Technologies with a very high life-cycle cost but with little or no additional benefit in risk reduction should be eliminated from consideration in favor of an alternate remedy that is more cost-effective. According to the CERCLA and the NCP, all remedies shall be cost-effective. Thus, remedial approaches can be eliminated from consideration if they are either higher in cost than an alternative remedy that is just as protective, or significantly higher in cost than an alternative remedy that is only slightly less protective, as documented in U.S. EPA's *The Role of Cost in the Superfund Remedy Selection Process*.

The *Navy/Marine Corps Policy for Optimizing Remedial and Removal Actions Under the Environmental Restoration Program* (Ser N45C/ N4U732343, 23 Apr. 2004) directs that special care be taken during the evaluation of any remedy that includes the extraction and treatment of groundwater (i.e., pump-and-treat) as a component. Navy experience has shown that the use of pump-and-treat is generally ineffective in reaching final cleanup levels and often results in high operating and maintenance costs, and that these costs often continue to be incurred further into the future than anticipated. Navy policy requires approval for the installation of a pump-and-treat system at any ER site. Approval for ER,N-funded sites is granted by NAVFAC HQ, and approval for BRAC-funded sites is granted by BRAC PMO. The information that must be submitted to NAVFAC HQ or BRAC PMO is discussed in the policy and includes an analysis of remedial alternatives considered and a detailed cost analysis that justifies the use of pump-and-treat.

When performing a cost evaluation, comparable life-cycle cost numbers should be developed by determining the NPV of all project costs, as discussed in Section 8.3.2.

Innovative technologies should always be considered, but they should be reviewed with special care. If information on certain remedial alternatives is limited, a range of probable costs can be determined from a decision-analysis, probabilistic cost-estimating approach that accounts for uncertainties in technology costs. ASTM's *E2137 Standard Guide for Estimating Monetary Costs and Liabilities for Environmental Matters* (2001) is a good source for cost-estimating information.

8.3.3.2 Approaches to Remedial Technology Selection

After RA Objectives have been developed for each identified target treatment zone, a concise list of potential remedial technologies applicable to each treatment zone is developed and screened. The general categories of remedial actions are listed below and progress from actions generally requiring lower logistics and/or costs to those actions requiring greater logistics and/or costs:

- NFA
- LUCs
- Containment and other engineering controls

- In situ treatment/mass removal
- Ex situ treatment/mass removal.

When considering the appropriateness of remedies that fall into one of these general categories, the RPM should consider that risk management (i.e., institutional controls and containment) may be more cost-effective than cleanup at certain sites. That is, a remedy can achieve protectiveness of human health and the environment through the elimination of exposure pathways or preventing contact with receptors, rather than by eliminating sources of contamination. Such an approach may be the only technically practical means of managing risks at sites involving complex, heterogeneous hydrogeology and recalcitrant contaminants, such as DNAPL. In performing the evaluation between risk management controls versus cleanup, the cost of LTMgt of the controls as well as impacts on potential future land use shall be considered. LUCs are often part of a treatment train used in conjunction with active and passive remedies. Similarly, a combination of remedial action categories often are used in a treatment train approach such as in situ treatment/mass removal, containment, and LUCs.

Any relevant historical information such as treatability studies or actual remedies implemented at the same base or similar environmental conditions can be useful for selection of applicable technologies. To the extent possible, presumptive remedies, and those remedies that are successful and cost-effective (best available technologies), should constitute the initial remedial alternative list. Presumptive remedies are standard technologies that can be applied at certain types of sites, such as municipal landfills or soils impacted with VOCs. They are designated by U.S. EPA based on historical patterns of remedy selection, past experience, and technology performance. U.S. EPA expects presumptive remedies to be considered at all applicable sites, as specified at the U.S. EPA Presumptive Remedy Web policy overview site.

The number of alternatives to be carried over for a detailed evaluation typically is limited through a preliminary consideration of the potential effectiveness, implementability, and costs associated with each remedial alternative. Both effectiveness and implementability are qualitative criteria, but technology information available through the Navy and other agencies can facilitate a good screening process. Cost estimates can vary significantly for a given technology at different sites, and it is important to distinguish independent objective literature from vendor information to obtain reliable cost estimates. Therefore, resources available on the internet, such as the Web sites for remedy selection listed in the box on the next page, can be valuable in making correct decisions.

The NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb) is a starting point for online remedy evaluation sources. From this Web site, a "Remediation Technologies Screening" page can be accessed. The ERB Web site links to resources related to evaluation and selection of remediation technologies, and to various other tools including the following:

- **Ex Situ Groundwater Treatment:** This tool helps to research and evaluate different ex situ groundwater treatment technologies. It also complements the October 2001 **Remedial Technology Selection Tool**: This site includes cost-estimating programs for various in situ and ex situ remedial technologies, as well as a Remediation Technologies Screening Matrix and Reference Guide that contains information on technologies that can be used to clean up a contaminated site (such as detailed information on the technologies and a summary chart that rates the technologies by applicable media, contaminants and other characteristic criteria).
- Remediation Innovative Technology Seminar (RITS) on management of secondary treatment trains. A 2001 fact sheet also presents cost information for specific ex situ groundwater treatment systems that is applicable to ex situ groundwater treatment.

Useful Web Sites for Remedy Selection

Several valuable online resources are available for remedy screening. These Web sites support the valuable process of a technical literature search for current information on technologies and methods. A few of the most comprehensive Web sites are listed below:

- **NAVFAC Environmental Restoration Web Site** – Provides a starting point for remedy evaluation. Provides a comprehensive review of the advantages, limitations, and other information for a wide variety of physical, chemical, and biological remediation technologies, as well as links to other relevant Web sites. Link to https://portal.navfac.navy.mil/go/erb. This link also includes Navy policy and guidance related to optimization and other cleanup requirements.

- **Federal Remediation Technologies Roundtable (FRTR)** – The FRTR Web site provides a comprehensive listing of technologies based on media and contaminant type and useful case examples, including cost and performance reports. Link to http://www.frtr.gov. A remediation technology screening matrix on this site, which includes: technology descriptions, applicability, limitations, and typical operation and maintenance duration can be reached directly at: http://www.frtr.gov/matrix2/sitemap.html.

- **U.S. EPA Presumptive Remedy Web Site –**The appropriate use of U.S. EPA presumptive remedy guidance can save time and money for site investigations as well as remediation. Link to http://www.epa.gov/superfund/resources/presump/pol.htm.

- **U.S. EPA Hazardous Waste Clean-Up Information** –This Web site for the U.S. EPA Technology Innovation Office advocates more effective, less costly approaches for the assessment and cleanup of contaminated waste sites, soil, and groundwater. Link to http://clu-in.org.

- **NAVFAC Natural Attenuation Software –** This Web site provides a downloadable tool to evaluate natural attenuation. Link to http://www.nas.cee.vt.edu.

- **U.S. EPA MNA Web Site –** This Web site provides U.S. EPA and non-EPA MNA guidance documents, software and technical information. Link to http://www.epa.gov/swerust1/oswermna/mna_epas.htm.

- **U.S. EPA Technology Innovation Program (TIP)** – This Web site provides information about characterization and treatment technologies for the hazardous waste remediation community to promote more effective, less costly approaches to assess and clean up contaminated waste sites, soil, and groundwater. Link to http://www.epa.gov/tio.

- **Other Related Web Sites**:
  - Groundwater Remediation Technologies Analysis Center: http://www.icubed.com/gwrtac;
  - Interstate Technology Regulatory Council: http://www.itrcweb.org;
  - Remediation Technologies Development Forum: http://www.rtdf.org;
  - Environmental Security Technology Certification Program: http://www.estcp.org;
  - Strategic Environmental Research and Development Program: http://www.serdp.org.

- **Ex Situ Off-Gas Treatment:** This tool helps to research and evaluate different off-gas treatment technologies. It includes a technology screening matrix for many types of off-gas treatment technologies, and a ranking tool that ranks the technologies based on the level of importance of various criteria.

8.3.3.3 Evaluation of Remedial Alternatives

Guidance for both human health and ecological risk assessments specifies that Tier 3 in the risk assessment process (i.e., Evaluation of Remedial Alternatives) be performed during the Feasibility Study. The entire process for both the HHRA and ERA are explained in further detail in Section 8.2.3 of this manual. Tier 3 is the evaluation of the remedial alternatives (including no action) with regards to: (1) the effectiveness of reducing risks to acceptable levels; (2) human health and/or ecological impacts related to remedy implementation; and (3) residual risks that will remain at a site.

The goal of the Tier 3 evaluation is to ensure that human health and ecological impacts from remedy implementation are considered as a part of each of the nine CERCLA criteria, and that the selected remedy best balances ecological and human health risks while minimizing ecological impacts. Evaluating the risk posed by the alternative itself (sometimes referred to as comparative risk) is a key component of the alternative evaluation process. Additional information regarding the risk of remedy implementation is discussed below.

Evaluating Short-Term Remedy Implementation Risks

The 1990 National Oil and Hazardous Substances Pollution Contingency Plan (NCP) explicitly cites potential remedy implementation risk as an important consideration in the remedy selection process at Superfund Sites (U.S. EPA, 1990), and the U.S. EPA has determined that a quantitative evaluation is useful for sites where exposure levels are expected to change significantly as a result of remediation activities (U.S. EPA, 1991, 1998).

Guidelines for evaluating short-term implementation risks to human health have been presented in Part C of the Risk Assessment Guidance for Superfund: Volume I, Human Health Evaluation Manual (U.S. EPA, 1991). According to U.S. EPA (1991, 1998), the risks posed to workers and the community during remedy implementation can be evaluated either qualitatively or quantitatively, depending on conditions at the site. According to U.S. EPA (1991), "when short-term risks are not expected to be a problem for a site, a more qualitative evaluation generally is appropriate. In these cases, a qualitative evaluation of the magnitude, duration and/or likelihood of the exposures and risks should be conducted and as such could describe short-term risks in a qualitative manner relative to the results of the baseline risk assessment. A quantitative evaluation of short-term risks is most likely to be useful when the types, levels and/or availability of hazardous substances are expected to change significantly as a result of remediation" (p. 19). Further, according to U.S. EPA (1998):

> "The detailed analysis of short-term risks includes the following components for each alternative:
>
> - Evaluate short-term exposure.
> - Evaluate short-term toxicity.
> - Characterize short-term risks to the community (including people who live or work on or near the site).
> - Characterize short-term risks to remediation workers…" (U.S. EPA, 1998, p. 4-5).

For workers and individuals in the nearby community, U.S. EPA (1991) further specifies that the risk analysis should consider:

- Potential for exposure to hazardous substances during on-site remedial activities;
- Potential for injury due to physical hazards, including explosion, heat stress, and precarious work environments; and
- Potential for exposure during emergency response activities.

Failure to adequately evaluate short-term effectiveness during the remedy selection process can result in unanticipated risks to workers and nearby residents during remedy implementation, and in costly delays for substantial remedy modifications or abandonment of an incomplete remedy.

Similarly, the assessment of potential ecological impacts associated with remedy implementation should be considered. Consistent with the provisions of the NCP, U.S. EPA's Ecological Risk Assessment and Risk Management Principles for Superfund Sites (1999) specifies the need to evaluate whether a proposed remedy will cause more ecological harm than the existing site contamination. Also, the DON's *Policy on Natural Resource Injury and Damages in the Installation Restoration Program* (CNO, 21 Dec. 2001) states that to the extent practicable, the alternative should be selected which causes the least injury to natural resources during implementation.

The assessment of ecological impacts associated with remedial alternatives should consider several factors including:

- Residual risks posed by site contaminants before and after implementation of the selected remedy;
- Changes in the functional values of each habitat expected to result from the proposed remediation;
- Rate of recovery for the biological community following remediation;
- Designated uses impaired during recovery; and
- The likelihood of the remedial alternatives achieving remedial action objectives.

The decision to implement a remedy for a site based on ecological risk must balance each of these factors. Even though an ecological risk assessment may demonstrate that adverse ecological effects have occurred or are expected to occur as a result of contamination, it may be determined that removing the contaminated media may not be in the best interest of the overall environment. For example, at sites where rare or very sensitive habitats are present, removal of the contamination may cause more long-term ecological harm due to physical destruction of habitat than leaving it in place. Conversely, leaving persistent and/or bioaccumulative contaminants in place where they may serve as a continuing source of substantial exposure, may also not be appropriate. If impacts of the remedial alternative are determined to cause more environmental harm than leaving the contaminants in place, it may be decided not to proceed with a remedy.

Consistent with the NCP and U.S. EPA guidance, the RPM should consider the need for conducting a quantitative evaluation and comparison of the following risks associated with each of the remedial activities under consideration:

- On-site worker and off-site resident exposure to emission of vapors and particulates during disturbance, excavation, and/or handling of contaminated materials;

- On-site accidents (physical hazards);
- Off-site accidents, and accident-related spills, injuries and fatalities associated with transportation of excavated contaminated materials and related remediation materials (e.g., clean backfill); and
- Ecological harm (if applicable).

At the conclusion of the Tier 3 risk assessment, a RPM will have an evaluation that identifies each alternative considered, its risk reduction effectiveness, residual risks remaining at a site, potential environmental impacts, cost, technical merits and benefits, and acceptance by the Navy and the stake-holders. This evaluation will then assist the Navy in selecting the final remedy for the site.

8.3.3.4 Treatability Studies

A Treatability Study involves testing and evaluation of a treatment technology to determine the effectiveness of that technology at a particular site or to establish site-specific design parameters. Treatability testing could be performed either at the bench-scale level, either on-site or off-site, or it can be performed at the pilot-scale level. Treatability studies are most often used to determine which remedial alternative better addresses site-specific conditions such as COCs and matrix effects (e.g., clays). These studies can be applied for remedy screening, selection, and design, and should be carefully designed to meet DQOs for the project. The additional costs for conducting treatability studies is often justifiable as these studies can significantly reduce the uncertainties that are sometimes associated with innovative technologies, or are inherent with complex treatment trains.

Treatability studies may be needed during the RI/FS when sufficient information for technology cost and performance, under site-specific conditions, is not available. For these technologies, laboratory-scale and/or bench-scale treatability studies may be conducted to obtain the required information. This information is necessary for applying the nine NCP criteria for evaluation of alternatives for the feasibility study. A treatability study should verify whether the technology is capable of meeting the cleanup goals or other specified performance objectives if it is part of a treatment train.

Treatability studies may also be needed during the Remedial Design/Remedial Action (RD/RA) phase to obtain more detailed information about the unit operations, performance, and cost for designing a full-scale treatment system. Generally, a pilot/field-scale system is deployed on-site to collect the required information.

8.3.4 FS Report

The results of the FS will be documented in a report usually provided in preliminary/internal draft for Navy review, draft for full regulatory review, and final after comments are addressed. This is often combined with the RI report to form a RI/FS report but the RI and FS reports also can be submitted separately. Details regarding the RI/FS report are presented in U.S. EPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA/540/G-89/004, Oct. 1988). As previously stated, Table 8-1 contains the recommended format for the RI report. Table 8-3 contains the recommended format for the FS report. The RI/FS report is a significant document, as it forms the basis for the selection of the remedy and the decision documents.

Table 8-3. Recommended Feasibility Study Report Format

Executive Summary

1. Introduction
   - 1.1 Purpose and Organization of Report
   - 1.2 Background Information (Summarized from RI Report)
     - 1.2.1 Site Description
     - 1.2.2 Site History
     - 1.2.3 Nature and Extent of Contamination
     - 1.2.4 Contaminant Fate and Transport
     - 1.2.5 Baseline Risk Assessment

2. Identification and Screening of Technologies
   - 2.1 Introduction
   - 2.2 Remedial Action Objectives – Presents the development of remedial action objectives for each medium of interest (i.e., groundwater, soil, surface water, air, etc.). For each medium, the following should be discussed:
     - 2.2.1 Contaminants of interest;
     - 2.2.2 Allowable exposure based on risk assessment (including ARARs);
     - 2.2.3 Development of remediation goals.
   - 2.3 General Response Actions – For each medium of interest, describes the estimation of areas or volumes to which treatment, containment, or exposure technologies may be applied.
   - 2.4 Identification and Screening of Technology Types and Process Options – For each medium of interest, describes:
     - 2.4.1 Identification and Screening of Technologies
     - 2.4.2 Evaluation of Technologies and Selection of Representative Technologies

3. Development and Screening of Alternative
   - 3.1 Development of Alternatives – Describes rationale for combination of technologies/media into alternatives. Note: This discussion may be by medium or for the site as a whole.
   - 3.2 Screening of Alternatives (if conducted)
     - 3.2.1 Introduction
     - 3.2.2 Alternative 1
       - 3.2.2.1 Description
       - 3.3.2.2 Evaluation
     - 3.2.3 Alternative 2
       - 3.2.3.1 Description
       - 3.2.3.2 Evaluation
     - 3.2.4 Alternative 3

4. Detailed Analysis of Alternatives
   - 4.1 Introduction
   - 4.2 Individual Analysis of Alternatives
     - 4.2.1 Alternative1
       - 4.2.1.1 Description
       - 4.2.1.2 Assessment
     - 4.2.2 Alternative 2
       - 4.2.2.1 Description
       - 4.2.2.2 Assessment
     - 4.2.3 Alternative 3
   - 4.3 Comparative Analysis

Bibliography
Appendices

CHAPTER 9

Remedy Selection

The Remedy Selection step involves identifying a preferred response action strategy from those alternatives evaluated in the Feasibility Study (FS). See Chapter 8 for a discussion of remedial alternatives including no further action (NFA), land use controls (LUCs), containment, in situ treatment/mass removal, and ex situ treatment/mass removal. The preferred alternative is based first on each alternative's ability to satisfy the threshold criteria (as identified in Table 8-2), and then on trade-offs among alternatives considering the primary balancing criteria. Further, results of the risk assessment need to be factored into the Selection of Remedy step. The results of the baseline human health risk assessment (BHHRA) and baseline ecological risk assessment (BERA) conducted during the Remedial Investigation (RI) serve as the primary means of supporting the selected remedy or documenting a NFA decision. The elements of Remedy Selection are discussed in this chapter.

9.1 Proposed Plan (PP)

The RPM, with the assistance and involvement of both regulatory agencies and the installation, prepares a Proposed Plan, which identifies the preferred alternative for the site (40 CFR Section 300.430(f)(2) [2003]). The purpose of the PP is to briefly describe other remedial alternatives that were analyzed, and to summarize the information used to select the preferred alternative. A PP includes the following:

- Site background and characteristics, including nature and extent of site contamination;
- Site risks, including a summary of the results of the BHHRA, BERA, and the assumptions used in the analyses;
- Remedial Action (RA) Objectives, including what the proposed remedy is expected to accomplish;
- Summary and evaluation of alternatives, including options for attaining RA Objectives;
- Preferred alternative, including rationale for its selection and expectations for fulfillment of statutory and regulatory requirements; and
- Information on how the public can participate in the remedy selection process.

Any formal state regulatory comments on applicable or relevant and appropriate requirement (ARARs) or alternative selections should be summarized in the Proposed Plan. If waivers to ARARs are required, an explanation of the basis for the waivers should be included.

Upon completion of the PP, DON makes this document available at repositories open to the public (requirements for information repositories and the AR File are presented in Chapter 14), and notifies the public and stakeholders of its availability and of the 30-day minimum public comment period. After that period, DON prepares a written summary of significant comments and new relevant information submitted during the comment period, along with DON's response to each issue. This Responsiveness Summary is made available with the Record of Decision (ROD). For National Priorities List (NPL) sites, DON holds a public meeting on the PP during the comment period if sufficient interest is expressed by the regulatory agencies, the Restoration Advisory Board (RAB), or other stakeholders. DON keeps a transcript of the meeting and makes it available to the public. Additional information regarding community involvement requirements is presented in Chapter 15.

9.2 Records of Decision (RODs) and Other Decision Documents (DDs)

The Remedy Selection discussed in the PP is formalized in a written document. There are two types of DON formalized decision documents:

- **Record of Decision (ROD):** For NPL sites, a ROD describes the remedy selection process and the remedy method selected, including NFA. It is the official term used by CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) for the documentation of a final remedial response action decision at a NPL site. The ROD shall be signed before a RA is initiated (see Section 9.2.4 for signature requirements). A ROD could also be used as the DD for non-NPL sites.
- **Decision Document (DD):** For non-NPL sites, a DD contains the official statement of remedial action(s) required for a site and demonstrates that the response action chosen is consistent with, and meets the requirements of, CERCLA and the NCP. The DD shall be signed before a RA is initiated (see Section 9.2.4 for signature requirements). The DD is similar to a ROD for a NPL site.

9.2.1 Preparation of the DD/ROD

The RPM shall prepare a draft DD/ROD at the conclusion of a RI/FS to support the selection of a remedial action at a site. The DD/ROD documents all facts and site-specific policy determinations considered during the remedy selection process. This documentation is described in the U.S. EPA's *Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (EPA/540/R-98/031, July 1999), and should be at a level of detail appropriate for the site and should be included in the Administrative Record. The documentation contained in the DD/ROD should summarize evaluation criteria used during remedy selection.

The DD/ROD should summarize the following information related to the scope and objectives of the action:

- How the selected remedy is protective of human health and the environment and how the remedy eliminates, reduces, or controls exposures to human and environmental receptors;
- Attainment of federal and state ARARs;
- ARARs or other federal and state laws that the remedy will not meet; any waivers invoked and the justification for invoking the waiver;
- How the remedy is cost-effective (i.e., provides overall effectiveness proportional to its cost);
- How the remedy uses permanent solutions, alternative treatment solutions, and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and
- Whether the preference for remedies using treatment which permanently and significantly reduce the toxicity, mobility, or volume of the hazardous substances, pollutants, or contaminants as a principal element is, or is not, satisfied by the selected remedy. If this preference is not satisfied, the DD/ROD shall explain why a remedial action involving such reductions in toxicity, mobility, or volume was not selected.

The DD/ROD also:

- Indicates, as appropriate, the remediation goals that the remedy is expected to achieve as discussed in the FS;
- Documents DON's attempt to restore natural resources, if the selected response action has an element that addresses natural resource injury (NRI), if a natural resources damage claim is filed against DON (see DON's *Policy on Natural Resource Injury and Damages in the Installation Restoration Program* [CNO, 21 Dec. 2001];
- Addresses significant changes and the responses to comments received during review of the FS and PP;
- Describes whether hazardous substances, pollutants, or contaminants will remain at the site such that a review at least every five years would be required; and
- Provides, when appropriate, a commitment for further analysis and selection of long-term response measures within an appropriate timeframe.

9.2.2 Streamlined ROD

In a joint initiative between U.S. EPA, DoD, and other stakeholders, a Streamlining Task Force was formed to address ways to reduce document size, review time, and number of revisions needed to document Remedy Selection at CERCLA sites. The committee chose to focus their initial efforts on streamlining RODs. The work group developed a prototype streamlined ROD that is easily understandable to the public, eliminates redundancy, consolidates documentation, reduces overall document size, minimizes regulatory review time, and can be produced more cost-effectively. Detailed information already documented in the Administrative Record is not replicated in the streamlined ROD. The streamlined ROD summarizes the facts relevant to the RI/FS, community participation, and remedy selected for the site. In an effort to augment the streamlined ROD, an electronic version of the streamlined ROD should be submitted to regulatory agencies along with the printed copy of the streamlined ROD. The electronic version can reside on a CD or Web site and should provide easy access to supporting documentation through interactive hyperlinks to information.

9.2.3 Flexible ROD

The ROD is a legally binding agreement between the Navy and regulatory agencies, and changing the ROD after it has been signed can be a complicated, costly, and time-consuming process. For this reason, the ROD should be carefully developed to allow flexibility in addressing unexpected issues without requiring changes to the document.

As discussed in Section 10.5.2, optimization during remedial action operation is a necessary element in ensuring effective remedy implementation. In many cases, the results of optimization reviews include recommended changes in the remedial approach. The goal of a flexible ROD, sometimes referred to as a "smart" ROD, is to allow modifications in the remedial approach to be implemented without the need to make changes to the ROD. These adjustments and modifications often are needed to address uncertainties and changing site conditions that typically are encountered during implementation of a remedy as additional site and performance data are collected.

It is important that the language used in the remedy description allows for flexibility in technology transition and unit process selection. The wording used in the ROD should state what the preference is at the time given current site conditions, but recognize the potential need for a transition to other more cost-effective remedial options over time. The remedy description also should discuss the treatment train

planned for remedial technologies, such as a transition from contaminant source area treatment to MNA for dissolved plume treatment. It also is important to document realistic performance objectives for the selected remedy components and the need for technology transition as further operation becomes no longer cost-effective, and to document an overall exit strategy for the site.

Additional information regarding the development of flexible RODs, including a checklist for optimizing ROD flexibility, is provided in Section 4 of NAVFAC's *Guidance for Optimizing Remedy Evaluation, Selection, and Design* (UG-2060-ENV, Apr. 2004).

9.2.4 DD/ROD Approval Process

The RPM shall provide the draft DD/ROD and a recommendation of action to the installation Commanding Officer/Commanding General (CO/CG) or BRAC PMO, as appropriate. If CO/CGs/PMO do not concur with the recommendation or have questions concerning the DD/ROD, they shall present the issues to the RPM for discussion and resolution.

As a matter of being proactive, DON wants to work closely with the regulatory agencies and receive their concurrence on remedy selection decisions wherever possible. Having regulatory agencies sign the ROD/DD is one way of documenting their concurrence. Other means, such as letters or memoranda, are also acceptable means of documenting agency concurrence. However, regulatory agency concurrence on ROD/DDs is legally required only in a few instances. CERCLA Section 120(e)(4) states that where a Federal Facility Agreement/Interagency Agreement (FFA/IAG) is in place, both the Navy and the U.S. EPA select the remedy. Under CERCLA Section 121(f)(3)(A), state concurrence is required only where the remedy does not attain an ARAR because the ARAR has been waived under Section 121(d)(4). Finally, a site's FFA/IAG/ Federal Facility State Remediation Agreement (FFSRA) itself might require state concurrence.

DDs and RODs shall be signed (electronic signatures are acceptable) by the installation CO/CG for active installations and the BRAC PMO delegate for BRAC installations. Following are options to address achieving regulatory concurrence:

- For NPL sites, RODs should include signature lines for the installation CO/CG or BRAC PMO delegate and may contain concurrence signature lines for U.S. EPA and the state. If the U.S. EPA and/or State do not want to sign the ROD, they can provide separate letters of concurrence to the DON ROD.
- For non-NPL sites, ROD/DDs should include signature lines for installation CO/CG or BRAC PMO delegate and may contain a concurrence signature line for the state (and U.S. EPA for BRAC installations). If the state (and U.S. EPA for BRAC installations) does not want to sign the ROD/DD, they can provide separate letters of concurrence to the DON ROD/DD.

For NPL sites, if DON and U.S. EPA do not concur on the selected remedy, the FFA outlines a detailed dispute resolution process to be followed in order to concur on the remedy selection. If the dispute cannot be resolved, U.S. EPA makes the final remedy selection decision. For non-NPL sites, DON has final decision authority. Some non-NPL sites also have dispute resolution processes in FFSRAs, with DON retaining final remedy selection authority. A notice of the decision and the availability of the DD/ROD should be publicized in accordance with public participation guidance (see Chapter 15).

For additional information on preparation of PPs, RODs, and other DDs, see U.S. EPA's *Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (EPA/540/R-98/031, July 1999).

9.2.5 Making Changes to the ROD

For sites subject to CERCLA, potential changes to RODs should be implemented through an Explanation of Significant Differences (ESD) or a ROD amendment; however, for minor changes, a memo to the RPM project file may be sufficient. An ESD documents a significant modification in cleanup goals or approach to those detailed in the original ROD, without change to the overall remedy. A ROD amendment documents a complete change in cleanup goals and/or approach to those detailed in the original ROD, including a change in the selected remedy. See U.S. EPA's *Guide to Preparing Superfund Proposed Plans, Records of Decision, and other Remedy Selection Decision Documents* (EPA/540/R-98/031, July 1999).

As discussed in Section 9.2.3, an advantage of having a flexible ROD is to allow continual optimization to be performed without the need or a ROD modification, which can be an onerous process. Should it be necessary to modify the ROD, it is important that efforts are made during the modification process to include the flexible ROD provisions discussed in Section 9.2.3.

9.2.6 Making Changes to the RCRA Permit

Sites subject to RCRA requirements shall operate within the framework of a RCRA permit. Potential changes to the remedy may require a modification of the RCRA permit. The requirements to modify the permit depend on the extent of the change. Minor changes to system operation may only require a letter to the regulatory agency (Class I modification). More significant changes to system operation may require additional background and supporting documentation (Class II modification), or a complete permit reapplication (Class III modification). The three classes of RCRA permit modifications are described in further detail in 40 CFR 270.42.

Similar to the ROD, the RCRA permit modification process can be quite onerous depending on the nature of the change and what class it falls into. Thus, the importance of having flexibility in the ROD applies equally to the RCRA permit. If a RCRA permit modification is necessary, it is important that efforts are made during the modification process to include the flexible provisions discussed in Section 9.2.3. Additional information about the RCRA process and how it relates to CERCLA is provided in Section 13.1.

CHAPTER 10

Remedial Design/Remedial Action (RD/RA)

The major activities of the Remedial Design (RD) and Remedial Action (RA) phases occur once the remedy selection has been documented in a Decision Document (DD) or Record of Decision (ROD). Remedial Design, Remedial Action Construction (RA-C) and Remedial Action Operation (RA-O) are the phases that lead to achieving the cleanup goals as defined in the DD or ROD.

Response actions during the RD and RA phases include design and implementation of the selected remedial action. The RD and/or the Remedial Action Work Plan (RAWP) should be site-specific and include the information from previous plans and procedures developed during the RI/FS. The following sections describe the key components of the RD and RA phases. U.S. EPA guidance for RD/RAs is located in the *Superfund Remedial Action Design and Remedial Action Handbook* (June 1995).

Section 20 of the *Management Guidance for Defense Environmental Restoration Program (DERP)* requires the DoD Components (e.g., DON) to continually evaluate environmental restoration remedies. In 2004, DON released *Policy for Optimizing Remedial and Removal Actions Under the Environmental Restoration Programs*, which outlines the requirements and processes for optimization during 1) Planning, Design, and Construction; 2) Operation; and 3) Long-Term Management at DON sites. The policy requires DON optimization guidance to be followed during each of these three critical phases of the restoration process. DON optimization guides are available on the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb). Each guide corresponds to one of the phases emphasized in the policy.

10.1 Remedial Design (RD)

The purpose of the RD phase is to convert the conceptual design for the selected remedy from the Feasibility Study (FS) into a full-scale detailed design for implementation. RD includes preparation of technical RD work plans, drawings, specifications, and RAWPs. The degree of detail conveyed by the task descriptions and technical drawings in the RD or RAWP should be adequate to implement the remedy, and depends on the contract mechanism. If the RD/RAWP is prepared by one contractor for implementation by another contractor, then the level of detail required is likely to be extensive. For design-build contracts, the same contracted entity may both prepare the design, and then build and implement the remedy. In this case, project continuity, institutional knowledge, and common personnel within the contracted firm should allow for a reduced level of detail in the RD and/or RAWP.

Sometimes a RD and a RAWP are developed separately and sometimes they are combined depending on the nature and scope of the remedial action. The RAWP describes the remedial action, in particular how it will be staged and implemented, and also includes details on the implementation actions for land use controls (LUCs) if they are required at the site.

The RD and the RAWP are considered by DoD and U.S. EPA as primary documents to help support the Site Closeout process and to eventually assist the National Priorities List (NPL) delisting process, if necessary.

Remedial system designs should incorporate flexibility to accommodate decreasing mass removal rate over time. The optimization of the RD/RAWP for a selected remedy should involve planning for a transition from higher- to lower-cost process options or technologies over the lifetime of the project. In the beginning, process options or technologies that can handle larger volumes of contaminated media or higher concentrations may be needed, but their use likely will become prohibitively expensive over time.

Therefore, a transition, over time, to lower-cost process options or technologies should be considered in the design process. The selected process options or technologies should be designed for extended maximum efficiency over the complete duration or "life cycle" of the project. Remediation systems are often designed for the "worst-case" initial conditions, which results in high initial capital costs and potentially higher operations and maintenance (O&M) costs due to increased energy demands and other factors. A proper life-cycle design results in a more sustained mass removal rate over time and typically lower capital and total O&M costs in the long run. See Appendix B for a summary description of technologies.

Another important aspect of remedial optimization is the consideration and continual evaluation of site conditions, technological advances, and regulatory developments during the remedy selection and design phase. It is common for multiple years to pass between the FS and the completion of the RD. Much can change over that time period with respect to site conditions, advances in technologies, or changes in regulatory requirements. Because of this, RPMs should consider the development of the conceptual site model (CSM) as a continuously evolving process until Response Complete (RC) or Site Closeout (SC) is achieved. Additionally, data from the RI/FS may not be (or may no longer be) accurate enough and better data may be necessary to delineate and characterize source areas to be treated with in situ technologies. A current literature search of proposed technologies may reveal advanced design concepts or technology limitations that were not well understood when the FS was developed. Further detail is provided in the *Guidance for Optimizing Remedy Evaluation, Selection, and Design* (Apr. 2004).

The Navy is moving more toward the design-build type of contract, which allows the design to evolve if necessary over the course of the project even after construction has commenced. Therefore, the frequency and level of internal design reviews are at the discretion of the RPM within the limits set forth in CERCLA or RCRA orders or permits. The Navy's goal is to avoid prescriptive requirements that limit the range of options available to the remediation contractor. Typically, in a design-build scenario, the contractor is not required to provide detailed construction designs. However, the contractor should be required to submit detailed designs prepared by qualified, registered professionals for critical design features (e.g., geotechnical and structural) that may pose a significant risk to human safety, integrity and stability of existing or new structures, or the essential performance of the remedy. Such submittals should include a project-specific construction Quality Assurance Project Plan (QAPP) with quality assurance/quality control (QA/QC) provisions for monitoring construction and for any field changes that may be necessary. If, during the RD phase, new information comes to light that would substantially alter the scope, cost, implementability, or effectiveness of the previously selected remedial action, an Explanation of Significant Differences (ESD) or amendment to the ROD may be required. Chapter 9 contains additional guidance for changing a ROD or DD.

Although U.S. EPA has not promulgated regulations that provide specific requirements for the plans developed during the RD phase of a CERCLA response, the following represent common elements of most RDs:

- Review the objectives established for the RA;
- Prepare a RD/RAWP;
- Develop a list of specifications for all equipment and materials required to implement the RA;
- Prepare operational and optimization guidance for the remedy;
- Identify specific performance objectives that are linked with the remedy's exit strategy;

- Develop a cost estimate and proposed schedule (note that if a design-build contractor is being used, an additional cost estimate for the construction would not be required because it would already be included in the task order proposal or work plan); and
- Develop a project-specific construction QAPP including QA/QC provisions.

U.S. EPA and the state review the RD/RAWP and provide comments, which the Navy RPM should address. Actual construction of the remedy should begin only when comments have been sufficiently addressed.

Following the preparation of RD documents, the Community Relations Plan (CRP) prepared during RI/FS scoping should be reviewed and revised if necessary. After completion of the RD, the RPM issues a fact sheet to notify the media and public and, as appropriate, conducts a public briefing.

10.1.1 Permits and Approvals

Permits, approvals, and site access agreements, if required, generally should be obtained during the RD phase. Cooperation between the RPM, the contractor, and the installation's legal, engineering, and public affairs staff is needed to secure the permits.

Remedial actions that are conducted entirely on site and in accordance with CERCLA Sections 104, 106, 120, 121 or 122, do not require federal, state or local permits to engage in the remediation activity (CERCLA Section 121(e), as codified in 42 USC Section 9621(e) [2001]).

U.S. EPA's interpretation of CERCLA Section 121(e) waives the requirement to obtain a permit and associated administrative and procedural requirements of permits, but not the substantive provisions of permitting regulations that are ARARs. For off-site treatment or discharge of environmental media such as soil or process wastewater associated with a remedial action, permits may be required. For example, if contaminated soil is excavated and then hauled off-site for treatment and disposal, a permit may be required. RPMs should consult their legal counsel and management before obtaining a permit. Subsequently, consultation with regulatory and permitting agencies may be necessary.

On-site remedial activities include the areal extent of contamination and all suitable areas in very close proximity to the contamination requiring the response action. RPMs are advised that under Section 121(d)(3) of CERCLA, wastes generated as a result of CERCLA remediation activities and transferred off-site shall be managed at a facility operating in compliance with federal laws. U.S. EPA requires off-site waste management facilities to fulfill U.S. EPA's definition of acceptability and has established detailed procedures for issuing and reviewing unacceptability determinations (see 40 CFR Section 300.400 for further details.)

10.2 Remedial Action (RA)

Upon completion of the RD, implementation of the RA (the remedy selected in the ROD) begins. The RA start date is defined as the date the contractor has mobilized and begun substantial and continuous physical on-site remedial action. The start date is important because it triggers the beginning of the Five-Year Review cycle if one is required.

The RA phase involves two main components, Remedial Action Construction (RA-C) and Remedial Action Operation (RA-O), which are addressed in detail in Sections 10.3 and 10.5, respectively. The RA involves the award of a contract or delivery order to a contractor to construct the selected remedy and implement the detailed design plans or performance specifications. With the trend toward design-build contracts within NAVFAC, a contractor may be obtained to provide the design of the remediation and the

construction. However, NAVFAC still uses traditional CLEAN and RAC contracts as well. In this case, the CLEAN contractor likely designs the system and the RAC contractor builds it. The RPM and the acquisition team at the FEC should determine which type of contract is most appropriate for the site requirements. RA activities require close cooperation between the Resident Officer in Charge of Construction (ROICC), the RPM, and the installation. The RPM is the technical manager for the RA and is responsible for oversight functions such as coordinating with U.S. EPA, state, and local officials; maintaining the Administrative Record; participating in appropriate community involvement efforts; and assuring overall QA/QC.

The Remedy In Place (RIP) milestone is achieved at the successful completion of the RA-C phase (i.e., completion of remedy construction and demonstration that it is operating properly), and the RC milestone is achieved at the successful completion of the RA-O phase (i.e., cleanup goals have been met as specified in a ROD/DD). SC may be achieved if the remedy has accomplished the remedial action objectives, allows for unlimited exposure and unrestricted use of the property, and no Long-Term Management (LTMgt) of the site is required.

10.2.1 Remedial Action Documentation

In 2004, DoD and U.S. EPA formed a task force to streamline the documentation requirements for Site Closeout and NPL deletion. The task force determined that there are five primary documents required to be prepared by DoD. These documents are the ROD, the RD/RAWP, and three types of Remedial Action Completion Reports (RACRs):

- Interim RACR (I-RACR);
- RACR; and
- Final RACR.

For remedial action requiring a prolonged RA-O phase to achieve remedial action objectives, the DON RPM shall prepare an Interim RACR (I-RACR) following remedy construction and evaluation to confirm the remedy operates as designed. Generally, remedial actions involving remediation of groundwater, including monitored natural attenuation (MNA), will require long-term operation during the RA-O phase, and an I-RACR should be prepared for these remedies. Depending on the project schedule, an I-RACR could be used to document completion of the RIP milestone, although it is not a prerequisite. The I-RACR also could be used for documenting Operating Properly and Successfully (OPS) for remedies at Base Realignment and Closure (BRAC) or at non-BRAC installations where the sites may be available for property transfer or lease.

The RACR formally documents the achievement of cleanup objectives specified in the ROD/DD, at the completion of the RA-O phase. In addition, it provides the basis for full or partial deletion from the NPL. The RACR also is used to document that RC has been attained. The RPM is required to obtain concurrence from regulatory agencies to achieve the RC milestone. Generally, a draft is prepared for U.S. EPA/state review and comments, and the final report is issued after addressing these comments. The concurrence could be in the form of a letter and/or a signature page added to the report.

When all cleanup goals are complete at the last OU or site at an installation, the RACR for the last OU or site will be designated the Final RACR. The Final RACR is to contain a brief summary of previous RACRs completed at the installation (in the Overview section of the report), as well as the RACR information for the last OU or site. The Final RACR also will contain a brief summary of NFA RODs, if any, and will provide references to the locations of previous RODs and RACRs. The RPM may include a table listing all the OUs addressed at the installation and references to site closeout documents (letters, RODs, I-RACRs, RACRs, etc.). The Final RACR will require concurrence from the regulatory agencies.

The Final RACR also contains all the essential elements for U.S. EPA to begin the NPL deletion process with the Notice of Intent to Delete (NOID).

All RACRs should cross-reference existing material and should not contain duplicative language from other reports. All RACRs consist of the sections listed in Table 10-1; the content outlined in this table helps ensure that Final RACRs contain all information needed for the NOID. For I-RACRs, which should follow the same outline as the RACR, U.S. EPA and the Navy RPM shall determine whether and how Sections D (Demonstration of Completion) and E (Ongoing Activities) are included.

DON Guidance to Documenting Milestones Throughout the Site Closeout Process (Mar. 2006) discusses the RACRs and other core documents required for Site Closeout. See the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb) to download a copy of the guidance. In addition, the use of RACRs to document RC is discussed in Section 10.6.

Table 10-1. I-RACR and RACR Outline

Section	Contents
A. Overview	Provide brief description of the OU characteristics, COCs, major findings, and results of site investigations. For the Final RACR, also summarize conclusions from previous I-RACRs and RACRs and identify their file location.
B. Remedial Action Objectives	Identify the remedial action objectives and cleanup standards specified in the ROD/DD and subsequent modifications, if any.
C. Remedial Action	Briefly discuss the remedial actions taken to meet the remedial objectives.
D. Demonstration of Completion	Include information needed to demonstrate attainment of remedial objectives (e.g., final sampling report, visual inspection report). Modify this section for an I-RACR and include information about remedy construction and remedy operation as designed
E. Ongoing Activities	Describe the activities, if any, still being performed or to be performed such as RA-O (this would only be included in an I-RACR) or LTMgt activities such as monitoring, 5-year reviews, LUCs, etc.
F. Community Involvement	Briefly summarize the public outreach activities conducted at the site, e.g., the Community Relations Plan; specify the date the RAB was formed and terminated (if applicable); provide the dates of public meetings and discuss environmental justice initiative (if applicable).
G. Certification Statement	Provide a statement by a DON representative authorized to sign ROD/DD, certifying that the RACR memorializes the completion of the remedial action objectives. For an I-RACR, this certification will be for completion of construction and operation of the remedy in accordance with the ROD/DD.

10.3 Remedial Action Construction (RA-C)

RA-C is the period during which construction occurs to implement the remedy. During the RA-C, the contractor cleans up the site or builds and installs a remediation system, and demonstrates through written reports that the system is functioning as designed.

With any RA-C contract, normal construction industry practice is to conduct pre-final and final inspections prior to final government acceptance of the construction phase of the contract. These inspections should be conducted to confirm that the construction has been completed in accordance with the contract design and specifications.

During the pre-final inspection, the RPM (or the Navy Technical Representative [NTR]) and the contractor should inspect all elements of work to see if the work is complete and ready for acceptance

under the terms of the contract. Some minor defects may come to light, if so the construction manager should develop a "punch list" of all items that need correction or completion before the work can be accepted. A pre-final inspection report is prepared that includes the punch list, completion dates for outstanding items, and a date for the final inspection.

If the RPM determines that punch list items are minor, the pre-final inspection may automatically serve as the final inspection. Otherwise, a final inspection is conducted later to determine that punch list items are corrected and all work has been completed in accordance with the contract plans and specifications. Federal Facility Agreement (FFAs) generally require a set of inspections to determine that all aspects of the remedy have been implemented in accordance with applicable enforcement documents and the ROD.

10.4 Remedy In Place (RIP)

RIP is achieved when the construction of a long-term remedy is complete and the remedy is operating as planned to meet project remedial action objectives in the future, or a short-term remedy has been successfully implemented and the final documentation is being prepared.

If the remedy is expected to operate over an extended period in order to reach remedial action objectives, once the construction is complete, the system is operating as designed and it is expected to meet RA Objectives, the RPM should document the RIP date in the NORM database so that the milestone is reported to NAVFAC HQ and used to support the reporting related to the DERP goals. The determination of whether RIP has been achieved is a Navy decision; therefore regulatory concurrence for this milestone is not needed.

10.5 Remedial Action Operation (RA-O)

Following the completion of the RA-C phase and the RIP milestone, the project may enter the RA-O phase. This phase involves operation, maintenance, monitoring actions, and continual optimization of the remediation system and site. If the remedy is accomplished (i.e., RC is achieved) by actions taken during RA-C, RA-O is not necessary.

During the RA-O phase, the remediation system is operated or chemical or biological processes are occurring leading to the cleanup objective identified in the ROD or DD. The RA-O phase also may include implementation and management/ maintenance of LUCs, if these were part of the selected remedial action in the ROD or DD.

RA-Os may include active remediation that requires an extended operation time to reduce contaminants to cleanup standards, such as remediation by air sparging/soil vapor extraction systems. RA-O also may include passive remediation technologies such as MNA. MNA requires an extended period of monitoring; however, this phase of monitoring is not considered LTM or LTMgt until cleanup goals are achieved. Therefore, MNA remains within the RA-O phase until cleanup goals have been achieved.

Figure 10-1 outlines the main activities conducted during RA-O.

10.5.1 Monitoring During the Remedial Action Operation

Monitoring conducted during RA-O should be primarily focused on collecting the necessary data to measure performance objectives and to compare them to the exit strategy. Exit strategies are means of determining when it is time to stop, modify, or change a particular technology, or terminate all remedial actions, based on the achievement of previously established performance objectives.

Elements of Remedial Action Operation (RA-O)

RA Construction → **RA Operation** ⇢ **Post-Project Activities**

Purpose	• Operation, maintenance, monitoring actions, and optimization for the remediation system and site to achieve RC.
Potential Subsequent Actions	• LTMgt • NFA • ESD • ROD Amendment • Develop RACR • Achieve RC
Tasks	• Operate and maintain installed equipment • Evaluate potential contaminant migration • Compare monitoring data to decision rules • Evaluate remediation performance and effectiveness • Optimize RA-O • Monitor system performance parameters • Monitor groundwater and/or other media • Track optimization in NORM • Five-Year Reviews
Documentation	• SAP and/or monitoring plan • Optimization reporting in NORM • Monitoring and remedial action progress reports • O&M Manuals • Five-Year Review Reports • RACR

Figure 10-1. Elements of Remedial Action Operation

Monitoring may have several other purposes as well, including:

- Evaluation of remedy performance and effectiveness;
- Protection of human health and the environment;
- Evaluation of contaminant migration; and
- Compliance with regulatory requirements.

A monitoring plan should be developed that clearly states all the goals of the monitoring program and the performance objectives of the RA-O and what specific data will be collected to satisfy those stated goals and objectives. Monitoring objectives should be developed that directly relate to the performance objectives of the remedial action, decision rules should be developed that directly support site management decisions, and the data that are to be collected according to the Monitoring Plan should support and inform the decisions that will be made as the exit strategy is implemented. (Note: Groundwater Monitoring Plans are discussed in Chapter 11 and Performance Objectives and Exit Strategies are discussed in Chapter 8 of this manual.)

RPMs should develop a SAP to detail the location, frequency, and type of samples to be collected and describe the analytical techniques, QA/QC requirements, and reporting protocol. A monitoring QAPP ensures that logic is maintained by focusing data needs and data collection and analysis methods to directly support the monitoring objectives, decision rules, and subsequent management decisions. Further detail is provided in U.S. EPA's *Guidance for Monitoring at Hazardous Waste Sites: Framework for Monitoring Plan Development and Implementation* (OSWER 9355.4-28, Jan. 2004).

10.5.2 RA-O and Monitoring Optimization

The *DON Policy for Optimizing Remedial and Removal Action Under the Environmental Restoration Program* (Apr. 2004) requires optimization evaluations for response action sites, implementation of the recommendations, and reporting of progress. Remedy effectiveness should be evaluated at least annually to ensure that it is efficiently making progress towards meeting project goals. Assessments include a review of the project goals, review and revision of the current CSM, evaluation of progress toward remediation goals, and evaluation of the remediation system and unit processes to ensure the appropriate technology (or combination of technologies) is being employed to reach cleanup goals.

Data collected during remedial action monitoring should be used to evaluate remedial performance, and to make decisions to optimize the remedial action by modifying the RA Objectives, modifying the system, modifying the monitoring program, or implementing a new remediation strategy, technology, or combination of technologies. For each site at which an optimization study is conducted, the RPM is required to track and report the following:

- Baseline conditions;
- Recommendations of the study;
- Implemented strategies; and
- Progress in NORM. (There is a specific NORM module for this optimization reporting requirement.)

NAVFAC's *Guidance for Optimizing Remedial Action Operation* (Apr. 2001) presents a step-wise process for optimizing RA-O projects. The objective of this guidance document is to provide information to Navy RPMs and their contractors on a process to maximize cost-effectiveness without compromising program and data quality. The steps detailed in the guidance document are:

1. Review and Evaluate Remedial Action Objectives
2. Evaluate Remediation Effectiveness
3. Evaluate the Cost-Effectiveness
4. Consider Remediation Alternatives
5. Develop and Prioritize Optimization Strategies
6. Prepare an Optimization Report and Implement the Optimization Strategy with input from the regulatory agencies.

An optimization evaluation usually is conducted during the RA-O phase to determine whether the existing remedy is making progress towards reaching cleanup goals and to recommend modifications or alternatives to enhance the performance of the remedy, reduce the operating costs and cleanup time, or shut down the system if performance objectives have been met.

RPMs and their project teams should optimize remedies throughout the restoration process and document their progress in the NORM Optimization module. In addition, Navy optimization guidance recommends periodic third-party optimization reviews. Third-party optimization review teams should be comprised of experienced environmental professionals that are independent of the remediation project being reviewed. Team members should be hand-picked with site-specific characteristics and technical issues in mind. Teams may include individuals with expertise in innovative technologies, remedial project management, technology transfer, total environmental cost control, environmental planning and analysis, and environmental cost-estimating. Team members normally are selected from the Navy, other federal agencies such as Army and United States Geological Survey, academia, and the private sector. The FECs retain the final decision to implement recommendations of the third-party review teams.

NAVFAC's *Guide to Optimal Groundwater Monitoring* was originally developed in 2000 and later revised to include new information about advances in monitoring technologies and to address various media such as soil, sediment, and landfills. This guide should be used by RPMs to ensure that their monitoring programs are designed and periodically optimized to cost-effectively support their monitoring goals without compromising program and data quality. The value in regularly evaluating monitoring data cannot be overstated. The data obtained from the monitoring program are the basis for assessing and optimizing remedy performance, including determining whether to shut off the system or terminate the RA-O phase, to change the monitoring program, or to consider another strategy. It is the RPM's responsibility to analyze monitoring data to determine the effectiveness of the response action and make good management decisions accordingly. The five general strategies that ensure a cost-effective monitoring program include:

- Reducing the number of monitoring points;
- Reducing monitoring duration and/or frequency;
- Simplifying analytical protocols;
- Ensuring efficient field procedures; and
- Streamlining data management and reporting.

It is also very important to ensure the right types of data are being collected to assess remedy performance and to support transition to the next phase of the treatment train. DON policy on optimization, NAVFAC optimization guidance documents, case studies, and other products are presented at the NAVFAC ER RAO/LTMgt Optimization Work Group Web page. Also see Section 11.2.2 for more information about groundwater monitoring optimization.

10.6 Response Complete (RC) Milestone

The RA-O phase is complete when the selected remedy has achieved cleanup goals specified in the ROD or DD. At that point the RC milestone has been achieved and the site either enters the LTMgt phase or the site achieves SC. It is very important that the Navy and federal and/or state regulators agree upfront on how monitoring data will be collected and analyzed to confirm that RC has been achieved. Navy optimization guides are excellent resources to help RPMs develop performance objectives, monitoring plans, and exit strategies to effectively achieve RC. In particular, NAVFAC's *Guidance for Optimizing Remedial Action Operation* (Apr. 2001) provides guidance on the types of data required and how to visualize and analyze that data to evaluate the effectiveness of the remedy. This is valuable information for a RPM to be able to identify appropriate sampling and analyses to confirm RC.

Formal documentation and concurrence for the RC milestone is essential to ensure that DON, U.S. EPA, and the state agree that cleanup goals have been achieved at the site. The RACR formally documents the

achievement of cleanup objectives, and is a comprehensive document that provides information about the site/OU, applicable ROD or DD, and cleanup activities carried out to achieve remedial action objectives. Generally, a draft will be prepared for regulatory review and comment, and the final report will be issued after addressing those comments. The RPM may need to obtain concurrence from the regulatory agencies for the RACR, if required to do so under the FFA or Interagency Agreement (IAG) governing the cleanup.

The RACR signifies the achievement of the RC milestone, and the RC date should be entered into NORM for reporting to NAVFAC HQ.

The Final RACR shows that the remedial actions have been completed and the remedial action objectives in the RODs have been met for the installation. The Final RACR contains all the essential elements needed to prepare the NOID, which is required for NPL sites only. DON shall not prepare preliminary and final closeout reports because the I-RACR and RACR serve as the functional equivalent of these documents. U.S. EPA may choose to prepare preliminary and final closeout reports based on information provided in the I-RACR, RACR, or Final RACR.

RPMs should consult with FEC and/or BRAC PMO management to determine who the proper signatory is for RACRs. It is likely that the same individuals required to sign the ROD also will sign the RACRs (i.e., Commanding Officer/Commanding General [CO/CG] or BRAC PMO representative.)

10.7 Five-Year Reviews

In accordance with Section 121(c) of CERCLA, a five-year review is required if a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at levels that do not allow for unlimited use and unrestricted exposure. For example, if the site is restricted to industrial use, or a containment remedy is in place at the site, five-year reviews will need to be conducted. If a RA results in unlimited use and unrestricted exposure, but will not achieve RC within five years, a five-year review will be required during the RA-O phase.

The *Navy/Marine Corps Policy for Conducting CERCLA Statutory Five-Year Reviews* (May 2004) provides important information for RPMs to understand regarding planning and conduct of five-year reviews. Much of this information is summarized below.

The planning and conduct of five-year reviews at active installations will remain with NAVFAC using ER,N funds for a period of five years after the *last* site at the installation achieves RC. Subsequently, the installation CO/CG shall become responsible for conducting and funding five-year reviews using installation O&M funds. For BRAC installations, the BRAC PMO or its representatives may assume responsibilities for five-year reviews. RPMs should coordinate with the BRAC PMO and check for the most up-to-date BRAC PMO directives and policies.

10.7.1 Purpose

The purpose of the five-year review is to evaluate the performance of the implemented remedy to verify that the remedy remains protective of human health and the environment, as stated in the ROD/DD. The existing remedy may be modified if it is no longer protective of human health and the environment. Although DON policy requires continual evaluation and optimization of remedies, RPMs should take advantage of opportunities presented by the five-year review process to discover, recommend, and implement optimization strategies for all ongoing RA-O projects. RODs and DDs should be prepared and negotiated to specifically and explicitly include opportunities for optimization and the flexibility to implement process improvements. (See the discussion on Flexible RODs in Chapter 9.)

10.7.2 "Trigger" Date for Five-Year Review

The start of the five-year review clock is triggered by the on-site mobilization date for remedial actions sites/OUs that require a RA-C phase. For remedies that do not require a RA-C phase (e.g., MNA or institutional controls), the remedy start date and trigger date is the ROD/DD signature date. The implementation of an interim remedial action or a removal action at a site does not trigger the requirement of five-year reviews. Only implementation (by mobilization for action or by signature, as appropriate) of a ROD or DD shall trigger the five-year review requirements.

10.7.3 Five-Year Review Report

The five-year review report should present a brief description of the site, the results of the five-year review, and recommendations. This report should consider and/or contain the following:

- Clearly state whether the remedy currently is or is expected to be protective;
- Document any deficiencies identified during the review;
- Recommend specific actions to ensure that a remedy will be or will continue to be protective;
- Where necessary, include a description of follow-up actions and a timetable needed to achieve or to continue to ensure protectiveness;
- For sites that are still in the RA-O phase, the remedy evaluation and optimization are performed routinely and most information for the five-year review report should be readily available;
- The first five-year review report is to be completed and signed no later than five years from the trigger date (see Section 10.7.4). Any subsequent review reports are to be completed and signed no later than five years after the previous five-year review report;
- In conducting a five-year review, the effect of any newly promulgated or modified standards on the protectiveness of the remedy originally selected in the ROD/DD should be determined;
- When the five-year review indicates that the remedy is not performing as designed, the report should recommend actions to improve performance; and
- Where a site is in the RA-O phase, a five-year review should confirm that immediate threats have been addressed and that the remedy will be protective when complete.

10.7.4 Review and Signature

In accordance with Executive Order 12580, and DoD Instruction 4715.7 (22 Apr. 1986), DON is the approval authority for CERCLA five-year reviews at DON sites.

- A five-year review and report for a site are to be completed and signed within five years of the trigger date for that site. Subsequent five-year reviews should be signed no later than five years after the signature date of the previous five-year review report.
- For active installations, the report is signed by the installation CO/CG or their designated representative. The RPM should work with his/her FEC management to determine the proper signatory.
- For closed bases still under the control of DON, the five-year review report is signed by the appropriate BRAC PMO representative and/or the CO of the supporting FEC, or their designated representative. RPMs should coordinate with the BRAC PMO and consult the latest directives and policies to determine who the signatories should be.

10.8 Site Closeout (SC) at RA Completion

For sites not requiring LTMgt, completion of the SC milestone shall occur concurrently with the RC milestone. SC can occur when the RC milestone has been achieved and environmental conditions at the site allow for unrestricted use and unlimited exposure. This milestone signifies that DON has completed active management and monitoring at the site, the remedy is protective of human health and the environment, and that no additional environmental funds are expected to be expended at the site. In this case, the RACR also formally documents the achievement of the SC milestone. Chapter 11 discusses SC following the LTMgt phase.

In addition to the *DON Guidance to Documenting Milestones Throughout the Site Closeout Process* (Mar. 2006), the *DoD/EPA Joint Guidance on Streamlined Site Closeout and NPL Deletion Process For DoD Facilities* (January 2006) also is available. Although these guidance documents provide similar information, the DON guidance provides more detailed information about the DON program, and therefore DON RPMs should generally follow the DON guidance to ensure consistency within the DON ER Program.

10.9 NPL Delisting

The NCP establishes the criteria that U.S. EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425(e), sites may be deleted from the NPL where no further response is appropriate. In making this determination, U.S. EPA considers, in consultation with the state, whether any of the following criteria have been met:

- Responsible parties or other persons have implemented all appropriate response actions required; or
- All appropriate Superfund-financed response under CERCLA has been implemented, and no further response action by responsible parties is appropriate; or
- The remedial investigation has shown that the release poses no significant threat to public health or the environment and, therefore, taking of remedial measures is not appropriate.

Sites may not be deleted from the NPL until the state in which the site is located has concurred on the proposed deletion.

Section 300.425(e)(4) of the NCP sets forth requirements for site delisting to ensure public involvement in the decision. U.S. EPA is required to conduct the following activities:

- Publish a NOID in the Federal Register and solicit comment through a public comment period of a minimum of 30 calendar days:
- Publish a notice of availability of the NOID in a major local newspaper of general circulation at or near the site;
- Place copies of information supporting the proposed deletion in the information repository at or near the site proposed for deletion; and
- Respond to each significant comment and any significant new data submitted during the comment period and include this response document in the final deletion package.

Upon completion of the public comment period, the U.S. EPA Regional Office will prepare a Responsiveness Summary, if necessary, to evaluate and address comments that were received. If none of the comments received during the comment period are dissenting, the site will be deleted from the NPL.

Section 300.425(e)(4) of the NCP also requires that information supporting a proposed deletion be placed in the information repository. The information needed to support a deletion decision is included in the ROD, RD/RAWP, RACRs, the NOID, public comments on the NOID, and documentation of state concurrence. No further information is required to support a delisting decision.

CHAPTER 11

Long-Term Management (LTMgt)

The Long-Term Management (LTMgt) phase may occur after the Response Complete (RC) milestone has been achieved at a site. This phase is required at sites where hazardous substances, pollutants, or contaminants remain after RC, and are above levels that would allow unlimited use and unrestricted exposure. This situation often arises when DON decides to implement remedies that are primarily containment-type remedies, or when DON remediates a site to a level that requires restricted land use (e.g., site remediated to levels only required for commercial or industrial use). Actions during this phase may involve long-term monitoring, implementation and/or management of land use controls (LUCs), maintenance of a containment cap, and preparation of five-year review reports.

On active installations, planning for and conducting actions in the LTMgt phase are the responsibility of NAVFAC using ER,N funds for a period of five years after the *last* site on the installation achieves RC (including Installation Restoration Program [IRP] and Munitions Response Program [MRP] sites). After that time, the responsibilities to plan, fund, and conduct any required LTMgt functions are transferred to the installation Commanding Officer/Commanding General (CO/CG). For sites on active installations within the LTMgt phase, NAVFAC will develop and implement a long-term maintenance, monitoring, and management plan (LTMgt Plan) that identifies the specific requirements for each site requiring LTMgt. Prior to handover of the LTMgt responsibility to the installation CO/CG, NAVFAC will provide the LTMgt Plan and cost data to the installation commander to allow the timely budgeting for any funds required to continue LTMgt. Cost data shall be in sufficient detail to support the Environmental Compliance budgeting requirements, as described in DON's *Policy for Conducting Five-Year Reviews Under the Installation Restoration Program* (21 May 2004).

The BRAC PMO is responsible for all management and funding of environmental restoration activities, including LTMgt, on BRAC installations. BRAC programs are funded by the BRAC account.

11.1 Land Use Controls (LUCs) During LTMgt Phase

Most DON sites requiring LTMgt are expected to have LUCs. Implementation, management, and monitoring of these LUCs are ultimately the responsibility of the FEC as long as the site remains funded under ER,N. LUCs include engineering controls (ECs) and institutional controls (ICs). ECs are remedies to contain and/or reduce contamination, and/or physical barriers intended to limit access to property. ECs may include fences, signs, guards, landfill caps, provision of potable water, slurry walls, sheet pile, and monitoring wells.

ICs include a variety of administrative and/or legal devices to maintain the viability and effectiveness of the selected remedy and any ECs. ICs are imposed to ensure that the ECs stay in place, or where there are no ECs, to ensure a restriction on land use. ICs include affirmative and negative easements, affirmative and restrictive covenants, equitable servitudes, notices (in deeds, newspapers, etc), zoning, permits (such as construction, excavation, well drilling, etc), agreements with regulators, and reporting on LUC maintenance.

At active DON installations, typical ICs may include restrictions on well drilling, soil excavation, and construction at remediation sites. During the LTMgt phase, these ICs may be implemented through base master plans and/or requirements to obtain permits from the appropriate base authority. ICs such as easements or covenants, commonly applied at the privately owned properties, are not available for active

installations due to requirements from the General Services Administration that establishes regulations for managing U.S. property.

When property is to be transferred to a non-federal entity at the completion of or during the LTMgt phase, the RPM, real estate manager, and legal counsel need to ensure that the LUCs are practiced and legally enforceable under state law. DON has the authority to impose restrictions on the transferee's use of the property, and these restrictions are to remain viable and honored by all subsequent owners. FECs should consult and work with the state and local government agencies for establishing and enforcing these restrictions.

Procedures for periodic inspections of LUCs are established in the Remedial Design (RD) or Remedial Action Work Plan (RAWP). Also, five-year reviews under CERCLA are required to include the assessment of the effectiveness of the LUCs.

The design and implementation plan for LUCs shall be included in the RD and RAWP, just like any other remedy components. Therefore, no additional document should be necessary for the design or implementation of LUCs for the LTMgt phase. However, for sites where the existing RD or RAWP does not include LUC-specific information, documentation may be necessary for implementing LUCs during the LTMgt phase. Further detail is provided in *DON/U.S. EPA Principles and Procedures for Specifying, Monitoring and Enforcement of Land Use Controls and Other Post-ROD Actions* (Sep. 2003).

For additional information on LUCs, see DON Policy Memorandum 99-02, *Land Use Controls, Interim Final* (25 May 1999); and *Policy and Land Use Controls Associated with Environmental Restoration Activities*, Office of Under Secretary of Defense, (17 Jan. 2001).

LUC Tracker

LUC Tracker is a Web-based management tool that operates as part of the Naval Installation Restoration Information Solution (NIRIS) (see Chapter 14) to allow RPMs and FEC personnel to effectively manage their LUCs. LUC information, reports, maps, etc., can be uploaded to the LUC Tracker, thereby allowing anyone in NAVFAC to run various queries to obtain specific LUC data for a site. LUC Tracker also can be used to automatically send reports to various stakeholders and can be used as an automated reminder system for upcoming inspections or reporting requirements. The LUC Tracker provides for easy LUC data access for RPMs, efficient tracking of LUC integrity and compliance, and standard LUC data formats for interoperability among different FECs and their contractors.

11.2 Long-Term Monitoring (LTM)

The LTMgt phase may involve LTM of groundwater, surface water, soil, sediment, vadose zone and/or landfill gases at many DON sites. A site-specific plan is required for all LTM actions. Any applicable existing requirements for the state, RCRA, or other relevant programs shall be followed in developing the LTMgt Plan.

At sites located in close proximity to buildings where volatile organic compounds (VOCs) exist in groundwater, vapor intrusion into the buildings may be a serious concern. If RC is achieved at such a site, but residual VOCs remain, vapor intrusion sampling may be part of the LTM requirements. NAVFAC developed policy and guidance for vapor intrusion monitoring and RPMs should consult the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb) for the latest information.

Although groundwater is the most common media associated with LTM, there may be other environmental media or site types that are subject to LTM in order to ensure the remedy remains

protective, including sediment monitoring, landfill and disposal site gas monitoring, and ecological resources monitoring. RPMs are strongly encouraged to consult the NAVFAC ERB Web site for the latest guidance and policy related to these and other issues related to LTM on ER Program sites. Since groundwater monitoring is the most common aspect associated with LTM on DON sites, this manual presents more detailed information on groundwater monitoring plans and optimization.

At DON sites requiring groundwater monitoring in the LTMgt phase, the monitoring program is often a carry-over from a previous phase such as the RA-O phase. Because objectives may change in the transition from RA-O to LTMgt, this program requires updating and optimization in order to focus on the objectives of the LTMgt phase. NAVFAC's *Guide to Optimal Groundwater Monitoring* (Jan. 2000) should be followed for developing and optimizing groundwater monitoring plans. This guide focuses on the most significant ways to design and optimize groundwater monitoring programs in order to maximize cost-effectiveness without compromising program and data quality. (RPMs should also consult the NAVFAC ERB Web site for NAVFAC guidance on optimizing LTMgt.)

11.2.1 Groundwater Monitoring Plan

The goals of the monitoring program should be clearly defined and focused on the LTMgt actions and these goals need to be documented in the Groundwater Monitoring Plan (GMP). The primary purpose of the GMP is to specify how the monitoring program will be conducted in order to meet the site-specific objectives. It allows for consistent data collection and comparability and documents the monitoring approach. The following components should be included in a GMP:

- Statement of program goals;
- Description of the current monitoring network;
- Frequency and planned duration of monitoring;
- Specific field procedures (e.g., purging, sampling, decontamination, record keeping, etc.);
- Analytical methods, sample handling requirements (e.g., containers, preservation), and quality assurance/quality control (QA/QC) sample collection rates;
- Data management and reporting procedures;
- Decision criteria (including exit strategies) and review process to periodically optimize all of the above; and
- Any other requirements (e.g., RCRA monitoring).

11.2.2 Groundwater Monitoring Optimization

NAVFAC's *Guide to Optimal Groundwater Monitoring* (Jan. 2000) provides detailed information and procedures to evaluate the performance of monitoring programs and to optimize the program to meet stated objectives. A systematic process should be followed for optimizing monitoring programs. The optimization process focuses on collecting relevant data of the appropriate quality to achieve program goals. The general strategies that ensure a cost-effective monitoring program include:

- **Program goals and conceptual site model (CSM).** During the LTMgt phase, typical goals of groundwater monitoring programs include monitoring protectiveness of the remedy, and meeting regulatory requirements such as landfill monitoring. The groundwater monitoring program needs to clearly define monitoring objectives. The CSM should be used to determine these objectives, and should be updated as new monitoring data become available.

- **Location of monitoring points.** An important step to designing or optimizing a groundwater monitoring program is to identify monitoring points that provide the right amount of coverage in the right locations. Every monitoring well in the program should have a specific purpose.
- **Frequency and duration of monitoring.** Monitoring frequency and duration of the monitoring program, including decision criteria, should be evaluated to determine optimal monitoring frequency. Time series data plots for each monitoring well are a basic tool to assist in determining monitoring frequency.
- **Analyte list and QA/QC samples.** Tailoring the data collection and quality assurance practices to the goals of the monitoring program ensures that data management and reporting is limited to the data required for program goals. Excessive data not only requires extra cost for data collection, but also confounds data review, management, and reporting.
- **Sampling procedures.** Techniques to improve sample quality and representativeness while decreasing sampling costs should be explored for optimization.
- **Data evaluation, management, and reporting procedures.** Statistical and geostatistical tools are available to assist in data analysis for spatial and temporal data analysis. These tools can greatly assist in optimizing a monitoring program. Similarly, data management tools such as GIS can assist in data visualization and trend analysis. Program optimization also may include report streamlining to focus on relevant information.

11.3 Site Closeout (SC) at End of LTMgt

Site Closeout (SC) signifies that DON has completed active management and monitoring at a site, the remedy is protective of human health and the environment, and no additional ER,N funds are expected to be expended at the site. Completion of the LTMgt phase demonstrates that SC has been achieved. To document this completion, a Remedial Action Completion Report (RACR) Amendment may need to be prepared.

An operable unit (OU) or site under LTMgt will not achieve SC as long as contaminants remain above levels that would allow unlimited use and unrestricted exposure. Achieving these levels, particularly for sites with containment remedies, may require a long period of time, with the OU/site remaining in the LTMgt phase for the entire period. For example, for landfill cap sites, groundwater monitoring requirements for the LTMgt phase may be 30 years or longer, with LUCs to be maintained more likely for an even longer period of time before SC.

It should be noted that although a site may be in the LTMgt phase, it has achieved RC and can be included in the installation's Final RACR to signify that all sites are completed on the installation. This inclusion facilitates both property transfer and the delisting process for NPL sites/installations.

A RACR Amendment documents the completion of all LTMgt actions. The report should include a brief discussion of previous reports such as a RACR that documented completion of the remedial actions that preceded the LTMgt phase, and the five-year review report(s) prepared during the LTMgt phase.

Also, a RACR Amendment signifies completion of all actions under the ROD/DD. DON shall obtain concurrence from regulators for this report, and inform the public about this document. A copy of the report along with supporting documents should be available in the RPM's site files.

RPMs should consult Navy information sources and Web sites (such as the NAVFAC ERB Web site [https://portal.navfac.navy.mil/go/erb]) for the latest policies and guidance on RACRs and RACR Amendments.

CHAPTER 12

Munitions Response Program

The Munitions Response Program (MRP) addresses response actions at munitions response sites (MRSs) where munitions and explosives of concern (MEC) and munitions constituents (MC) are present in the environment. A MRS is defined as a discrete location within a Munitions Response Area (MRA) that is known to require a munitions response[6]. MEC is defined as unexploded ordnance (UXO), discarded military munitions (DMM), and MC[7] present in high enough concentrations to pose an explosive hazard. MC in lower concentrations are not considered MEC. (Note: DON uses the shortened term "Munitions Response Program (MRP)" to refer to its program. The term "Military Munitions Response Program (MMRP)" refers to the entire DoD program.)

This chapter provides RPMs with basic information, resources, and necessary tools to understand and to begin executing and managing MRP projects. It outlines any specific differences between the MRP and the traditional Installation Restoration Program (IRP), which was addressed in previous chapters.

This chapter does not address chemical warfare material (CWM), either contained in munitions or in a Chemical Agent Identification Set (CAIS). RPMs that encounter CWM should immediately contact the Naval Ordnance Safety and Security Activity (NOSSA) for a Navy site or Marine Corps Systems Command (MARCORSYSCOM) for a Marine Corps site. NOSSA or MARCORSYSCOM will assist RPMs in contacting the U.S. Army's Non-Stockpile Chemical Materiel Program Office, Aberdeen Proving Ground, MD.

12.1 DON MRP Site Inventory

The Navy and the Marine Corps conducted comprehensive surveys to establish inventories of sites that may require munitions response. The survey collected information on "other than operational ranges" which includes closed, transferred and transferring ranges, and other sites not on operational ranges that potentially contain MEC and/or MC. DON used the inventory data to develop the inventory of sites to be included in the MRP.

The inventory is shared with public stakeholders and regulators to ensure that all MRSs are identified. Each year the inventory is reviewed and updated to include any recently identified MRSs.

12.2 MRP Response Actions

Because the MRP is implemented under the DERP, the response actions follow the CERCLA response process as described in the NCP and previous chapters of this manual. MRP response actions are normally categorized into investigations, removal actions, and remedial actions, based on the severity of the safety hazard, level of detail, and scope.

Munitions response actions typically begin by conducting a PA/SI. Data collected during the PA/SI determine the scope of the remedial investigation and the suitable level of response action (i.e., removal action or remedial action) and/or the immediacy of the response (i.e., emergency, time critical or non-time critical).

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[6] The MRS—and not the MRA—is the MRP unit tracked by NAVFAC in NORM.

[7] MC are any materials originating from UXO, DMM, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

12.2.1 Explosives or Munitions Emergency Responses

An explosives or munitions emergency response is an immediate action taken to alleviate an actual or potential imminent threat to human health and safety, or the environment, including property, as determined by an explosives or munitions emergency response specialist. U.S. EPA's Military Munitions Rule exempts explosives or munitions emergency response specialists from compliance with generator, transporter, treatment, storage, disposal, and permitting requirements of RCRA during immediate responses to explosives or munitions emergencies. If an immediate response is not required (i.e., the response can be delayed without increasing the risk to human health or the environment), an emergency permit, issued for a specific time and specific place, may be required by the state's regulatory agency. However, on-site response actions conducted pursuant to CERCLA Sections 104, 106, 120, 121, or 122 do not require federal, state, or local permits (40 CFR 3000.400(e)). Emergency responses can occur either on or off an active installation. The government, typically the responding Explosive Ordnance Disposal (EOD) unit, makes the ultimate decision on whether to conduct an emergency response; however, contractors can take measures to ensure a site remains safe for personnel and property. Additional information on explosives or munitions emergency responses is available in the *DoD Policy to Implement the EPA's Military Munitions Rule* (01 July 1998).

Emergency responses may be integral to a MRP response action or may take place separately from a MRP response action. An explosives or munitions emergency response can be taken at any time during a MRP response action but should not be confused with the MRP response action itself. EOD personnel do not conduct planned munitions responses; however, they will respond to explosives or munitions emergencies that occur during planned responses. Because emergency responses do not fall under the CERCLA response action process, they are not normally conducted with MRP (ER,N or BRAC) funding. Emergency responses shall be conducted by a service EOD unit or an authorized UXO contractor, and may be funded by the appropriate EOD unit accounts.

Explosives or munitions emergency responses that are separate from CERCLA response actions typically begin with the discovery of a MEC item at a project site where MEC was not expected to be encountered. When MEC is first encountered at a site, the RPM shall stop all operations that may put personnel, equipment or property at risk, and then notify the servicing EOD unit or detachment. The document *Military Munitions Response Program Oversight* (NOSSAINST/MARCORSYSCOM 8020.15) contains EOD contact information, and can be requested by calling NOSSA or NAVSEA. The RPM must also notify NOSSA/MARCORSYSCOM using Enclosure (1) of NOSSAINST/ MARCORSYSCOM 8020.15.

12.2.2 Preliminary Assessment (PA)

The PA for a MRS serves the same purpose as a PA for an IR site; that is to review existing information, much of which may come from historical archives. Then, if appropriate, conduct an on-site reconnaissance. Conducting a PA under the MRP is consistent with the IR process (see Chapter 6). Potential MRSs may be identified as part of a base-wide PA. The *Navy Munitions Response Program Guidance* (CNO ltr Ser N456/N5U9011373, 30 Jun. 2005) provides guidance for inclusion of sites or areas of concern in the Navy's MRP for both terrestrial and water sites; this guidance can be found on the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb) under the Munitions Response Workgroup page.

The PA report should include the Conceptual Site Model (CSM) which is developed during the PA as a method of organizing, displaying, and using site data. These data facilitate the development of the hypothesis for the site history and status, and help draw logical conclusions about the site. At this early stage of the munitions response, the preliminary CSM should contain all known information on site use, concentrating on the delivery mechanism whereby the suspected MEC was placed in its current location.

RPMs should refer to the *Munitions Response Historical Records Review* (Nov. 2003), published as an aid to regulators reviewing PAs by the Interstate Technology and Regulatory Council (ITRC) Unexploded Ordnance Team.

12.2.3 Munitions Response Site Prioritization Protocol (MRSPP)

The MRSPP, developed by the DoD, provides DoD Components a framework to use with stakeholders to determine the relative risks posed at each MRS within its MRS Inventory. The MRSPP structure includes three evaluation modules, each focusing on the unique characteristics of the specific hazard:

- Explosive Hazard Evaluation (EHE) Module;
- Chemical Warfare Material Hazard Evaluation (CHE) Module; and
- Human Health Evaluation (HHE) Module.

Each module is comprised of three categories of information, called factors that are used to derive the outcome of the module. The three factors, which are similar in each module, allow the project team to examine the source of the hazard, how accessible the hazard is, and any receptors potentially affected by the hazard. The three-axis structure is important as it limits the influence of any one factor on the outcome.

By examining each applicable hazard, the project team can determine the relative priority assigned to an MRS. Only one module need be completed in order to score the MRS. Typically, sufficient information for scoring is available at the conclusion of the PA. After a priority is assigned to each MRS, the Component can then sequence and conduct response actions to mitigate any hazard posed by past use of MEC. The RPM should update the score as new information is determined for the MRS.

12.2.4 Site Inspection (SI)

Like the PA, the SI for a MRS serves the same purpose as a SI for an IR site; that is, to determine whether further response action is required at the site. Although subsurface intrusive investigations should be conducted during the Remedial Investigation (RI) if warranted, circumstances at a MRS may lead to a logical decision to conduct a limited subsurface investigation along with other SI field activities.

Although not required, based on available information, a RPM may choose to conduct a preliminary Hazard Assessment (HA) during the SI phase. A HA is a site-specific assessment of the explosive safety hazards at a MRS. At a minimum, the preliminary HA conducted during the SI phase should do three things: (1) classify the strength of evidence for MEC at the site based on both the PA and SI, (2) make an initial assessment of the nature and likelihood of MEC based on PA and SI data, and (3) recommend follow-on actions for the site. This could include taking no further action (NFA), executing an accelerated removal action, or progressing to the RI phase.

Before any SI fieldwork begins that involves the intentional physical contact with munitions, or the conduct of ground-disturbing or intrusive activities in areas known or suspected to contain MEC, an Explosive Safety Submission (ESS) shall be submitted to and approved by NOSSA or MARCORSYSCOM. After NOSSA or MARCORSYSCOM approve the ESS, they submit it for Department of Defense Explosives Safety Board (DDESB) review and approval.

The DDESB provides oversight of the development, manufacture, testing, maintenance, demilitarization, handling, transportation, and storage of explosives, including CWM, on DoD facilities worldwide. The DDESB ensures that safety is maintained during conduct of response actions under DDESB authority (10 USC, Section 172) where MEC are involved and by adhering to the requirements of DoD ammunitions

and explosives safety standards presented in DoD's *Ammunition and Explosives Safety Standards* (DoD 6055.9-STD, Oct. 2004).

12.2.4.1 Explosives Safety Submission (ESS)

Prior to performing any intrusive on-site work, the RPM shall prepare an ESS for review and approval by NOSSA or MARCORSYSCOM at Navy and Marine Corps installations, respectively, in accordance with NAVSEA Ordnance Pamphlet 5 (OP 5), Vol. 1, 7th Rev., entitled *Ammunition and Explosives Ashore, Safety Regulations for Handling, Storing, Production, Renovation, and Shipping*. (OP 5 is not available online; copies of both OP 5 and NOSSAINST 8023.11A can be requested by contacting NOSSA or NAVSEA.)

NOSSA or MARCORSYSCOM will then forward the ESS to the DDESB for their review and approval in accordance with DoD 6055.0-STD. The ESS is independent of the Site HASP, and addresses only those hazards posed by MEC. An approved ESS is required before the start of munitions response activities, or any other operations occurring at a site, that involve the placement of explosives on a site, the intentional physical contact with munitions, or the conduct of ground-disturbing, or intrusive activities in areas known or suspected to contain MEC. This includes munitions response actions conducted by or for the Navy and the Marine Corps. For the Navy, the ESS shall be completed in accordance with NOSSAINST/ MARCORSYSCOM 8020.15, Enclosure (3) "Guidelines for Preparing an Explosives Safety Submission." The following addresses Navy requirements only. RPMs working on Marine Corps MRSs should contact MARCORSYSCOM.

RPMs must ensure that their project schedules include adequate time for preparation, review, and approval of an ESS and Explosives Safety Site Approval. (The Explosives Safety Site Approval is discussed in detail in Section 12.2.4.2.) This schedule needs to be clearly articulated with the entire project team, including regulatory agencies, stakeholders, and NOSSA. In addition to reviewing and approving ESS submissions, NOSSA is a valuable resource to the project team. RPMs are encouraged to include NOSSA early in the project planning stages so that they can ensure that all aspects of explosive safety are considered prior to submission of an ESS for review. NOSSA is also encouraged to provide alternatives to the RPM on new technologies and options, which could optimize the project execution. This team approach should in no way limit NOSSA's approval responsibility for the ESS.

An approved ESS from NOSSA or MARCORSYSCOM and DDESB is required for:

- MRS investigation or characterization that involves intentional physical contact with MEC;
- A determination of NFA with regard to MEC and MC;
- Any removal actions involving MEC;
- Construction support where the probability of encountering MEC is determined to be moderate or high; and
- Execution of the selected MEC remedial actions.

An ESS is not required for:

- Munitions or explosives emergency responses;
- PA/SI activities when intentional physical contact with MEC, or ground-disturbing activity is not intended;
- Maintenance and clearance activities on operational ranges; or

- Munitions responses on former ranges used exclusively for training with small arms ammunition. However, the responsible project manager must document the fact that munitions having high explosive fillers were not used on the range. If in doubt, the responsible project manager must request that NOSSA or MARCORSYSCOM determine that an ESS is not required.

NOSSA or MARCORSYSCOM may determine that an ESS is not required for:

- On-call construction support;
- Anomaly avoidance activities; or
- Construction or non-munitions response activities after having a single explosives or munitions emergency response in an area not otherwise known or suspected of having MEC

To obtain NOSSA or MARCORSYSCOM determination that an ESS is not required, the responsible project manager must complete and fax, e-mail, or mail NOSSAINST/MARCORSYSCOM 8020.15 Enclosure (2), "Request for NOSSA/MARCORSYSCOM Determination that an Explosives Safety Submission is Not Required". Information provided will allow NOSSA or MARCORSYSCOM to evaluate the site-specific conditions and the risk/ hazard assessment. NOSSA or MARCORSYSCOM will concur or non-concur in writing. In order to meet operational time constraints, this concurrence/ non-concurrence may take the form of a fax or e-mail. The responsible project manager shall contact NOSSA (N53) or MARCORSYSCOM if there is any uncertainty regarding whether the ESS is required.

12.2.4.2 Site Approval Request

The ESS shall contain a Site Approval Request (SAR). The purpose of the SAR is to obtain explosives safety site approval from NOSSA or MARCORSYSCOM and the DDESB to conduct operations involving the handling, processing, storing, or treating munitions and explosives at any facility, including those operations taking place at an MRS.

The responsible project manager shall request site approval by preparing and submitting a SAR in accordance with OP 5 and NAVFAC Instruction 11010.45 (series). This instruction tells the responsible project manager how to complete a NAVFAC Form 11010/31, "Request for Project Site Approval" for the operations at the MRS. (The NAVFACINST 11010.45 (series) can be downloaded from the following Web site: https://www2.navfac.navy.mil/doclib/files/cultural-resourcesmay-2001.pdf.) Although NAVFAC Form 11010/31 was designed for operations related to construction projects, it is flexible enough to be used to plan operations that will take place at an MRS.

The SAR, or NAVFAC Form 11010/31, consists of two parts, and once completed will provide sufficient information about the munitions response project to allow others to evaluate it. The first part of the SAR asks for general information on the type of project, and includes an area for the various reviews and approvals required in the process. In addition to this form, graphic information such as plans and maps, showing proposed munitions response project location in relation to the activity's land use plan, existing facilities, and appropriate siting constraints are also required.

The MRP SAR shall be routed like a SAR for a non-MRP project. It should originate with the responsible project manager and be routed through the activity and/or regional Explosives Safety Officer (ESO), the activity Public Works Officer (PWO), and the cognizant FEC or FAC. Once each of these offices has concurred, the responsible project manager submits the SAR to NOSSA or MARCORSYSCOM as part of the ESS, with a copy to the cognizant NOSSA Explosives Safety Support Office Atlantic (ESSOLANT) or Pacific (ESSOPAC) for a Navy MRS. NOSSA or MARCORSYSCOM shall then forward the SAR as part of the ESS to DDESB and recommend their approval.

12.2.4.3 Health and Safety Requirements

OP 5 requires that every means possible be used to protect personnel and the general public from exposure to the hazards associated with MEC-contaminated real property currently or formerly under DON ownership or control. Such real property includes manufacturing areas, firing and impact ranges, and waste collection or treatment/ disposal areas such as pads, pits, basins, ponds, streams, and burial sites.

Protective means include:

- Obtaining NOSSA or MARCORSYSCOM, and DDESB approval of both the ESS and the Explosives Safety Site Approval;
- Munitions response actions using the most appropriate technology to ensure protection of the public consistent with the proposed end use of the property, consistent with federal, state, and DoD directives and coordinated with appropriate DoD agencies;
- Planning and providing for, and knowing, the measures to be taken in the event of an accident or incident involving MEC; and
- Identifying and requiring training and personnel qualifications for all MEC workers.

The following general explosives safety rules apply:

- Assume all MEC to contain a live charge until it can be determined otherwise;
- Consider MEC that has been exposed to fire or detonation to be extremely hazardous;
- Carefully examine all MEC for markings and other identifying features;
- Do not move suspected MEC items; and
- Do not allow unauthorized or unnecessary personnel to be exposed to MEC.

RPMs can request that NEHC review contractor HASPs. However, explosives safety-related reviews of contractor HASPs should be referred to NOSSA or MARCORSYSCOM.

The Navy requires that standard operating procedures be developed and adhered to for all operations involving ammunition or explosives, including MEC response actions. SOPs developed for Munitions Response projects must meet the substantive requirements of *Standard Operating Procedures Development, Implementation, and Maintenance for Ammunition and Explosives* (NOSSAINST 8023.11A, 20 Aug. 2004). This includes the requirement that all SOPs be approved by the RPM and that persons using the SOP be certified as having been trained in its use.

12.2.5 Remedial Investigation/Feasibility Study (RI/FS)

The RI and FS for a MRS serves as the mechanism for collecting data to characterize site conditions, determine the nature and extent of the MEC and MC present, assess risk to human health and the environment, and conduct treatability studies to evaluate the potential performance and cost of the treatment technologies that are being considered. In addition to evaluating various remedial alternatives using the EPA nine criteria, explosives safety must also be taken into account. The major difference between a RI for a MRS and a RI for a traditional IR site is the need to conduct detailed geophysical investigations to determine the extent of MEC contamination and to verify site boundaries. Munitions detection technologies that perform the detailed geophysical investigation in the RI are discussed in Section 12.2.3.2. Prior to conducting a geophysical survey, a significant effort will likely be required to

clear the site of any surface MEC and brush. Both the ESS and Explosives Safety Site Approval must be approved before intrusive RI work begins due to subsurface investigation activities and likely contact with munitions. Also, once recovered, munitions cannot be reburied, so RPMs need to plan for management and disposal of MEC and munitions scrap during the RI.

12.2.5.1 Munitions and Explosives of Concern Hazard Assessment (MEC HA)

The CERCLA response process includes the development of site-specific risk assessments appropriate to the requirements of a site. The results of the risk assessment help site managers decide whether further response action is required, and support the risk management decisions that are made throughout the remedy evaluation, selection, and implementation process. However, the human health risk assessment methodology was not designed to address explosive safety hazards at MRSs.

To address explosive safety hazards, qualitative guidance for performing MEC Hazard Assessments (MEC HA) is under development by federal agencies and state and tribal organizations. The MEC HA serves two main purposes:

- ***Support the hazard management decision-making process*** by analyzing site-specific information to evaluate removal and remedial alternatives, and to assess land use activity decisions
- ***Support the communication of hazards*** between members of the project team and among other stakeholders, and by organizing site information in a consistent manner

Along with the MEC HA guidance document, RPMs may find it useful to review MEC HAs that have already been developed for other MRSs. The Navy developed a methodology for conducting a hazard severity screening of available data, referred to as a Level 1 Hazard Screening at Adak Island, Alaska. The initial delineation of contiguous areas of potential concern (AOPCs) (i.e., potential areas containing MEC) was based on the land use categorization and history in the Archival Search Report (ASR). The Level 1 Screen then provided further confirmation of the authenticity and quality of the ASR data and further refined the AOPCs. The intent of the Level 1 Screen was to provide a methodology for MEC evaluations and procedures that was consistent with regulatory requirements and stakeholder values. This process resulted in documentation that allows future landholders to understand the rationale for decisions that resulted in no further action at a site or why further action was required.

(RPMs should visit the NAVFAC ERB Web site [https://portal.navfac.navy.mil/go/erb] for the latest MRP-related guidance and policy, including the MEC HA Guidance.)

12.2.5.2 Munitions Detection Technologies

The selection of the most appropriate MEC detection technology for conducting a response action is not a simple task for two reasons: (1) there is not a currently accepted "best" tool that offers a high degree of effectiveness, ease of implementation, and cost-effectiveness in every situation; and (2) the "best" detector in one geological, topographical, and vegetative environment may not work well in a different environment. The accepted method for determining which is the best munitions detection technology for a particular MRS is to design and construct a geophysical prove-out (GPO) test bed and then test a variety of instruments on the GPO to determine their probability of detection and to establish a confidence level in that probability. RPMs should refer to the *Geophysical Prove-outs for Munitions Response Projects* document, published as an aid to regulators reviewing GPOs by the Interstate Technology Regulatory Council (ITRC) Unexploded Ordnance Team in November 2004.

Regardless of the technology used to detect MEC, all of the current detection technologies have difficulty distinguishing between MEC and non-munitions materials, such as scrap metal. Research is underway by the DoD's Strategic Environmental Research and Development Program (SERDP) to address this technical challenge.

MEC detection technology is utilized to perform three distinct types of MEC detection operations:

- ***MEC Sweep Operations***—systematic search of a specific area using a handheld instrument in real time to detect and locate subsurface anomalies. "Mag-and-flag" and surface sweeps are examples of sweep operations.
- ***MEC Mapping Operations***—collecting geo-referenced digital geophysical mapping data over a specific area and processing that data to aid in boundary determination and footprint reduction, and to identify and report the locations of subsurface anomalies for later action.
- ***MEC Reacquisition Operations***—locating subsurface anomalies previously detected through sweep or mapping operations in support of excavation and removal.

MEC sensor technology is available in a broad range of commercially available instruments and, depending on the type of MEC operation, is deployed in many different configurations ranging from manually operated handheld systems to complex multisensor towed arrays and airborne platforms.

A MEC detection system for either MEC sweep, MEC mapping, or MEC reacquisition operations is composed of four main elements:

- Geophysical sensor
- Sensor platform
- Positioning and navigation system
- Data-processing system.

The geophysical sensor is generally the main focus in MEC detection systems, but other elements are also critical to the success of the overall system. The survey platform deploys the geophysical sensor and not only governs the terrain in which the system can be operated, but is also a major factor in sensor performance. The positioning equipment determines the geophysical sensor's geographic location at each data point recording during the survey. The navigation system ensures that the correct area is surveyed and complete coverage is achieved. The data-processing system ultimately determines how data are handled and how targets are selected and interpreted.

Geophysical Sensors

Two main sensor technologies are utilized for MEC detection:

- ***Electromagnetic Induction (EMI)***—an active sensor that induces electrical currents in nearby conductive objects. The electrical currents generate a secondary magnetic field that is measured to detect both ferrous and nonferrous items. A common example of a handheld EMI sensor is the metal detector used to locate coins buried at the beach.
- ***Magnetometer***—a passive sensor that measures a magnetic field. Ferrous items create irregularities in the Earth's magnetic field and may contain remnant magnetic fields of their own that are detected by magnetometers. Magnetometers can only detect ferrous metal items. They cannot detect non-ferrous items such as aluminum or brass.

Sensor Platforms

Various platforms are used to deploy the geophysical sensors to survey an area. There are six basic classes or types:

- Handheld
- Man portable
- Cart mounted
- Towed array
- Airborne
- Underwater.

The choice of sensor platform is dictated by the type of MEC detection operation, the type of sensor deployed, and the site to be surveyed. Accessibility is a significant consideration in selecting a sensor platform. Site features such as terrain, vegetation, and accessibility, and the overall size of the survey site will influence sensor platform design and are often the deciding factors in selecting equipment.

Positioning Equipment

A positioning technology is needed in digital geophysics to produce any type of representation or mapping of the Earth's surface or subsurface. Positioning technologies determine the sensor's geographic location at each data point recorded. From this information, a map of the sensor response and a record of the travel pathways can be produced. Accuracy, effects of terrain, tree canopy, line of sight, ease of use, and costs are generally the most significant criteria for technology selection.

Locations can be determined by many different techniques of varying sophistication. Traditional surveying techniques may use tapes and trigonometry to determine relative positions from known ground points. Highly accurate optical laser-based measuring equipment can provide centimeter accuracy in a continuous tracking mode in areas where line of sight is not obstructed by trees or other objects. Other techniques rely upon various applications of differential global positioning systems (DGPS); ultrasonic, radio ranging; and inertial navigation systems (INS). In more advanced systems, positioning technologies are directly integrated with geophysical sensors to provide a digital output that can be directly merged with sensor readings for creation of a site map.

Navigation System

The navigation system guides the system operator over the area of interest to be mapped. Traditionally, the operator has navigated using visual aids, such as lines or cones set out in regular patterns. With the advent of towed-array and airborne mapping systems, advanced navigation systems based on geolocation technologies, such as DGPS, have been developed. These systems provided real-time guidance and feedback that indicates whether a preplanned course is being correctly followed. Navigation systems can also provide real-time feedback on data quality and coverage, allowing coverage errors and data gaps to be corrected in the field.

The major components of a navigation system are the geolocation receiver (i.e., DGPS), navigation computer, and navigation aids. Towed-array navigation system guidance errors of less than half the survey line spacing are needed for efficient field mapping of most full-coverage surveys. However, greater accuracy may be needed at sites with tighter data quality objectives.

Digital Data Processing

For digital geophysical mapping surveys, digital sensor data are recorded in the field by a data-acquisition system (i.e., a data logger or computer) and are typically processed and analyzed after the survey is completed. Qualified personnel and processing procedures are critical to producing accurate data.

For more information on MEC detection technologies, see one or more of the following sources:

- DoD's ESTCP: http://www.estcp.org/Technology/MM-Wide-Area-Assessment.cfm
- ITRC's UXO Documents Web site: http://www.itrcweb.org/teampublic_UXO.asp
- U.S. EPA's Military Munitions and UXO Web site: http://www.epa.gov/fedfac/documents/munitions.htm.
- DoD's UXO Center of Excellence Web site: http://www.uxoinfo.com/uxoinfo/conoppuxocoe.cfm.

12.2.6 Remedial Action Construction and Operation

MEC remedial actions likely will take the form of a combination of physical removal of munitions and implementation of LUCs. At these sites, there may be little construction required as the remedy may be implemented without emplacing a treatment facility or equipment. However, when taking response actions to address MC, classic design, construction, and operation of the remedial action may be necessary. In this case, actions at a MRS follow the traditional CERCLA process as described in previous chapters, including Remedial Action Construction (RA-C), Remedy in Place (RIP), Remedial Action Operation (RA-O), Response Complete (RC), Long-Term Management (LTMgt), and Site Closeout (SC). Nevertheless, in the RA phase, the selected and designed remedy is implemented on-site. Both during and after a remedial action, controls shall be used to protect workers on the site and to protect the public from any residual risk that may remain on-site after the remedial action is complete. Once the response action has achieved all the designated objectives as delineated in the Record of Decision (ROD) or decision document, the site can be designated RC. At this point, either LTMgt will be implemented or the site will proceed to final SC.

12.2.7 Response Complete (RC)

As with an IR site, RC can only be achieved at an MRS when all required actions have been taken. RC for MC-related response actions follows the same process as traditional IR sites. Two NOSSA/MARCORSYSCOM measures will help the RPM achieve RC with respect to MEC-related response actions, audits and verification:

- The audit is a process by which NOSSA or MARCORSYSCOM assesses the extent to which a project complies with applicable explosives safety and environmental requirements related to the management of MEC in accordance with the approved ESS, OP 5, and other safety publications. Audits include a review of munitions response project documents and field activities, including the quality control (QC) and quality assurance (QA) processes.
- Verification is the formal process by which NOSSA or MARCORSYSCOM finds that (1) the munitions response actions were completed per the approved ESS and (2) the final remedy, including required LUCs, is protective of human health and the environment with respect to explosives safety, consistent with the current, determined, or reasonably anticipated future land use of the MRS.

Once all munitions response actions have been completed at a MRS, the responsible project manager must submit an After Action Report (AAR) to NOSSA or MARCORSYSCOM for review and endorsement to the DDESB for their concurrence. With respect to MEC, the DDESB concurrence serves as RC under CERCLA. The AAR should follow the guidance and format contained in NOSSAINST/MARCORSYSCOM 8020.15 enclosure (5), "Guidelines for Preparing an After Action Report".

12.2.8 Site Closeout (SC)

Many MRSs will never achieve the SC milestone. When RA Objectives are not designed to remove all MEC (including MC), technology limits the ability to remove all MEC, or when MEC or MC remain on site at levels that do not allow for unrestricted use or unlimited exposure, LUCs are required to ensure the continued protectiveness of the remedy for the site's current or reasonably anticipated future reuse. However, when the best available technology is used to detect and remove MEC and/or MC and strong evidence indicates that there are no remaining hazards or risks, RPMs should strive to obtain regulatory concurrence that NFA is required for the site. This allows SC to be achieved.

12.3 MRP Quality Assurance (QA)

DON's goal is to ensure that an auditable, objective record is maintained for all aspects of DON munitions response actions. To meet this objective, *Explosives Safety Review, Oversight, and Verification of Response Actions Involving Military Munitions* (OPNAVINST 8020.15, 14 Oct. 2003) requires that NAVFAC develop QA procedures for all munitions response actions. The MR QA program only addresses the explosive safety hazard posed by MEC. The QA of the risk presented by MC contamination is addressed under the Navy IRP and is discussed in Chapter 8. The MR QA program:

- Evaluates completed munitions response actions to verify/validate that these actions meet contractual requirements as stated in work plans or other defining documents;
- Ensures that an audit record documenting the completion of response actions is collected, documented and maintained;
- Ensures the integrity of the QA data gathered during the process; and
- Supports the verification required by NOSSA or MARCORSYSCOM for RC with respect to MEC explosives safety.

The MR QA program covers all phases of the CERCLA process including:

- Ensuring that quality data elements are developed at the start of a project including SOWs, Work Plans, HASPs, QAPPs, QCPs, ESSs, and Standard Operating Procedures (SOPs), and that qualified personnel, and proper geophysical and positioning equipment are used;
- Checking field work and processes to ensure field work is conducted in accordance with work plans and SOPs; checking field equipment with the QCP; testing field teams on the site GPO; observing field work, and evaluating data tracking and storage; and
- Sampling a selected fraction of the completed response action to assess the quality of the completed response action.

The Naval Explosive Ordnance Disposal Technology Division (NAVEODTECHDIV) has knowledge, training, and experience to conduct QA and develop the QAPP for the explosive hazard of the MEC. To support their QA role, NAVEODTECHDIV developed the Automated Quality Assurance Program System (AQAPS). It is the primary tool by which QA is conducted on MRSs. AQAPS consists of the following:

- Data Quality Objectives;
- Data Quality Elements;
- Question Sets;
- Work Instructions;
- Quality Assessment Record; and
- Corrective Action Record.

Also embedded in the AQAPS software is the Quality Assessment Manual (QAM). The QAM provides step-by-step detailed instructions on conducting a successful QA operation.

12.4 Disposal of Real Property Contaminated with Ammunition, Explosives, or Chemical Agents

It is DON policy to use all reasonable means possible to protect the public from exposure to hazards from real property contaminated with ammunition, explosives, or CWM. In addition, the permanent contamination of real property by the final disposal of ammunition, explosives, or CWM is prohibited. Real property that is known to be contaminated with ammunition, explosives, or CWM shall be decontaminated with the most reasonable and appropriate technology to ensure the protection of the public consistent with the proposed end use of the property.

All plans for leasing, transferring, excessing, disposing and/or remediating DON real property when ammunition, explosives, or chemical agent contamination exists or is suspected to exist shall be submitted to the DDESB via NOSSA or MARCORSYSCOM for the review and approval of explosive safety aspects.

These land disposal submissions shall state the intended use of the property, the nature and extent of on- and off-installation contamination, location of the contaminated land, any improvements that may have been made, proposed detection and degree of decontamination, and the extent to which the property may be used safely without further decontamination.

When the accountability and control of the contaminated real property is transferred, the required permanent record of contamination also shall be transferred.

Further detail on the requirements for the disposal of real property known or suspected to be contaminated with ammunition, explosives or CWM is outlined in Chapter 14 of OP 5.

CHAPTER 13

Other Environmental Restoration (ER) Program Considerations

This chapter identifies issues and activities that are associated with or may occur concurrently with the ER Program. Many of these issues and activities impact ER Program budgets, prioritizations, and schedules.

13.1 Resource Conservation and Recovery Act (RCRA) Corrective Action (CA)

13.1.1 Background

As discussed in Section 1.1, RCRA was enacted in 1976 as an amendment to the Solid Waste Disposal Act, and establishes a comprehensive legislative framework for a cradle-to-grave hazardous waste management program. RCRA's focus is on regulating currently operating hazardous waste facilities and protecting human health and the environment through good management practices when generating, transporting, treating, storing, or disposing of hazardous wastes. In addition, RCRA requires the cleanup of releases from accidents or other activities at facilities that treat, store, or dispose of hazardous wastes. U.S. EPA refers to the cleanup of treatment, storage, and disposal (TSD) facilities under these statutory authorities as a RCRA Corrective Action.

U.S. EPA mandates Corrective Action (CA) at facilities primarily through permits and orders. Originally, the RCRA statute provided limited authority requiring cleanup at hazardous waste facilities; only releases that presented imminent and substantial endangerment to human health and the environment or that originated from regulated units such as landfills and surface impoundments were subject to cleanup requirements. In addition, the term "corrective action" referred only to remedial action to address groundwater contamination. The Hazardous and Solid Waste Amendments (HSWA) of RCRA in 1984 greatly expanded the government's authority to require CA for releases of hazardous waste and hazardous constituents at facilities that manage hazardous waste. Expanded U.S. EPA and state statutory authority includes: (1) the ability to require corrective action for all releases of hazardous wastes or constituents from any solid waste management unit (SWMU) at a TSD facility seeking or renewing a hazardous waste permit and (2) the authority to require CA beyond a facility's boundaries where necessary to protect public health and the environment (RCRA, Sections 3004(u), 42 USC, Chapter 82, Subchapter III, Section 6924(u) [2001]; and 3004(v), 42 USC Section 6924(v) [2001]).

With the exception of the CA requirements established for monitoring and remediating releases to groundwater from permitted hazardous waste impoundments, waste piles, land treatment units, and landfills, few federal regulations governing the implementation of this program have been promulgated. A major rule was proposed in July 1990 that would have provided procedures and technical requirements for implementing CA (1990 Subpart S proposal; 55 FR 30798, 27 June 1990). In addition, in 1996 U.S. EPA published an advanced notice of proposed rulemaking (ANPRM) which outlined a strategy for improving the CA process and offered guidance on CA implementation, including the following basic principles for CA (61 FR 19432, 1 May 1996):

- CA decisions should be risk-based;
- CA implementation should focus on results rather than processes;
- Interim actions and stabilization should be used to reduce risk and prevent exposures;
- CA should be phased to focus resources on the areas or pathways of highest concern;

- CA should provide meaningful inclusion of all stakeholders;
- CA requirements should be met using the most appropriate authority, including non-RCRA state authorities; and
- States should be the primary implementers of the CA program.

The 1996 ANPRM also emphasized that current and reasonably expected land use should be considered when selecting CAs, and it encouraged the use of innovative site characterization techniques. In 1997, U.S. EPA issued a memorandum emphasizing the agency's expectation that the ANPRM would be used as guidance (OSWER, 17 Jan. 1997). In 1999, U.S. EPA withdrew most provisions of the 1990 Subpart S proposal. As a result, the statutory requirements for CA under RCRA Section 3004(u) are implemented based on guidance such as the 1990 Subpart S proposal and the 1996 ANPRM.

A brief outline of the RCRA Corrective Action Process can be found in Section III, Chapter 9 of U.S. EPA's *RCRA Orientation Manual* (EPA/530/R-06/003, Mar. 2006). Additional background information and guidance is provided in U.S. EPA's Final *RCRA Corrective Action Plan* (OSWER 9902.3-2A, May 1994), and on U.S. EPA's Corrective Action Web site.

13.1.2 RCRA CA Completion Determinations

In 2003, U.S. EPA issued the *Final Guidance on Completion of Corrective Action Activities at RCRA Facilities* (68 FR 8757, 25 Feb. 2003) to provide guidance on defining the appropriate type of completion determination. Two types of completion determinations are possible: (1) Corrective Action Complete *Without* Controls, and (2) Corrective Action Complete *With* Controls. A "Corrective Action Complete *Without* Controls" determination signifies that site-specific media cleanup objects have been met, and the areas subject to the determination do not require any additional action or measures to ensure the remedy remains protective of human health and the environment. A "Corrective Action Complete *With* Controls" determination signifies that the only remaining task is performance of required operation and maintenance, monitoring, and/or compliance with and maintenance of institutional controls. The equivalent determination using ER Program terms would be achieving the Response Complete (RC) milestone and conducting further activities in the Long-Term Management (LTMgt) phase to ensure protectiveness of the remedy.

For sites requiring LTMgt, the RCRA permit will specify "post-closure" requirements that may include monitoring, land use controls (LUCs), and reporting (e.g., five-year review, annual reports, etc.). At the completion of the "post-closure" period when a "Corrective Action Complete *Without* Controls" determination can be made, a completion report, similar to a Remedial Action Completion Report (RACR) Amendment, may need to be prepared. Also, the RCRA permit would need to be modified. This RCRA permit modification generally is a Class III modification for completion of the CA, which requires a 60-day public comment period, a public meeting, and other community involvement actions, in accordance with 40 CFR 270.42(c). DON needs to respond to stakeholder comments on the proposed permit modification prior to the regulatory agency's approval of the permit modification.

13.1.3 CERCLA/RCRA Overlap and Interface

There will be cases in the ER Program when RCRA and CERCLA requirements will overlap. The interface between CERCLA and RCRA begins with the overlap between the definition of a CERCLA hazardous substance (CERCLA Section 101(14)) and the definition of a RCRA hazardous waste (RCRA Section 3001). A RCRA hazardous waste shall either meet the description of a specifically listed waste or exhibit one of four hazardous waste characteristics (i.e., ignitability, corrosivity, reactivity, or toxicity). A CERCLA hazardous substance includes constituents defined under other environmental laws, such as RCRA, the Clean Air Act (CAA), the Clean Water Act (CWA), and the Toxic Substances Control Act

(TSCA), but excludes petroleum (commonly referred to as the "petroleum exclusion"). CERCLA hazardous substances include most RCRA hazardous waste constituents, although a contaminant can be a RCRA waste without being a CERCLA substance (e.g., petroleum) and vice versa.

As described in Chapter 1 of this manual, CERCLA and RCRA are the primary federal environmental laws governing the investigation and cleanup of contaminated sites. CERCLA was intended to address past mismanagement of hazardous substances by identifying and cleaning up contaminated sites. Because CERCLA was designed to address historical contamination, the requirements for using the CERCLA response process are broader than those for RCRA. By comparison, U.S. EPA and authorized states have the authority to compel cleanup of contamination at RCRA facilities. Generally, CA is invoked in the following circumstances:

- A RCRA treatment, storage, or disposal facility seeks an operating permit or a post-closure permit;
- An implementing agency (e.g., U.S. EPA or the authorized state) issues a cleanup enforcement order; or
- A site manager at a facility decides to voluntarily implement corrective action.

Cleanup of contaminated sites may be governed by either CERCLA or RCRA depending on such factors as the source and cause of the contamination, the status of the installation as either a NPL or a non-NPL site, and whether the installation has sought or is seeking a RCRA permit for managing hazardous wastes. U.S. EPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (1988) contains criteria for evaluating RCRA/CERCLA eligibility.

Conflicts are not uncommon as the different regulatory agencies exercise their respective authorities under these statutes. However, these laws share the goal of protecting human health and the environment, and any procedural differences between CERCLA and RCRA should not substantially affect the outcome of remediation. This concept of parity between CERCLA and RCRA programs is outlined in U.S. EPA's policy *Coordination Between RCRA Corrective Action and Closure and CERCLA Site Activities* (24 Sep. 1996). U.S. EPA's policy memorandum *Improving RCRA/CERCLA Coordination at Federal Facilities* reemphasized the importance of improved RCRA/ CERCLA coordination at federal facilities as one of principal mechanisms for increasing efficiency and effectiveness of cleanups. Most importantly, the primary goal is to minimize duplication of effort and second-guessing of remedial decisions (OSWER Directive 9272.0-22; 22 Dec. 2005).

Environmental remediation implemented under CERCLA response obligations will be protective of human health and the environment such that remediation of releases shall obviate the need for further corrective action under RCRA (i.e., no further corrective action shall be required). With respect to releases of hazardous waste, RCRA shall be considered an applicable or relevant and appropriate requirement in accordance with CERCLA Section 121, 42 USC 9621. Federal Facility Agreements should contain an integration clause that commits the regulatory agencies to accepting a final CERCLA remedy as also satisfying RCRA requirements. There should be no instances in which a CERCLA remedy is reopened under RCRA for further work. Should a regulatory agency reopen a CERCLA remedy to address RCRA issues, the RPM should seek DON legal council prior to proceeding.

Figure 13-1 provides a comparison of the CERCLA and RCRA cleanup processes, from initial site identification, investigation, remedy decision, cleanup, and closeout. Table 13-1 summarizes the relationships between key elements and definitions of the RCRA CA and CERCLA response process.

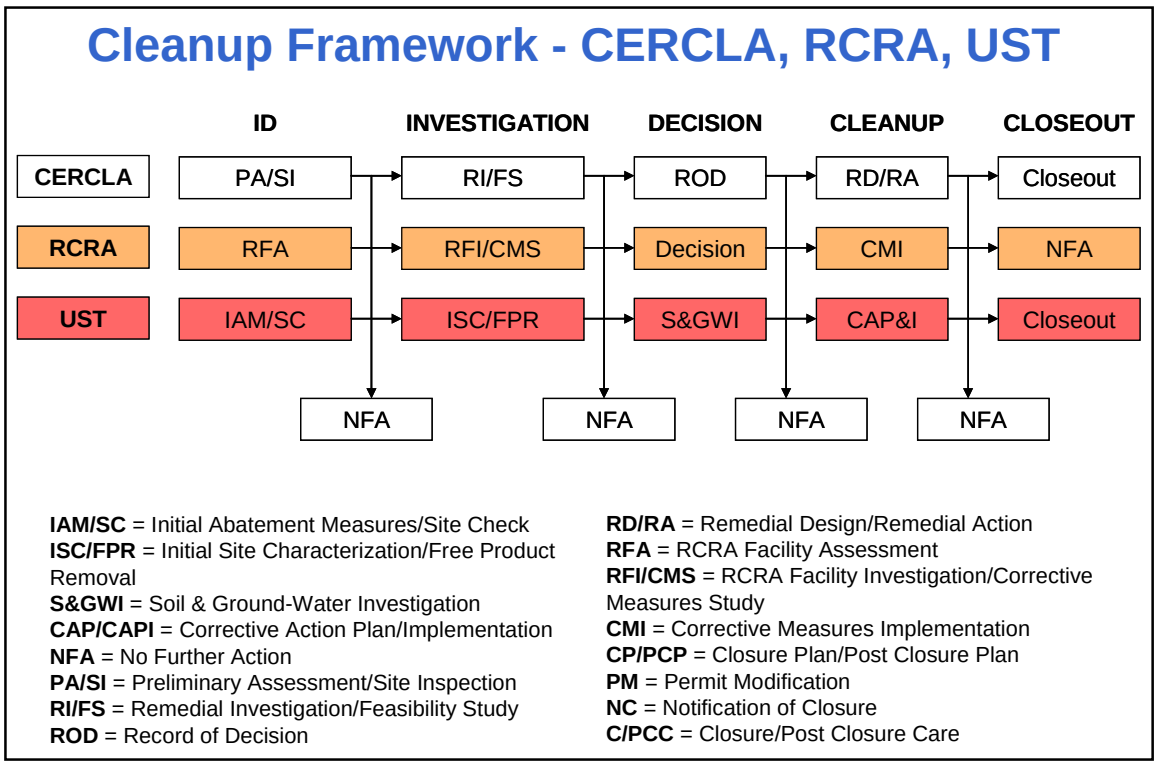

Figure 13-1. Comparison of the CERCLA, RCRA, and UST Cleanup Processes

Given the potential for CERCLA and RCRA process overlap, it is important to understand the relationship and the distinctions between these regulatory program requirements. In addition, a CERCLA response has statutory advantages for expediting cleanups; for example, under CERCLA there is no need for permits for on-site actions, and there is the ability to order off-site access. Finally, the overlap between CERCLA and RCRA can have implications on the eligibility of cleanup activities for DON funding. Chapter 4 of this manual provides a summary of the funding eligibility of various CERCLA and RCRA activities. Additional information on the CERCLA/RCRA overlap is provided in DoD's *CERCLA/RCRA Overlap in Environmental Cleanup*; and Section IV, Chapter 2 of U.S. EPA's *RCRA Orientation Manual* (EPA/530/R-06/003, Mar. 2006).

13.2 Petroleum Underground Storage Tank (UST) Sites

Underground storage tanks (USTs) generally are all tanks and appurtenant piping containing regulated substances in which the tank volume (including piping) is 10% or more beneath the surface of the ground. DON UST programs involve both cleanup and compliance issues; however, only cleanup of past contamination from petroleum USTs is managed under the ER Program and eligible for ER,N or BRAC funding (see Chapter 4). Information regarding the cleanup of petroleum UST sites under the ER Program shall be added to the NORM database by the RPM (see Chapter 14.3 for additional information on NORM). Petroleum cleanup from non-UST sites is managed under the IR program (see Chapter 4 for information on eligibility).

The DON's UST cleanup program follows a similar process as RCRA and CERCLA. Figure 13-1 provides a comparison of the UST and CERCLA cleanup processes from initial site identification, investigation, remedy decision, cleanup, and closeout. Resources for planning UST removals include U.S. EPA's Underground Storage Tank Program Web site (http://www.epa.gov/OUST/cat/index.htm).

Table 13-1. Comparison Between CERCLA Response Actions and RCRA Corrective Actions at Federal Facilities

Remediation Step/Activity or Requirement	CERCLA Response Action Program	RCRA Corrective Action Program
Identification		
Regulated Facilities	• Any site where a hazardous substance has been stored, placed, disposed, or deposited, whether or not it is subject to RCRA	• All contiguous property controlled by an owner/operator seeking or having a RCRA permit
Regulatory Triggers	• For purposes of notifying the National Response Center, release of a reportable quantity of a hazardous substance • For environmental response purposes, a "hazardous substance" release that causes a "threat to human health or the environment" or a release of a "pollutant or contaminant" that poses an "imminent and substantial endangerment"	• Treatment, storage, or disposal of hazardous waste at a facility that existed as of November 19, 1980, and did not obtain RCRA closure by January 26, 1983
Regulated Materials	• Any hazardous substance, pollutant, or contaminant (with certain exceptions) (CERCLA Section 101(14))	• Any hazardous waste or hazardous waste constituent listed in Part 261, Appendix VIII or Part 264 Appendix IX, or any waste exhibiting a hazardous characteristic identified in Part 261 released from a solid waste management unit
Lead Agency	• U.S. EPA or the federal agency controlling the facility	• U.S. EPA or authorized state agency
Prioritization and Delineation		
Site Prioritization	• HRS score	• National Corrective Action Prioritization System (NCAPS)
Management Unit Delineation	• Area of concern • Operable Unit	• AOC • CAMU • SWMU • HWMU
Land Disposal Restriction Applicability	• Applicable when remedial wastes are "placed" (e.g., moved from one area of contamination to another)	• Applicable when remedial wastes are "placed" (e.g., moved from one area of contamination to another); not applicable to CAMUs
Off-Site Access	• Permission is authorized	• Permission shall be obtained
Investigation and Planning		
Remedy Selection Goals	• To protect human health and environment, maintain protection over time, and minimize volume, toxicity, or mobility of waste	• To protect human health and environment, attain cleanup levels, comply with waste management standards, and remediate (remove, treat, or control) release sources
Public Participation	• Program is specified in regulations	• Occurs as part of permitting process
Early Response	• Through removal action provisions	• Through interim measures
Incremental Response	• Through operable units	• Through phased remediation
Remedy Selection	• Remedy selected by DON	• Remedy selected by U.S. EPA or authorized state agency
Remedy Challenge	• CERCLA Section 113(h) precludes citizen suits before a selected response action is complete to prevent delays in cleanup	• RCRA Section 7002 governs citizen suits. No citizen suits may commence if an action is already being conducted under RCRA or CERCLA §104 or §106

Table 13-1. Comparison Between CERCLA Response Actions and RCRA Corrective Actions at Federal Facilities (continued)

Remediation Step/Activity or Requirement	CERCLA Response Action Program	Proposed RCRA Corrective Action Program
Implementation		
Standards Governing Remediation	• ARARs	• As set forth in facility's permit
Permits	• No permits required for on-site portion of removal or remedial actions (remedy must still comply with substantive requirements of permit provisions)	• All necessary permits must be obtained for the selected remedy
Cleanup Levels	• Negotiation based on ARARs, or promulgated state or federal standards where applicable • Cleanup levels shall satisfy acceptable risk range	• Negotiation based on promulgated federal and state standards, risk derived standards, and/or other applicable guidance documents • Cleanup levels shall satisfy acceptable risk range
Post-Closure/Post-Remedy		
Post-Closure/Post-Remedy Requirements	• Generally reevaluate every five years	• As established in permit
Costs		
Penalties	• If stipulated in an interagency agreement	• Specified in RCRA and state laws
Cost Recovery	• Available	• Not Available. See Mehring et al. v. KFC Western, Inc., 116 S. Ct. 1251 (1996); however, costs incurred under RCRA and other programs that meet CERCLA's definition of removal or remedial action are generally recoverable under CERCLA • Natural resource damages are not recoverable under RCRA, nor is the facility owner/operator liable for them under RCRA Section 7003
Natural Resource Damage	• Trustees may recover costs for natural resource damages	• Facility owner/operator liable under RCRA Section 7003

13.3 PCB Cleanup

As discussed in Section 1.6, the remediation of polychlorinated biphenyls (PCBs) is regulated under the TSCA. On June 29, 1998, U.S. EPA issued final amendments to the TSCA PCB Disposal Regulations (40 CFR Parts 750 and 761), which specify treatment, storage, and disposal requirements for PCB waste. The PCB wastes most commonly found at CERCLA sites meet the TSCA definition of PCB remediation waste (examples are contaminated soil, sediment and building materials). One of the most important changes contained in these amendments was the provision that any cleanup or disposal of PCB remediation waste can now be performed "based on the concentration at which the PCBs are found," rather than based on the concentration of the original source (spilled) material. In addition, the final TSCA amendments provided that remediation wastes containing less than 50 ppm PCBs no longer need to be placed in a TSCA-permitted landfill, but instead can be placed in a municipal or non-industrial, non-hazardous landfill that is permitted to accept low concentration PCBs. Remediation wastes containing PCBs at or above 50 ppm may be disposed of in a TSCA-permitted landfill, or may also be disposed of in a RCRA-permitted hazardous waste landfill.

The amended disposal regulations provide three options for cleaning up and disposing of PCB remediation waste: a self-implementing approach, a risk-based approach, and a performance-based approach. These requirements may be applicable or relevant and appropriate requirement (ARARs), depending on site-specific conditions.

1. Self-implementing on-site cleanup and disposal. This requires application and approval by U.S. EPA and then follows guidelines established in 40 CFR Part 761 for cleanup and disposal.

2. Performance-based disposal. When using this option, remediation wastes are managed under existing disposal regulations established for other types of PCB wastes.

3. Risk-based disposal approval. This requires application and approval by U.S. EPA to utilize disposal standards other than the self-implementing standards or the performance based standards.

Under the self-implementing cleanup provisions, cleanup requirements are based on whether an area is classified as high occupancy or low occupancy, as follows:

1. Bulk PCB remediation waste (e.g., soil, sediment, sludge) and porous surfaces (e.g., concrete):

   - High Occupancy Areas: 1 ppm without restriction, 10 ppm with a 10-inch cap.
   - Low Occupancy Areas: 25 ppm, or 25-50 ppm if fenced and marked, or 25-100 ppm with a cap.

2. Non-porous surfaces (e.g., uncorroded metal):

   - High Occupancy Areas: 10 $\mu g/100\ cm^2$
   - Low Occupancy Areas: 100 $\mu g/100\ cm^2$

The definitions for high and low occupancy areas are provided in 40 CFR 761.3. Examples of high occupancy areas include assembly line work stations, control rooms, and residences. Examples of low occupancy areas include electrical substations, non-office space in a warehouse, and other areas of an industrial facility where a worker spends a small amount of time.

For additional information regarding the PCB cleanup and disposal regulations, see http://www.epa.gov/opptintr/pcb/.

13.4 Land Management

FEC real estate planners need to coordinate with all installation staffs to ensure that real property planning and management decisions consider ER and potential site contamination issues, including ammunition, explosives, and chemical agent contamination. The RPM's responsibilities include ensuring that FEC planning and real estate personnel are aware of the installation's contaminated sites.

13.4.1 Land Use Planning

Planners involved in developing and locating new facilities need to know where contaminated sites are and should interact with RPMs on the nature of the contamination, the length of the ER process, and the likely effects of the contaminated site on the proposed real property use. Similarly, FEC real estate personnel involved in out-leasing DON property need to be aware of contaminated sites or contaminated

groundwater so that appropriate decisions can be made. Installation Master Plans, which address planning issues for specific installations, including plans for future land uses, also should contain the locations of ER sites. FEC Planning Division files should contain the appropriate ER documents for use by planners. The plans are maintained by the installation or the FEC and updated every five years.

As DON installations continue to be restructured into regional entities, the Installation Master Plan is being replaced by the Regional Shore Infrastructure Plan (RSIP). The RSIPs include planning issues throughout a specific Navy region. A RSIP contains similar information to the Master Plan and, therefore, contains the location of all ER sites that are in the region, as well as the various land use categories assigned to specific parcels on any given installation within a Navy region. All ER sites have been or will be identified in the RSIP for most if not all installations in a region. RPMs should ensure newly identified sites are added to the Installation Master Plan or RSIP in a timely manner.

The RPM also should consult the Installation Master Plan or RSIP to identify reasonable and appropriate land use to be considered as part of any risk assessment developed in the cleanup process as well as for remedy selection (see Chapter 9). Specifically, the Baseline Risk Assessment should address current or reasonably anticipated land use based on information provided in the RSIPs.

At BRAC installations (see Section 13.5), current and projected land use plays an essential role in determining cleanup levels. DON must ensure that remedies and cleanup levels are in compliance with policy and consistent with community reuse plans where reasonable. This is especially important at sites where contamination is remediated to acceptable levels based on specific assumptions regarding the projected reuse of the land.

In the absence of an approved reuse plan, remedies and cleanup standards should be based on the current land use or the most likely land use as identified in the reuse environmental impact statement (EIS). Risks should be presented for actual current or reasonably anticipated future land uses as well as those land uses that are required to be calculated by regulatory agencies. BRAC cleanups based on projected land use, which is different from the current land use, may sometimes be in the best interest of both DON and the community. U.S. EPA's *Reuse Assessment Guide*, (OSWER 9355.7-06P, June 2001) provides guidance for determining future land use assumptions for CERCLA response actions. Additional guidance on this subject can be found in U.S. EPA's *Land Use in the CERCLA Remedy Selection Process* (OSWER 9355.7-04) and DoD's *Responsibility for Additional Environmental Cleanup after Transfer of Real Property* (25 July 1997).

13.4.2 Planning and Construction at or Near Contaminated Sites

Site contamination discovered during the planning, design, or construction of DON installation projects, especially military construction projects, can delay project completion, increase cost, and adversely impact the DON mission. Project planning, construction, and environmental personnel should work together to avoid siting projects on contaminated sites and/or over contaminated groundwater plumes, and take appropriate action during any of the project stages when contamination is discovered. To identify contamination problems or potential problems early in the siting process, the FEC should review available information from ER studies including records searches, personal interviews, soil borings, chemical and physical analysis, and other relevant data. Soil investigations performed to determine foundation conditions should seek evidence of contamination.

Installations and FECs are encouraged to identify ER sites on a base-wide GIS to assist in reviewing prospective construction project locations. Plans should be reviewed to ensure that new construction projects are not located on ER sites, or that appropriate consideration is given to the presence of an ER site as part of construction planning including determining if the site has received a NFA or confirming

that the site remedy is protective for the intended reuse. All ER sites will be or have been identified in the RSIP for most if not all installations in the region.

The installation environmental staff also should ensure that the ER and public works personnel within the FEC are informed about the location of ER Program sites, and formal review of all siting proposals should consider the proximity and potential impact of ER sites at an early stage. Installation personnel, including individuals from the Public Works Department who work in or around contaminated sites, should be informed of the geographic boundaries of the sites and receive appropriate training at a level relative to the nature of their work and the site contamination.

The FEC, Public Works Department, and all contracting officers should work together to develop the same notification for all contractors who work or may work in or near a contaminated site. For example, this notification includes identification of the geographic boundaries of the site prior to allowing contractors into the area, even where the contractors are building security fences around the contaminated site, and may include immediate training in proper health and safety procedures. The notification should take into consideration the nature of the work to be accomplished and the nature and location of the contamination. Contractors' construction plans also should account for protection of nearby residents and the environment from any potential releases from the construction site.

13.4.3 Out-Leasing

Out-leases should contain restrictions, which protect DON property from contamination by the tenant. In particular, out-leases should include a reference to 10 USC Section 2692, which restricts the use of a DoD installation for the storage or disposal of any toxic or hazardous material that is not owned by DoD, unless one of the exceptions specified in Section 2692 is met with SECDEF approval.

13.5 Base Realignment and Closure (BRAC) Program

To sustain military readiness and improve the defense mission during changing times and requirements, DoD recognized the need to close some of its installations and realign DoD missions at others through five rounds of BRAC program implementation. DoD is realigning missions or transferring property within DoD at some BRAC installations, but a large portion of BRAC property is intended for transfer to another federal agency or non-federal entity. Many of the BRAC installations have required some type of activity under the ER Program to make the property ready for transfer. This section focuses on activities associated with the BRAC program that will have major impacts on the ER Program budget, prioritization, and schedule.

RPMs should be aware that as part of every transfer of DoD property, the property recipient is afforded protection from liability by a CERCLA Section 120(h) covenant for environmental contamination caused by DoD. In addition, except in the case of federal-to-federal transfers[8] and as provided for under DoD's Early Transfer Authority (see Section 13.5), CERCLA requires that DoD clean up contaminated property to protect human health and the environment prior to transferring property by deed. The federal government also is responsible for cleaning up any contamination that can be attributed to DoD activities discovered after the property is transferred.

[8] When excess property is identified for transfer, this property is offered to other federal agencies for reuse. First, DoD considers if there are any other DoD uses for the property and if not, it is determined to be excess property. Then the property is offered to other federal agencies for their use, or to the Department of Housing and Urban Development for homeless assistance pursuant to the McKinney Act. Thereafter, any property that remains is considered surplus and can be redeveloped by the local redevelopment or reuse authority.

Normally, federal agencies that have been identified to receive BRAC property from DON must accept the property in "as-is" condition; DON will not retain continuing liability for the post-transfer environmental condition of these properties. Cleanup and management responsibilities shall be established between DON and the receiving federal activity and set forth in the transfer document. DON's *Environmental Requirements for Federal Agency-to-Agency Property Transfer at BRAC Installations* (DON Environmental Policy Memorandum 95-01, 26 May 1995) established the requirement for a summary document. This document shall be forwarded to the BRAC PMO as part of the package requesting approval for an agency-to-agency property transfer.

Most methods and protocols in use by DON for the ER Program at active installations are applicable to the BRAC installations. The differences between the ER Program at BRAC and active installations include:

- ***Scheduling*** – BRAC requires a more aggressive schedule of cleanup than active installations. Expedited response actions are emphasized;
- ***Funding*** – Congress established the BRAC Account which provided multi-year funds to pay for BRAC independent of the ER,N funding. This fund can only be used to investigate and remediate existing conditions at closing or realigning installations that have property identified for excessing. Costs to ensure environmental compliance of current operations are not supported by this account; and
- ***Site Closeout*** – Site Closeout under BRAC reflects the requirements associated with real property transfer. The Environmental Findings of Suitability to Transfer (FOST), Environmental Findings of Suitability for Early Transfer (FOSET), or Environmental Findings of Suitability to Lease (FOSL) are used to identify and document parcels of land that are environmentally suitable for transfer.

13.5.1 BRAC Policy

The Base Realignment and Closure Act of 1988 and the Defense Base Closure and Realignment Act, 10 USC Section 2687 (2003), govern the closure and realignment of DoD installations identified and approved for closing or realignment in various fiscal years. DoD needs to accomplish disposal quickly and efficiently to expedite redevelopment to benefit local economies and to save money for readiness and other defense responsibilities.

Implementation of the overall BRAC process will be in accordance with DoD's *Base Redevelopment and Realignment Manual (BRRM)* (DoD 4165.66-M, 01 Mar. 2006), which provides a common set of guidelines for BRAC 2005 and remaining incomplete actions from prior BRAC rounds. Topics covered in the Manual include:

1. The overall process for base realignment and closure.
2. Working with affected communities and states to facilitate transition and base redevelopment.
3. Management of human resources and programs available to assist in transition.
4. Real property disposal process.
5. Maintenance, utilities, and services to protect and maintain surplus facilities and equipment at BRAC installations.
6. Necessary environmental actions at installations affected by BRAC decisions. Key objectives regarding environmental actions are:

a. Ensure protection of human health and the environment on BRAC properties.

b. Expeditiously transfer BRAC property to new owners.

c. Maximize the value of BRAC property by making wise public policy and business decisions.

d. Maximize the use of all available tools to expedite response actions and redevelopment, including integration of early transfer authorities, and privatization of response actions with redevelopment.

7. Planning for growth where BRAC realignment actions increase military missions and functions and personnel levels at existing installations.

8. Contacts and resources for further information regarding specific questions and issues.

13.5.2 BRAC Cleanup Plan (BCP)

In order to expedite the reuse and redevelopment of BRAC installations, the installation shall undergo a "bottom up" evaluation of the environmental programs including cleanup activities. This review is conducted by BRAC PMO staff, represented by the BRAC Cleanup Team (BCT) and the BRAC Environmental Coordinator (BEC). This review includes the following tasks:

- Reviewing selected technologies for application of expedited solutions;
- Identifying areas for immediate removal actions to eliminate "hot spots" while investigation continues;
- Identifying transferable properties;
- Identifying overlapping phases of the cleanup process;
- Using improved contracting procedures;
- Interfacing with the community reuse plan and schedule;
- Embracing a bias for cleanup instead of studies;
- Validating the technology of the proposed remedy to ensure conformity with Fast Track Cleanup objectives;
- Identifying opportunities for application of presumptive remedies; and
- Using innovative management, coordination and communication techniques (e.g., partnering).

The findings of this review are used to prepare the BRAC Cleanup Plan (BCP). The BCP serves as a road map for the cleanup necessary to convey the property to communities for redevelopment. The BCP is a phased plan encapsulating and prioritizing requirements, schedules, and costs of the environmental programs to be implemented by the BCT for completing environmental action in support of the cleanup, reuse, and redevelopment of the installation.

BCPs should be made available to interested parties and community groups and become an integral part of the operations of the installation's Restoration Advisory Board (RAB). However, although project level details are appropriate for BCT discussions/consensus, only relevant summary financial data are appropriate for release to the public. Issues affecting the execution of the ER Program should be resolved at the BCT level or, where no dispute resolution can be made, ultimately by the Deputy Assistant Secretary of the Navy (Environment) [DASN(E)]. For sites with existing Federal Facility Agreement (FFAs), Interagency Agreements (IAGs), and orders or decrees, the BEC, assigned as the DON representative on the BCT, proposes and negotiates changes needed to expedite cleanup in consultation with

the FEC. As a response action progresses, the BCP should be updated to reflect the progress that has been made, as well as any changes in community redevelopment needs.

13.5.3 BRAC Information Resources

Information on the implementation of the BRAC program at Navy and Marine Corps installations is provided by the BRAC PMO, whose Web site (http://www.bracpmo.navy.mil) is the primary source of information concerning BRAC policy, bases, schedules, and links to other pertinent information. Additional BRAC resources are available from the following resources:

- DoD BRAC: http://www.dod.mil/brac/index.html
- DoD BRAC Navy: http://www.dod.mil/brac/navy.htm
- DoD Office of Economic Adjustment: http://oea.gov/oeaweb.nsf/home?openform
- Defense Environmental Network Information Exchange (DENIX): https://www.denix.osd.mil (see https://www.denix.osd.mil/denix/register.html for instructions on accessing and using DENIX's non-public features).
- U.S. EPA Federal Facility Restoration and Reuse Office: http://www.epa.gov/swerffrr/.

In addition, NAVFAC has developed the Web-based Naval Installation Restoration Information Solution (NIRIS) to manage all ER data and ensure data quality (see Chapter 14), including how ER data shall be submitted, and the tools available for data analysis and visualization using GIS. These tools help Navy RPMs and contractors effectively analyze the spatial distribution and correlate large volumes of data and generate persuasive maps.

13.6 Other Property Transfer Considerations

13.6.1 Early Transfer Authority (ETA) Program

CERCLA requires that federal agencies complete all environmental response actions before transferring property by deed to a non-federal entity. In 1996, Congress amended CERCLA to provide a mechanism by which a state governor, or a governor and the U.S. EPA Administrator for sites listed on the NPL, could approve a property transfer before all environmental remediation is completed. The law, as amended, sets the conditions that shall be met and the determinations that shall be made before such a transfer can occur. Both DoD and U.S. EPA have issued guidance on the implementation of this authority. DoD's guidance is provided in the *Early Transfer Authority, A Guide to Using ETA to Dispose of Surplus Property* (Oct. 2004).

As environmental restoration and cleanup programs progress, opportunities to return contaminated properties to productive use are increasing. ETA gives DoD the opportunity to dispose of environmentally contaminated property for the purposes of both cleanup and redevelopment faster than traditional transfer methods. DoD currently has surplus property, primarily as a result of military base closures under the BRAC program. Some of this property is environmentally contaminated, and legally, DoD may not transfer property until all necessary environmental remedial actions have been taken. ETA provides an exception to this requirement, authorizing DoD to transfer the property before completing remedial actions, when certain conditions are met. By executing an early transfer, DoD may transfer the property to a developer who can conduct cleanup and redevelopment activities concurrently, saving time and money.

When an early transfer occurs, ownership of the property moves from DoD to another party, but DoD, per CERCLA, retains all legal liability and responsibility for environmental remediation of contamination existing at the time of property transfer. Prior to completing the transfer, the parties will reach an

agreement as to whether DoD, the property recipient, or a combination of both parties will finish the post-transfer cleanup. Property transfer using ETA has several advantages over traditional property transfer methods, including the ability to integrate cleanup and redevelopment activities, increase investment in property, place property on local tax rolls sooner, and create jobs and revenue for the community. ETA applies to all federal property but has proven to be especially effective at some base closure sites where its application facilitates accelerated property reuse by streamlining the transfer, cleanup, and redevelopment of environmentally contaminated property.

13.6.2 Real Property Transactions

NAVFAC real estate and planning personnel, in conjunction with installation personnel, are responsible for ensuring that the ER Program is fully considered prior to engaging in real property transactions and as part of all land management decisions.

13.6.2.1 Sale or Transfer of Real Property

40 CFR Section 373.1 (2003), in accordance with CERCLA Section 120(h)(1), 42 USC Section 9620(h)(1) (2002), requires all federal agencies, when contracting for the sale or transfer of real property, to notify prospective purchasers if hazardous substances have been stored for a year or longer on the property or have ever been released or disposed of on the property. If required, this notice identifies the type and quantity of such hazardous substances, and the time when the storage, release, or disposal took place.

CERCLA Section 120 requirements apply to all federal facilities, regardless of whether the real property being conveyed is part of a National Priorities List (NPL) facility. For installations on the NPL, U.S. EPA shall concur in the determination that the parcel is characterized as clean. The concurrence of the appropriate state agency/personnel also should be sought. In the case of real property that is not part of a facility on the NPL, concurrence should be sought from the appropriate state official.

Before conveying any real property on which any hazardous substances have been stored for a year or more, or on which a hazardous substance (or substances) is known to have been released or disposed, a federal agency shall comply with the provisions of CERCLA Section 120(h)(3), 42 USC Section 9620(h)(3) (2002). This section requires that the deed for each property where hazardous waste was stored, released, or disposed of shall contain specific information regarding the hazardous substances and a covenant that warrants the following:

- All remedial action necessary to protect human health and the environment with respect to any such substance remaining on the property has been taken before the date of transfer (as noted above, this provision does not apply to federal-to-federal agency property transfers); and
- DON will conduct any additional remedial action found to be necessary after the date of such transfer.

DON is responsible for all expenses to the government resulting from the supervision and decontamination of DON's excess and surplus real property that has been subjected to hazardous material contamination. DON is required to notify the General Services Administration, or the disposal agency designee, of "any and all inherent hazards involved relative to such property in order to protect the general public from hazards and to preclude the Government from any and all liability resulting from indiscriminate disposal or mishandling of contaminated property." 41 CFR Section 102-75 (2003) provides the federal regulations concerning real property disposal.

13.6.2.2 Documenting Current Environmental Conditions

Environmental issues may pose the greatest obstacles to the property transfer because of the potential risk to human health and the environment. To properly communicate the environmental issues, the necessary documentation of Environmental Conditions of Property (ECP) needs to be assembled. The ECP report summarizes historical, cultural and environmental conditions and provides references to publicly available reports, studies and permits. The following sources of information are important in developing the ECP report:

- Basewide Environmental Baseline Survey (EBS) (generally only at BRAC installations);
- Supplemental EBSs;
- Environmental studies documents, such as CERCLA Preliminary Assessment/Site Inspection (PA/SI), or Remedial Investigation/Feasibility Study (RI/FS), RCRA facility assessments, and other environmental agreements (such as a FFA);
- Monitoring reports; and
- Other similar documents.

The environmental elements required to document the ECP may vary based on the proposed real estate action. The following are the primary purposes and outcomes of the process:

- Assess any environmental risks associated with the surveyed property, and determine what actions may be necessary to protect human health and the environment prior to effecting any proposed real property transaction.
- Support decisions for developing and documenting any necessary use restrictions and/or LUCs to be placed in the real estate agreement, including a determination regarding the environmental suitability of the real estate action.
- Identify data gaps concerning environmental contamination. The environmental, real estate, and legal professionals may make management decisions to disclose these gaps to the grantee or perform additional investigations to fill the data gaps and reduce potential risk, liability, property use restrictions, or LUCs.

NAVFAC is responsible for preparing the ECP for all leases, easements, and transfers for non-BRAC properties. The BRAC PMO is responsible for all BRAC properties. NAVFAC/BRAC PMO determines the appropriate amount of investigation and documentation based upon the particular circumstances of the real estate instrument and the proposed use of the property. In making this determination, NAVFAC/ BRAC PMO needs to consider changes in current use, type of use, length of use, and potential risk, among other relevant criteria. The investigation and documentation could range from a note in the file saying no further documentation is necessary (through a review of existing environmental studies) to a complete and thorough ECP.

The procedures for preparing an ECP for non-BRAC real estate actions are provided in DON's *Policy for Streamlining the Assessment, Documentation, and Disclosure of the Environmental Condition of Property (ECP) for Non-BRAC Real Estate Actions* (05 July 2006). This policy document is available on the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb), and outlines procedures intended to reduce cycle time and increase efficiency in executing real estate actions on active DON installations. These procedures are consistent with the BRAC procedures described in DoD's *Base Redevelopment and Realignment Manual (BRRM)* (DoD 4165.66-M, 01 Mar. 2006), which are applicable to all BRAC installations.

13.6.2.3 Environmental Finding of Suitability for Real Property Transaction

As described in the BRRM, before transfer or lease of BRAC property, the DON shall ensure that all applicable statutory and regulatory requirements have been satisfied. For matters specifically related to hazardous substances, petroleum products, and other regulated materials (e.g., asbestos) on the property, the DON shall prepare a FOST/FOSL summarizing how the applicable requirements and notifications for these substances and materials have been satisfied in order for DoD to provide the applicable CERCLA 120(h)(3) or CERCLA 120(h)(4) covenants (reference (f)).

The FOST/FOSL shall state that the property is environmentally suitable for transfer or lease and contain a description of any long-term remedies (including land-use controls) and responsibilities for their maintenance and reporting. The FOSL will document that the property is suitable for lease in that the uses contemplated for the lease are consistent with protection of human health and the environment, and that there are adequate assurances that all necessary remedial action has been taken or will be taken after the execution of the lease. The BRAC PMO will prepare the FOST/FOSL. Similarly, a FOSET may be prepared, which allows the temporary deferral of the covenant that all remediation be completed prior to property transfer in order to expedite the transfer of property.

FOSTs are forwarded for review and comment to the state and, if a NPL site, to U.S. EPA. For leases, providing the FOSL to U.S. EPA for comment satisfies the consultation requirement of CERCLA Section 120(h)(3) and 10 U.S.C. Section 2667(f)(2). Although resolution of comments on the FOST/FOSL is desirable, it is not required for transfer/lease.

For non-BRAC real estate actions, NAVFAC will prepare the necessary documentation of environmental conditions. As specified in the DON's *Policy for Streamlining the Assessment, Documentation, and Disclosure of the Environmental Condition of Property (ECP) for Non-BRAC Real Estate Actions* (05 July 2006), available on the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb), the previous DON requirements to prepare an EBS and FOSL/FOST for non-BRAC actions have been replaced with the ECP, as described in Section 13.6.2.2. In preparing an ECP for a non-BRAC real estate action, federal, state, and local regulators shall be consulted as necessary and appropriate (i.e., U.S. EPA where parcel involved is part of an NPL site).

13.6.2.4 Property Acquisitions

In acquiring land, the acquiring DON activity shall conduct due diligence as set forth in U.S. EPA's "All Appropriate Inquiry" regulations (40 CFR 312). "All appropriate inquiries" is the process of evaluating a property's environmental conditions and assessing potential liability for any contamination. These regulations specify requirements for conducting inquiries into the previous ownership, uses, and environmental conditions of a property for the purposes of qualifying for certain landowner liability protections under CERCLA. The effective date of the final rule is November 1, 2006, one year following the date of publication. Between the date of publication and November 1, 2006, parties may use either the requirements set forth in the final rule, or the requirements of the interim standard established in the Small Business Liability Relief and Brownfields Revitalization Act (the Brownfields Amendments to CERCLA). The interim standard is the ASTM E1527-00 *Phase I Environmental Site Assessment Process*. After November 1, 2006, parties must comply with the requirements of the final rule, or follow the standards set forth in the ASTM E1527-05 *Phase I Environmental Site Assessment Process*, to satisfy the statutory requirements for conducting all appropriate inquiries necessary to obtain protection from potential liability under CERCLA as an innocent landowner, a contiguous property owner, or a bona fide prospective purchaser. Additional information is provided on U.S. EPA's Brownfields and Redevelopment Web site.

The acquiring activity shall use command or installation funds, not ER,N funds, to perform all investigations as part of the due diligence process prior to land purchase or transfer. The results of this process may find contamination (known contamination) and may miss other contamination (unknown contamination). As DON wants to limit its future environmental liability on future property acquisitions, responsibility for both known and unknown contamination, as well as appropriate indemnifications, shall be incorporated in the purchase agreements and deeds. There are a variety of options to address future site contamination based on the source of the property acquisition (i.e., from another service, from another federal agency, from private sector, etc.). Therefore, NAVFAC HQ shall be consulted during the proposed property acquisition process to ensure the appropriate steps are taken to reduce DON future liability.

The extent of the contamination should be reflected in the appraisal before acquiring a known contaminated site. The *NAVFAC Contracting Manual* (NAVFAC P-68) and the *NAVFAC Real Estate Procedural Manual* (NAVFAC P-73) provide further guidance to DON personnel involved in the sale or transfer of real property.

13.6.3 Indemnification

Transferees of base closure property who are not potentially responsible party (PRPs) have been afforded additional protection through the National Defense Authorization Act of 1993 (Public Law 102-484; Section 330), as amended (such protection has been carried through to the National Defense Authorization Act for Fiscal Year 2005, Title III, Subtitle B); Pub. L. 102-484; 42 USC Section 9620(h)(3) (2002). Section 330 of the Defense Authorization Act of 1993, as amended, which is not technically a part of CERCLA, under certain circumstances, authorizes indemnification of the non-PRP transferee for personal injury and/or property damage that occurred as a result of that same contamination.

Real estate contracts should include language that provides for indemnification of DON should the transferee's of its subsequent transferee's acts exacerbate existing contamination or release additional contamination to the real property being transferred.

13.7 Off-Station (Third-Party) Sites Where DON is a Potentially Responsible Party (PRP)

An off-station or third-party site is a private, state, or municipally owned or operated site that has received DON waste and now requires cleanup under CERCLA. U.S. EPA seeks to recover CERCLA response costs for assessments and cleanup from the PRPs or gets them to fund assessment and cleanup costs.

PRPs may include any of the following:

- The present owner or operator of the hazardous waste facility;
- The owner or operator of the hazardous waste facility at the time hazardous waste was disposed there;
- Anyone who transported hazardous waste to the facility; or
- Anyone who arranged for disposal at the site.

DoD has no current or past ownership interest at PRP sites but does have a responsibility for cleanup of the site under CERCLA Section 107(a)(3), 42 USC Section 9607(a)(3) (2001). The military services may fulfill their third party responsibilities by:

- Being actively involved in the steering committee for a PRP-led cleanup; or

- Working with the Environmental and Natural Resource Division of the Department of Justice to adjudicate or defend a claim for monetary contribution toward remediation of a PRP site.

Under CERCLA, DON may become a PRP to enforcement actions taken to recover costs of cleanups. Although U.S. EPA cannot sue DON to recover such costs, non-federal PRPs can; hence, the designation as "third party."

U.S. EPA uses the following procedures to notify and work with PRPs:

- The U.S. EPA Regional Office sends a "Special Notice" certified letter to the PRPs. This notification may occur before, during, or after U.S. EPA responses at a site. The U.S. EPA letter informs PRPs of their potential liability, provides a list of other known PRPs, and calls for PRPs to do any or all of the following:
  - Voluntarily remove their hazardous waste from the site;
  - Provide all available documentation on hazardous waste sent to the site (required by CERCLA);
  - Voluntarily attend a meeting where U.S. EPA regional personnel will describe the problem and potential liability in more detail; or
  - Indicate a willingness to negotiate settlement for costs incurred by U.S. EPA to date.
- The U.S. EPA region encourages PRPs to form a steering committee to undertake studies and site cleanup directly or by using an U.S. EPA contractor. The committee determines appropriate division of costs between the PRPs and the means of cost recovery from PRPs who do not participate in the committee; and
- Where U.S. EPA chooses not to recommend PRP steering committee formation or where the committee is unable to reach agreement with U.S. EPA, U.S. EPA may proceed with the cleanup using the CERCLA Trust Fund and then initiate enforcement litigation against PRPs to recover Trust Fund expenditures.

Under DON policy, the Navy Litigation Office has the lead for settling claims against DON for third-party sites (see DASN(E)'s *Department of the Navy Environmental Policy Memorandum 02-01; Third Party Sites and Affirmative CERCLA Claims*, 28 Jan. 2002). NAVFAC provides support as coordinated through NAVFAC HQ.

13.8 Affirmative Environmental Response Claims

13.8.1 Recovery of Response Costs

The *Department of the Navy Environmental Policy Memorandum 02-01; Third Party Sites and Affirmative CERCLA Claims* (DASN(E) Memo, 28 Jan. 2002) formally established a DON program to recover response costs resulting from contamination by non-DON parties on or from Navy and Marine Corps lands. Chapter 26 of the *Management Guidance for the DERP* (28 Sep. 2001) outlines further requirements for affirmative claims. The OGC Litigation Office (LITOFF) has the lead for coordinating the internal evaluation, pursuit of, and negotiation of such claims under contract, CERCLA, or other applicable legal theories.

1. **Claim Threshold:** Consistent with *Management Guidance for the DERP*, potential affirmative environmental response claims that are valued at greater than $50,000 will be evaluated by LITOFF and, if warranted, pursued by DON. Claims of lesser value may still be pursued by other commands through informal negotiations or the exercise of contract authority.

2. **Case Evaluation:** Consistent with the DASN(E) Memo, commands referring environmental cost recovery or enforcement matters to LITOFF shall provide timely support to ensure successful execution of the affirmative claims program. It is important that early coordination with LITOFF occur to ensure protection of DON's interests. In addition to coordination of cost recovery and/or enforcement strategy, the following elements may need to be specifically addressed as early as possible in the cleanup process:

   a. Consistency with the NCP;
   b. Selection and documentation of the appropriate statutory response authority;
   c. Development of defensible cost documentation, including internal project management (legal and technical), potential litigation, and contractor costs;
   d. Statute of limitations deadlines and/or any other issues that may foreclose recovery;
   e. Development and preservation of evidence, including contract files if appropriate; and
   f. Evaluation of the feasibility of a PRP response in lieu of ER,N expenditure.

3. **Contaminated Sediments:** Consistent with CNO's *Policy on Sediment Site Investigation and Response Action* (Ser 453E/2U589601, 08 Feb. 2002), Navy and Marine Corps commands will identify, to LITOFF, situations where they believe that significant sources of non-DON contamination have contributed to sediment contamination that requires a response action. If DON has expended or is considering spending ER,N funds at such site, LITOFF (with assistance from NAVFAC) determines if an affirmative claim should be pursued against non-DON parties. To ensure consistent policy approaches, the Regional Environmental Coordinator and installation staffs will similarly coordinate such situations under their cognizance with NAVFAC and LITOFF prior to expenditure of DON funds.

4. **Divestiture of Navy and Marine Corps Real Estate:** When the Navy or Marine Corps is attempting to divest a government-owned/contractor-operated (GOCO) facility (see Section 13.8.2), transfer a BRAC property, or terminate other federal operations on DON lands, the divesting command shall coordinate its divestiture strategy with the DASN(E), the Associate General Counsel (Litigation), and CNO-N45 or CMC (as appropriate) before implementing such strategy if there is a possibility of an affirmative environmental response claim. This is necessary to ensure:

   a. That cost recovery efforts and divestiture strategies do not conflict;
   b. That there is appropriate reimbursement of the ER,N account by GOCO operators and other PRPs;
   c. That the real estate transfer agreement, GOCO or other contractor termination agreement, and other pertinent documents do not obligate DON or relieve the PRP from legal responsibilities in such a way as to waive or compromise environmental cost recovery claims without appropriate authorization.

5. **Contract Management Issues:** RPMs who are responsible for DON environmental restoration and facilities management programs shall promptly notify real estate and acquisition contracting officers of potential affirmative environmental response claims against contractor-PRPs. This facilitates sound contract management decision-making, and helps prevent undue waiver or compromise of the DON's environmental cost recovery claims. It also is intended to assist contracting officers in properly evaluating allowability of environmental response costs that contractors may attempt to charge back to DON contracts. Environmental and facilities managers shall promptly provide contracting officers any evidence of environmental or related safety violations or releases of contamination to the environment by the contractor-PRP that might be relevant to these issues.

13.8.2 Government Owned/Contractor Operated (GOCO) Facilities

GOCO facilities require special consideration and procedures to carry out ER-type activities. DON's liability and responsibility for cleanup at GOCO facilities is based on its status as the "owner" of the facility. Past and present contractors share this liability because they are "operators" or "generators" at these facilities. It is possible that a facility could become GOCO subsequent to DON operation when contamination occurred.

DON policy requires current GOCO contractors to pay for any and all cleanup costs associated with their operation of DON facilities. However, depending on how DON structures the GOCO contract, environmental costs may be allowable expenses and, hence, recoverable by the GOCO operator.

DON actions to fulfill its CERCLA responsibilities should be consistent with its contractual requirements with the GOCO contractor. The result of failure to coordinate GOCO responsibilities between DON and the contractor may include submittal of a claim by the operating contractor under a DON contract, or loss of potential claims by DON against the operator. *Navy Environmental and Natural Resources Program Manual* (OPNAVINST 5090.1B, 01 Nov. 1994) requires that the following policy regarding GOCOs be adhered to:

- NAVFAC will perform a PA/SI at DON GOCOs and will coordinate with the corresponding command prior to commencing the study. ER,N funds will be used for the PA/SI;
- The results of the PA/SI will be provided to the command for action. If the PA/SI recommends additional follow-up work, the command will immediately initiate discussions with the contractor concerning contractor responsibilities and participation in the cleanup efforts;
- If the contractor declines to perform the follow-up studies, the command will request NAVFAC to conduct the work under the ER Program. ER,N funds will be used, and all costs for the follow-up study will be identified, segregated, and tracked separately for future cost recovery actions, if appropriate;
- Similar scenarios will be followed for any Remedial Design/Remedial Action (RD/RA) including removal actions and interim remedial actions. DON will pursue cost recovery actions against the contractor where appropriate; and
- All actions (i.e., studies and cleanups) performed at GOCOs will be consistent with CERCLA and the NCP. All GOCOs will also provide ARs and CRPs. If DON funds studies and cleanup with ER,N funds, RABs shall be convened.

All timetables associated with CERCLA Section 120 apply if a GOCO is placed on the NPL, and DON will ensure that these timetables are met.

The FECs will negotiate FFAs for GOCO facilities placed on the NPL. The negotiated and signed FFA should in no way be construed as DON's acceptance of the contractor's/operator's share of the liability for cleanup costs associated with the GOCO site.

13.9 Off-Base Contamination

On occasion, contamination from a DON installation may migrate off the installation. CERCLA Section 104(e), permits reasonable access to properties that may not be owned by DON for the purposes of inspecting real property that may have been contaminated as a result of substances migrating from DON installation (42 USC Section 9604(e) [2001]).

The legal right of entry for the purpose of investigating contamination of off-base sites can be handled in a variety of ways to include:

- The FEC can approach the landowner and seek permission to perform the required investigations. This may require issuance of a real estate instrument or potentially require payment if the land owner will not allow free access; or
- The FEC (RPM, Counsel, and Real Estate) will coordinate Department of Justice assistance to either condemn a right of entry or provide a compliance order allowing access and entry.

In either case, the FEC real estate and legal counsel must be involved once it is determined that a right of entry onto adjacent land is necessary to determine the extent of contamination.

Considerations for off-base access shall be taken into account when entering into FFAs and agreeing to timetables for completion of work. The FEC CO or NAVFAC will review and sign the Record of Decision (ROD) and decision documents involving the cleanup of contamination on land that is not controlled by DON but which is DON's cleanup responsibility. In cases where the BRAC PMO is involved, the BRAC PMO will sign the ROD.

13.10 CERCLA Citizen Suit Provisions

CERCLA provisions allow citizen suits against any person or federal agency to enforce the requirements of CERCLA (42 USC Section 9659 [2001]). Suits can be brought for either:

- A violation of any standard, regulation, condition, requirement, or order which has become effective in accordance with CERCLA to include any provisions of CERCLA Section 120, 42 USC Section 9620 (2001) regarding federal facilities; or
- An alleged failure to perform any act or duty imposed by CERCLA Section 120, which is not disciplinary; 42 USC Section 9620 (2001).

No action may be commenced before selection of the remedial action if the DON is diligently proceeding with a RI/FS.

The plaintiff must provide a 60-day notice to the alleged violator before any suit can be brought. An installation should immediately notify the chain of command, the appropriate FEC, and the Navy Litigation Office if it receives a notice of intent to sue. During the 60 days following the notice of intent to sue, DON personnel should identify relevant facts and information for use in negotiation or litigation, whichever occurs first. Additional guidance is provided in the *Navy Environmental and Natural Resources Program Manual* (OPNAVINST 5090.1B, 01 Nov. 1994) CHANGE-2 Paragraph 1-2.9; and the *Marine Corps Environmental Compliance and Protection Manual* (MCO P5090.2A, Paragraph 10221n subparagraphs (1),(2).

13.11 Integrating Natural Resources and Environmental Restoration Activities

Cleanup activities have the potential to adversely affect natural, cultural, and human resources, both directly and indirectly. These potential impacts include such resources as wetlands, coral reefs, essential fish habitat, endangered species and other sensitive biological species and habitats, archeological and historical resources, air quality, water quality, traffic and access, coastal zone concerns, public safety, Native American concerns, Environmental Justice, and local community sensitivities.

Natural resources management in the ER Program includes ensuring that such resources are appropriately accounted for during the planning and execution of all phases of the ER Program, transfer of real property; granting of leases, and base closures. For many of the resources likely to be encountered, there are environmental laws and policies to consider and/or comply with, depending on the type of cleanup program and the type of impact. The principal laws and policies include: the National Environmental Policy Act, the Endangered Species Act, the National Historic Preservation Act, the Archeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, the Clean Water Act (especially sections 404 and 401), the Clean Air Act (conformity), the Coastal Zone Management Act, the Migratory Bird Treaty Act, the Magnuson-Stevens Fishery Conservation and Management Act, EO 13089 Coral Reef Protection, EO 13158 Marine Protected Areas, and EO 12898 on Environmental Justice. (See Chapter 1 of this manual for additional information on principal laws and policies.)

In addition, as specified in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), a risk assessment, including an ecological risk assessment (ERA), shall be conducted as part of the RI at the ER site to determine the need for a remedial action. ERAs evaluate the likelihood that adverse ecological effects may occur as a result of exposure to one or more stressors, including the presence of hazardous substances in environmental media. Further, DoD *Interim Policy on Integration of Natural Resource Injury (NRI) Responsibilities and Environmental Restoration Activities* (02 May 2000) requires the identification and, whenever practical, the redress of NRI as a part of the site assessment, investigation, remedy selection, and remedy implementation activities. To the extent practicable, a remedy should be selected that eliminates the cause of the NRI and restores the resource. In addition, selected remedies should avoid or minimize any additional NRI that may occur during cleanup of a site. CNO's *Policy on Natural Resource Injury and Damages in the Installation Restoration Program* (21 Dec. 2001) provides additional information on the DoD policy.

RPMs should consult with their facility environmental planners and counsel when dealing with the environmental laws and regulations discussed above and for input regarding such resources of concern and any related compliance requirements. The facility or FEC Natural Resources Coordinator can provide detailed information about natural resources that regional or natural resources trustees may not know about. This information can prove invaluable to RPMs in avoiding controversial issues such as endangered species and wetlands. By involving the Natural Resources Coordinator early in the program, remediation and restoration activities can be used to benefit both programs to enhance, restore, and/or create habitats.

13.11.1 Natural Resources Trustees

Natural resources trustees are responsible for the Natural and Cultural Resources Management Program within the federal government. These federal trustees have statutory responsibilities with regard to protection or management of natural resources, or stewardship as a manager of federally owned land. State agencies and Indian tribes are also trustees.

CERCLA designates the President as the "trustee" for all federally protected or managed natural resources on behalf of the public. The President, by issuing EO 12580 and following the NCP, designated DoD as the National Resource Trustee for all DoD facilities. As specified in 40 CFR 300.615, the DoD's responsibilities as the natural resource trustee in the environmental restoration process include:

- Establishing appropriate contacts to receive notifications of discharges or releases;
- Conducting a preliminary survey of the area affected by the discharge or release to determine if trust resources under their jurisdiction are, or potentially may be, affected;
- Providing support to the RPM in coordinating assessments, investigations, and planning;

- Providing for natural resources expertise in contingency planning; and
- Planning and implementing any plans to restore, rehabilitate, replace, or acquire equivalent natural resources.

Natural resources trustees also include the National Oceanic and Atmospheric Administration (NOAA), state agencies, and the United States Department of the Interior (DOI). Where there are multiple trustees, because of coexisting or contiguous natural resources or concurrent jurisdictions, they should coordinate and cooperate in carrying out these responsibilities.

13.11.2 Historic and Archeological Resources Program (HARP)

DON's HARP is based on the National Historic Preservation Act (NHPA), 16 USC Section 470 (2001), and the Archeological Resources Protection Act (ARPA), 43 CFR Section 7 (2000). ARPA prohibits the excavation, removal, damaging, alteration, or defacement of archeological resources on federal property without a permit. "Archeological resources" are identified as any material remains of past human life or activities which are at least 100 years old and which are of archeological interest (32 CFR Section 229 [2000]). Although the ARPA permitting process does not apply to excavations performed by the DON itself under CERCLA, the Section 106 process of the NHPA does apply (i.e., work must be conducted in accordance with the substantive requirements of HARP to manage ecological resources, but an ARPA permit is not required).

13.12 Radiological Issues

The CERCLA process to investigate, characterize, and remediate potential hazardous substances under the oversight of U.S. EPA or the appropriate state agency also applies to radioactive materials, including naturally occurring radioactive materials, technologically enhanced naturally occurring radioactive materials (TENORM), naturally occurring and accelerator-produced radioactive materials (NARM), in addition to byproduct, source, and special nuclear materials. The radioactivity present at DON installations may be broadly characterized as Naval Nuclear Propulsion Program (NNPP) radioactive material (NNPP-RAM) or Radiological Affairs Support Program (RASP) General Radioactive Material (G-RAM).

Assessment of radiological issues is often complex as it entails overlapping regulatory authority including some exercised by the DON itself, and involves specialized knowledge and expertise. A significant factor during the assessment and evaluation of sites for radioactive contamination is the ubiquitous presence of naturally occurring radioactive materials that varies with geophysical characteristics of the site.

As the DON Executive Agent for the ER Program, NAVFAC has the responsibility to ensure all aspects of the cleanup process are appropriately addressed. Therefore, FECs shall coordinate with DON agencies, which have radiological responsibilities and technical expertise, as discussed in following subsections.

13.12.1 Naval Nuclear Propulsion Program (NNPP)

The Naval Nuclear Propulsion Program (NNPP) in the Office of the Chief of Naval Operations (OPNAV N00N), also known as COMNAVSEASYSCOM Code 08 (NAVSEA 08, Nuclear Propulsion Directorate), is responsible for all matters pertaining to Naval nuclear propulsion, including the control of radioactivity associated with the operation and servicing of Naval nuclear propulsion plants. NNPP regulates this radioactivity in accordance with EO 12344 of 1 Feb. 1982, first set forth in Public Law 98-525 of 19 Oct. 1984 (42 USC 7158 note) and subsequently in Public Law 106-65 of 05 Oct. 1999 (50 USC 2406). Because of this statutory authority, the NNPP regulates remedial action concerning their material (i.e., NNPP-RAM) under CERCLA and RCRA.

13.12.2 Radiological Affairs Support Program – General Radioactive Material (G-RAM)

The Radiological Affairs Support Program (RASP) is managed by the Radiological Control Program Office, NAVSEASYSCOM (NAVSEA 04N). The Radiological Control Program Office has responsibility for all non-NNPP radioactive materials (i.e., G-RAM). This includes naturally occurring radioactive materials, NARM, TENORM, byproduct, source material, and special nuclear material, low-level radioactive waste derived from G-RAM[9], and machines that produce radioactivity. The Navy's Radiation Safety Committee, chaired by CNO-N45, also oversees uses of G-RAM, particularly byproduct, source material, and special nuclear material. Naval Sea Systems Command Detachment Radiological Affairs Support Office (NAVSEADET RASO) serves as the technical support center for both SEA-04N and CNO-N45. RASO is located in Yorktown, Virginia and should be contacted at 757-887-4692 whenever radioactive material is found or suspected.

13.12.3 NAVFAC/NNPP/RASP Interface

In administering the ER Program, FECs are responsible for coordination of any radiological issues with NAVSEA 08R, NAVSEA 04N, and/or NAVSEADET RASO, as appropriate. This may include work at all phases of the ER process. NAVSEA 08R and NAVSEADET RASO have the technical lead for all radiological issues and will designate a representative to support the NAVFAC RPM for all radiological issues and discussions with the regulators and public. NAVFAC shall coordinate all responses to radiological questions with the cognizant radiological office.

At installations frequented by nuclear powered warships, FECs should inform both NAVSEA 08R and NAVSEA 04N/NAVSEADET RASO of any agreements or plans being developed to investigate or clean up G-RAM radioactivity (investigation and cleanup of NNPP-RAM is always handled directly by the NNPP). The NNPP has an interest in G-RAM issues to ensure the consistency of efforts at sites under NNPP jurisdiction. For any G-RAM radiological issue at other installations, only NAVSEA 04N/NAVSEADET RASO need be kept informed.

NAVFAC FECs need to ensure that NAVSEA 04N/NAVSEADET RASO and the NNPP, as appropriate, are included in the drafting and concurrence process for all documents that address radiological issues. These documents include but are not limited to all CERCLA, RCRA, NEPA, Historical Radiological Assessments (HRA), and any policy, guidance, and other DON documents or presentations pertinent to the NERP. NAVFAC FECs shall allow adequate time for such document review, and should incorporate such reviews in the schedules for document completion.

13.12.4 Historical Radiological Assessments (HRAs)

DON produces HRAs to document the extent of radiological operations at a specific site, including any residual effects these operations may have had on the site. HRAs are prepared for both active and BRAC DON sites. HRAs provide a "snapshot in time" history of the use, handling, and disposal of radioactive materials in a baseline reference document. HRAs for active DON commands are updated on a periodic basis. Supplemental information to HRAs for DON commands undergoing closure is usually provided in individual site reports following remedial action, as necessary.

Naval nuclear-capable shipyards authorized to handle NNPP radioactive material prepare both the NNPP and G-RAM HRAs for themselves and for assigned Naval installations frequented by nuclear powered

[9] Examples of G-RAM include gauges with dial markings painted using luminous radium paint, commodity items such as electron tubes and smoke detectors containing radioactive materials, and small radioactive sources used for calibration and testing of radiation detection instruments.

warships, to document historical radiological policies and practices, and to compile existing radiological environmental data.

HRAs also are prepared to document the use of G-RAM at Navy commands. Historically, shipyards prepared G-RAM HRAs, as noted above for the NNPP. Currently, NAVFAC, shipyards, or other commands may produce specific HRAs, as appropriate. However, NAVSEA 04N controls the review and approval process of G-RAM HRAs.

For sites with NNPP-RAM and G-RAM, HRAs are produced as two-volume documents with Volume I addressing NNPP-RAM and Volume II covering G-RAM. HRAs are issued as single volumes for sites without NNPP-RAM operations.

HRAs provide a level of information consistent with that in a PA, and are used to support further CERCLA response actions (refer to Chapter 6 for a description of information contained in a PA). The HRA may also be used as a Historical Site Assessment as defined by the *Multi-Agency Radiation Survey and Site Investigation Manual* (NTIS document number PB97-117659, Aug. 2000).

HRAs often are used to satisfy requirements outlined in FFAs and other legal agreements. At BRAC installations, HRAs are part of the base closure documents that become an integral part of the regulatory process for site release and transfer of property.

HRAs and other radiological actions and responses that support the ER Program shall be funded by Naval Shipyards (ongoing routine HRAs), or ER,N or BRAC funds as appropriate. Specifically, ER, N and BRAC funding will cover the initial development of HRAs for G-RAM. Funding for G-RAM HRA updates will be determined by CNO-N45. ER,N and BRAC funding does not cover HRAs for NNPP-RAM.

13.12.5 Radioactive Waste Disposal

The NNPP is responsible for proper disposal of waste generated under its cognizance, so any issue pertaining to such waste should be referred to NAVSEA 08R. The remainder of this section applies to G-RAM only.

G-RAM waste is managed through the Navy Low-Level Radioactive Waste (LLRW) Disposal Program. The Deputy Chief of Naval Operations (Logistics) (CNO-N4) provides guidance and resources to NAVSEA 04N for execution of the LLRW Disposal Program and has designated NAVSEADET RASO as the single Navy agent for disposal of all non-NNPP LLRW.

In 1992, the Assistant Secretary of Defense appointed the Department of the Army as DoD Executive Agent for the management of the DoD LLRW Disposal Program. NAVSEADET RASO, through the Navy LLRW Program, manages the Navy's participation in the DoD LLRW Program. Participation in the Navy LLRW Program is mandatory for all non-NNPP Navy generators of LLRW. Installation CO/CGs are responsible to dispose of non-NNPP LLRW only through the Navy LLRW Program under authorization of NAVSEADET RASO. In addition, they shall comply with instructions and guidance issued by NAVSEADET RASO for every non-NNPP LLRW disposal action.

13.12.6 Mixed Waste

Mixed waste is both radioactive and chemically hazardous waste. The hazardous constituents in the waste are regulated under RCRA. The NNPP is responsible for the management and disposal of all mixed waste from Naval nuclear propulsion work. Any issue pertaining to NNPP mixed waste should be referred to NAVSEA 08U. As authorized by CNO-N4, non-NNPP mixed waste falls under the

cognizance of the Navy LLRW Program managed by NAVSEA 04N/NAVSEADET RASO. Disposal of non-NNPP mixed waste through the Navy LLRW Program is mandatory for all Navy and Marine Corps generators of non-NNPP mixed waste.

The NNPP is a joint Department of Energy (DOE) and Navy program. Pursuant to the Federal Facilities Compliance Act, the DOE is required to prepare and submit Site Treatment Plans to address treatment of mixed waste for each site under DOE cognizance that generates and stores mixed waste. The Site Treatment Plan identifies treatment options for each mixed waste stream present (42 USC Section 9620 [2001]).

13.13 Transfer of CERCLA Wastes to Off-Site Facilities

Planning for the management of CERCLA waste at an off-site facility (i.e., for off-site treatment and/or disposal) must be conducted in accordance with the NCP. Specifically, off-site transfer of any hazardous substance, pollutant, or contaminant as defined under CERCLA Sections 101 (14) and (33) ("CERCLA waste") that is conducted by U.S. EPA, states, private parties, or other federal agencies, and that is Fund-financed and/or is taken pursuant to any CERCLA authority, including cleanups at federal facilities under CERCLA Section 120, are subject to regulations set forth at 40 CFR 300.440. Therefore, prior to transfer of CERCLA waste for management at an off-site facility, the RPM should confirm that the facility is permitted to receive wastes containing the constituents listed in the waste profile and consult with U.S. EPA (usually a regional office) to determine the acceptability of a facility proposed for the treatment, storage, or disposal of CERCLA waste. U.S. EPA will determine if there are relevant releases or relevant violations at a facility prior to the facility's initial receipt of CERCLA waste. A facility which has previously been evaluated and found acceptable under this rule is acceptable until the U.S. EPA Regional Office notifies the facility otherwise pursuant to 40 CFR 300.440(d). It is recommended that the RPM include documentation of waste acceptance from the facility and U.S. EPA's determination of facility acceptability in the closeout documentation.

13.14 Handling of Classified Items or Objects Found On-Site

If any unidentifiable munitions-related items of a nuclear, chemical or biological nature are found on-site, which may be considered possible classified material, contact Naval Ordnance Safety and Security Activity (NOSSA) at (301) 744-4534 as soon as possible for direction on how to handle the material. If any other material is found that appears to be classified, which is not munitions-related, contact NAVFAC HQ for further direction.

13.15 Emerging Contaminants and Issues

There have been a number of instances where response actions were affected by disagreements over contaminant toxicology values or contaminant transport pathways. This can greatly affect the progress of many sites in the ER Program. Because these issues can have a significant impact on the scope and schedule for an ER Program site, including the potential for reopening sites that have already reached the RC milestone, DoD is continually addressing these new emerging issues. The following sections outline some DoD initiatives.

13.15.1 Emerging Contaminants

DoD works with the U.S. EPA and states to reach consensus on how to address Emerging Contaminants (ECs). The first step is to agree on a common definition of ECs. The working DoD definition of EC is "a chemical or material that is characterized by a perceived or real threat to human health or the environment with no published health standard, or an evolving standard." ECs may also have insufficient or limited

health and science data or available science and technology necessary to address them. There also may be new detection limits or contaminant migration pathways associated with ECs, which must be investigated before agreement can be reached on a path forward.

13.15.2 Perchlorate

Perchlorate is of great concern to DoD. U.S. EPA performed perchlorate toxicological studies in the 1990s and published a perchlorate risk assessment. There were some disagreements within the scientific community over the results of the risk assessment, so U.S. EPA performed a reassessment and proposed lowering its cleanup standard to 1 part per billion (ppb). The DoD also conducted toxicological studies and felt the cleanup standard should be higher than those proposed by U.S. EPA. As a result of this disagreement, the National Academy of Sciences (NAS) reviewed all supporting toxicological data and produced a final report of their findings. The U.S. EPA incorporated the NAS findings into their national database, the Integrated Risk Information System (IRIS).

DoD provides information on current policies, guidance and scientific publications on its Perchlorate Web site (http://www.dodperchlorateinfo.net/), including the following documents:

- Policy on DoD Required Actions Related to Perchlorate (26 Jan. 2006)
- DoD Perchlorate Handbook (Mar. 2006)
- Navy Perchlorate Sampling and Management Policy (5090, N456J Ser/6U838120, 16 May 2006).

Additional resources relating to perchlorate are identified in Appendix A.

13.15.3 Emerging Contaminants and Risk Issues

The DoD faces challenges with other ECs during some ER Program risk assessments. Some of these ECs include: trichloroethylene (TCE), naphthalene, tetrachloroethylene (PCE), 1,2,3 TCP, *cis*-1,2-dichloroethene (DCE) and 1,4-dioxane. Although agreements have not been reached regarding the toxicity of many of these ECs, U.S EPA and some states still require the DoD to conduct site-specific risk assessments including these ECs and implement response actions based on the findings of these risk assessments. DoD is continually developing guidance on how to address these situations. RPMs are reminded to check with their ER Manager for the latest guidance regarding these EC issues.

13.15.4 Vapor Intrusion Pathway

There have been differing opinions on whether to address the vapor intrusion (VI) pathway as part of a site investigation. There are also differing opinions on the approaches for characterizing the VI pathway, appropriate risk evaluation criteria, and site remediation alternatives. In November 2002, the U.S. EPA, Office of Solid Waste and Emergency Response (OSWER), released the *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* to assist scientists and managers in conducting a screening evaluation to determine whether the VI pathway poses an unacceptable risk to human health at potentially impacted sites. This guidance document received numerous comments from within U.S. EPA, other state regulatory agencies, the DoD, and other industry affiliates. U.S. EPA held a variety of public meetings and workshops to try to resolve these comments. Many DON installations have been requested to conduct VI evaluations at sites without clear agreement on the need for, or methods for evaluating, this pathway. When guidance or policy is unclear, RPMs are encouraged to consult with their ER Manager to seek current DON guidance and policy regarding VI issues.

CHAPTER 14

Records, Reporting, and Information Management Systems

This chapter outlines the legal and regulatory requirements for records management for CERCLA Administrative Records, Information Repositories, RCRA documents, and National Environmental Policy Act (NEPA) Administrative Records.

In addition, it describes the Navy's information management systems used to track progress of the ER Program and manage site data, including incurred and projected costs and schedules.

14.1 Administrative Record and Information Repository

Section 113(k)(1) of CERCLA requires that, as part of the public participation requirements, an Administrative Record (AR) File be kept on each response action taken and a copy be made available at or near the site, and that a notice of the availability be made public. DON compiles one AR File for each installation under its area of responsibility. Each installation has a single AR File no matter how many response actions are undertaken at the installation.

The AR File is compiled for two reasons:

- It contains those documents which form the basis for selection of a response action and under CERCLA Section 113(j); judicial review of any issue concerning the adequacy of any response action is limited to the AR;
- It serves as a vehicle for public participation in the selection of a response action.

Information regarding the establishment of AR Files can be found in *Final Guidance on Administrative Records for Selecting CERCLA Response Actions* (OSWER 9833.3A-1; 03 Dec. 1990) and in NAVFAC's *CERLCA Interim Administrative Records Management System (ARMS) Users Guide* (UG-2024-ENV, 01 Dec. 2000).

Types of response actions requiring an AR File and the timing of its availability to the public are defined by OSWER 9833.3A-1 as follows:

- **Remedial Actions:** The AR File for a remedial action shall be established and available for public inspection when the remedial investigation begins.
- **Time Critical Removal Actions:** The AR File for time critical removal action (TCRAs) shall be established and available for public inspection no later than 60 days after the initiation of on-site removal activity. If an on-site removal activity is initiated within hours of the verification of a release or threat of a release and on-site removal activities cease within 30 days (emergency actions), the record file need only be available at a central location but still no later than 60 days after initiation of on-site removal activity.
- **Non-Time Critical Removal Actions:** The AR File for a NTCRA shall be established and made available for public inspection when the Engineering Evaluation/Cost Analysis (EE/CA) is made available for public comment.

The AR File assembles over time and closes to become an "Administrative Record" after a decision document has been executed. Decision documents (e.g., Record of Decision [ROD] or Action

Memorandum [AM]) shall be supported by an Administrative Record. To avoid creating the impression that the record is complete or that the response action decision has been made, the set of records is referred to as the "AR File".

14.1.1 Compiling an Administrative Record

The AR File should be compiled as relevant documents on the response action are generated or received. All documents which are clearly relevant and non-privileged should be placed in the AR File, and their data entered into an index. Documents must be made available to the public as soon as possible. The AR File shall include a comprehensive document index to enable users to locate and retrieve documents included in the file. Information related to the site that is not appropriate for inclusion in the AR File should be added to the site files. The use of site files is discussed within this section. It is strongly recommended that all NAVFAC commands have Records Managers and Administrative Record Coordinators to establish and maintain NAVFAC records and documents.

Final documents which are part of the DON decision-making process should be added to the AR File. Draft documents should be included only if they contain information that forms the basis of selection of the response action and the information is not included in any other document in the AR File. The AR File should include any public comments addressing the choice of remedy generated by the proposed plan and DON response to those comments. Documents which pertain to multiple installation sites should be added to the installation AR File only once. If questions arise, the matter should be referred to the appropriate NAVFAC office of counsel.

Documents which contain confidential or privileged information should be placed in the confidential portion of the AR File. Records in this part of the AR File are located in a secure area and are not accessible to the public. To the extent feasible, placeholders for these records, such as cards or pages with the documents metadata, should be made available in the open portion of the AR File.

General guidance documents and technical sources need not be cited in each AR File. Keep in a central location, usually the Facilities Engineering Command office. Relevant guidance documents, applicable laws and statutes, and technical sources that are publicly available are not required to be maintained in the AR File but the document shall be referenced in the AR File index along with their location and availability. Technical literature or portions of technical literature that are considered or relied on in selecting a response action and are not publicly available should be included in the AR File for that response action. Consult with Environmental Counsel before including any technical journal and magazine articles as well as unpublished documents/papers in the AR File.

Table 14-1 provides the list of documents typically included in an AR File. Information in the table is meant to serve as a guide and should not be considered comprehensive. As stated in *Final Guidance on Administrative Records for Selecting CERCLA Response Actions* (OSWER 9833.3A-1, 03 Dec. 1990), documents which are considered or relied upon to select the remedy, or which demonstrate the public's opportunity to participate in and comment on the selection of the remedy, shall be placed in the AR File.

Removal Actions

Documents which are typically included in the AR File for removal actions include many of the documents listed in Table 14-1 for Remedial Actions as well as the following documents specific to removal actions:

Table 14-1. Typical Administrative Records for Remedial Actions

Project Phases	Typical Remedial Action Documents
PA/SI	• Preliminary Assessment Report • Site Inspection Work Plan • Site Investigation Report • Site Inspection Sampling and Analysis Plan • Site Inspection Quality Assurance Project Plan • Site Inspection Health and Safety Plan • Site Inspection Field Sampling Plan • Site Inspection Chain-of-Custody Forms (see OSWER 9833.3A-1 guidance) • Raw Analytical Data (see OSWER 9833.3A-1guidance) • Data Summary Data • Site Inspection Report
RI/FS Phase	• Remedial Investigation/Feasibility Study Work Plan • Remedial Investigation/Feasibility Study Work Plan Amendments • Remedial Investigation Sampling and Analysis Plan • Remedial Investigation Quality Assurance Project Plan • Remedial Investigation Health and Safety Plan • Remedial Investigation Field Sampling Plan • Remedial Investigation Chain-of-Custody Forms • Raw Analytical Data (see OSWER 9833.3A-1guidance) • Inspection Reports • Data Summary Sheets
RI/FS Completed	• Remedial Investigation Report • Feasibility Study Report • Data submitted by the public • Remedial Investigation/Feasibility Reports (as available for public comment and as final, if different) • Supporting technical studies and reports • Alternative Technologies/Treatability studies • Human Health Risk Assessment • Ecological Risk Assessment • Engineering Evaluation/Cost Analysis
Policy and Guidance	• Technical literature • Technical studies performed for the site • Memorandums on site-specific or issue-specific policy decisions
General	• Site Management Plans • Site photographs/maps • Letters to regulators requesting identification of ARARs • Responses from regulators identifying of ARARs • Notice to regulators • Regulatory (state/federal) letters and comments on draft, draft final, and final documents • Selected correspondence and memorandums to / from government agency to regulatory agency • Regulatory concurrence or non-concurrence correspondence on final documents • NAVFAC response to comments or other correspondence from regulatory (state/federal) agencies • Selected other federal agency documents (U.S. EPA, ATSDR, etc.) • Congressional correspondences • National Resources Trustee notices and responses, Findings of Fact • Responsiveness Summary • Documentation of substantive oral comments on the selected remedy

Table 14-1. Typical Administrative Records for Remedial Actions (continued)

Project Phases	Typical Remedial Action Documents
Public Participation	• Community Relations Plan(s) • Newspaper articles showing general community awareness • Fact Sheets or summary information regarding Remedial Action alternatives • Proposed Plan • Letters forwarded to persons on the community involvement mailing list, including associated data and mailing list for each document. • Public notices • Public comments and NAVFAC responses • Responses to significant comments received from the public concerning the selection of a Remedial Action • Transcripts of formal public meetings • Restoration Advisory Board meeting minutes, agendas and presentations • Written comments on selected remedy submitted by the public
Record of Decision	• Record of Decision (ROD) • Amendments to ROD • ESD to the Record of Decision
Enforcement Documents	• Notice letters to Potentially Responsible Parties (PRPs) and their response • Administrative Orders • Consent Decrees

Modified from: NAVFAC's *CERLCA Interim Administrative Records Management System (ARMS) Users Guide* (UG-2024-ENV, 01 Dec. 2000)

- Site Evaluation Work Plan
- Site Evaluation Sampling and Analysis Plan
- Site Evaluation Quality Assurance Project Plan
- Site Evaluation Health and Safety Plan
- Site Evaluation Field Sampling Plan
- Site Evaluation Report
- EE/CA (for non-time critical removals)
- Notice of Availability of the EE/CA and AR File
- Action Memoranda and Amendments.

Enforcement documents (Administrative Orders and Consent Decrees) are included only if they are relevant to selection of the removal action.

Site File

Documents beyond the scope of the AR File should be added to the site file. These files do not need to be in the AR File, although many of the documents in the files may be available to the public if requested under the Freedom of Information Act. Examples of documents that are irrelevant to the decision on selecting a response action may include U.S. EPA Hazard Ranking System (HRS) scoring packages, contractor work assignments, cost documentation (as opposed to cost-effectiveness information), National

Priorities List (NPL) deletion information, ARARs correspondence between attorneys and/or site team members, enforcement orders (federal and state), Navy or contractor notes, scopes of work, internal Navy correspondence, Technical Assistance Grants information, Environmental Baseline Survey documents, Master Plans, and Memoranda of Understanding.

Records disposition for the RPM site files is not addressed in the *DON Navy Records Management Program Records Management Manual* (SECNAVINST M5210.1, 31 Dec. 2005); however, the *Records Management Manual* should be consulted regularly for changes and updates. The *Records Management Manual* addresses reports and other records required by CERLCA, and requires documents to be retired to the nearest Federal Records Center three years after completion of response action and destroyed when 50 years old. Records Managers schedule AR Files for disposition.

Post-Record of Decision (ROD) Non-Decision Documents File

Documents generated or received after signing of the ROD are kept in the Post-ROD Non-Decision Document File. These documents generally are not relevant to the response decision and should not be included in the AR File. However, there are some instances when the post-ROD information should be added to the AR File, including the following situations:

1. When a DD does not address a portion of the decision or reserves a portion of the decision to be made at a later date. An example of this is a DD that does not resolve the type of treatment technology. In such cases, the documents that form the basis for the unaddressed or reserved portion of the decision should continue to be added to the AR File; and

2. When there is a significant change in the selected response action. Changes that result in a significant difference to a basic feature of the selected remedial action (e.g., timing, ARARs), with respect to scope, performance, or cost may be addressed in an ESD. If a remedial action is taken that differs in any significant respects from the final plan, an ESD is required. The AR File should include the ESD, underlying documentation for the response action changes, any significant comments from the public, and NAVFAC responses to any significant comments.

Examples of documents which are post-ROD non-decision documents include remedial design documents, reports, and plans; remedial action documents, reports and plans; long-term monitoring information and reports (quarterly, semiannual, annual, etc.); Land Use Control Implementation Plans; Land Use Control Assurance Plans; operation and maintenance manuals (there are exceptions); five-year reviews; and BRAC documents and reports. For additional instruction, consult III-N, Post-Decision Information, in U.S. EPA's *Final Guidance on Administrative Records for Selecting CERCLA Response Actions* (OSWER 9833.3A-1, 03 Dec. 1990). Documents can be removed from the Post-ROD File if they are determined to be unsuitable for preservation at a later date.

14.1.2 RCRA Documents

For actions at past hazardous waste sites on non-NPL RCRA-permitted facilities that are being characterized or remediated under RCRA, the AR File typically is kept with either the state or the U.S. EPA. RPMs should ensure that the AR File is being kept and that it meets CERCLA requirements. RPMs should consult with counsel to ensure that the AR File demonstrates that the Agency has met CERCLA's mandates.

When a RCRA site is officially moved to the Installation Restoration Program (IRP), RCRA documents and records should be reviewed by counsel and a decision made on which documents will be added to the AR File.

It is strongly recommended but not mandated by law that the public and Restoration Advisory Board (RAB) members (discussed in Chapter 15) review and comment on permits and permit modifications necessary to accomplish site remediation.

Records disposition for RCRA documents is not addressed in the *DON Navy Records Management Program Records Management Manual* (SECNAVINST M5210.1, 31 Dec. 2005); however, the *Records Management Manual* should be consulted regularly for changes and updates.

14.1.3 Information Repository

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) requires an information repository for all remedial actions and any removal actions that exceed 120 days; however, DON guidance is to establish an information repository for all sites where cleanup activities are expected to last for more than 45 days. The complete AR File for the activity can be housed at the physical repository or selected documents which are of public interest can be placed in the physical repository. The AR File index is always included in the Information Repository.

U.S. EPA's *Final Guidance on Administrative Records for Selecting CERCLA Response Actions* (OSWER 9833.3A-1, 03 Dec. 1990) defines an Information Repository as a place "where current information, technical reports, and reference materials relating to ER sites are housed. The information repository, usually located at a public library (called the physical repository), is established in the community at the beginning of site studies to provide the public with easily accessible information." Public libraries often are used as the physical repository because they typically have handicapped access, are open in the evening and on weekends, and have copying facilities available. Other locations could include town halls, municipal offices, etc.

The information repository includes documents related to the site that may or may not be suitable for inclusion in the AR File. Any document containing technical site information or non-technical descriptive information may be included in the information repository.

NAVFAC is responsible for establishing, maintaining, and determining the types of documents to be placed in the information repository. The integration of community involvement activities with the use of the repository is a key element of the Community Relations Plan (CRP). The following documents are recommended for inclusion in the information repository:

- AR File index;
- Brochures and fact sheets;
- RAB minutes and presentations;
- Initial assessment study;
- Technical assistance grant information;
- Copies of pertinent press releases;
- Proposed Plans;
- Records of Decision; and
- Notices of Intent to Delete (NOIDs) for NPL delisting.

Further information on developing an information repository can be obtained from U.S. EPA's *Community Involvement Guidance and Publications* Web site and *Superfund Community Involvement Handbook* (EPA/540/K-01/003, Apr. 2002).

14.2 CERCLA and DERP Reports

DoD is required to provide detailed information to the President, the Congress, and regulatory agencies about its environmental program to ensure compliance with budget and legislative requirements. For its ER Program, DON uses NORM Site Data Management Software Program (discussed in Section 14.3.1) to track and report the status of ER site cleanup, and submit budget requirements for future years.

It is important for all ER Program participants to document the steps of their response process, including requested and completed interactions with U.S. EPA, state and local governments, and local communities. Deputy Under Secretary of Defense, Installations and Environment [DUSD(I&E)] compiles a number of public reports from DON information and provides this information to Congress, U.S. EPA, and regulatory agencies, and other interest groups.

The following subsections describe reports and information systems supporting the ER Program.

14.2.1 Release of Hazardous Substances Reports

CERCLA Section 103(a) and 42 USC Section 9603(a) (2001) require the Commanding Officer/Commanding General (CO/CG) of an installation to immediately report the discovery of a hazardous substance release on their installation, if the release is a reportable quantity, to the National Response Center (telephone 800-424-8802). The reporting substances and their released limits in a 24-hour period are provided in 42 USC Section 9603(a). The CO/CG will notify appropriate federal and state regulatory agencies of the release as required. *Navy Environmental and Natural Resources Program Manual* (OPNAVINST 5090.1B, 01 Nov. 1994) and *Marine Corps Environmental Compliance and Protection Manual* (MCO P5090.2A, 10 July 1998) describe in detail the responsibilities for release response for the Navy and Marine Corps, respectively.

14.2.2 Potential Release of Hazardous Substances Reports

CERCLA Section 103(c) and 42 USC Section 9603(c) (2001) require the submittal of a notification report to U.S. EPA of the existence of any site where hazardous substances may have been stored, treated, or disposed of, and from which there could potentially be a release.

14.2.3 Annual Report to Congress

In accordance with CERCLA Section 120 (e)(5), 42 USC Section 9620(e)(5)(2001), DoD submits an Annual Report to Congress detailing the status of each installation involved in the DERP during the previous year. The Annual Report to Congress reports information on environmental restoration from all components (Air Force, Army, Defense Logistics Agency, and Navy and Marine Corps). Preparation of the report occurs in the first and second quarters of each fiscal year with submittal to Congress and distribution to states and the public at the end of the second quarter.

The annual report includes the following:

- Success stories highlighting significant Defense Environmental Restoration Program (DERP) project actions to clean up sites and reduce risk to human health and the environment;
- A listing by state of the number of BRAC (NPL and non-NPL) sites and ER NPL sites under the jurisdiction of DoD at which hazardous substances have been identified;
- A narrative summary for each BRAC installation and ER NPL installation, including action dates, contaminants, funding, and a description and status of studies and cleanup actions;

- A report on the status of Interagency Agreement (IAGs) for BRAC sites and ER NPL sites, including a summary of public comments received, a description of the instances in which no agreement was reached, and cost estimates and budgetary proposals for each IAG; and
- A report on the status of cost recovery and cost sharing efforts with PRPs who have contaminated DON real property.

NAVFAC is responsible for coordinating DON input to the Annual Report to Congress. NAVFAC submits data to DoD from the DON NORM database along with other information. It is important that the RPM updates the NORM data on a regular basis to maintain accurate records of DON ER activities and ensure that data used to prepare the report are current.

14.3 Information Systems for the ER Program

This section describes how DON manages ER Program data using the NORM and NIRIS databases, and how these systems integrate with other DoD and DON centralized data management systems (e.g., the RMIS, and GeoRepository) to report on progress of the ER Program, establish budgets, and hold various other relevant information.

14.3.1 DON (NAVFAC) Management Information System (NORM)

NORM is a NAVFAC Web-based computer system that does environmental site registration, cradle-to-grave tracking, relative risk ranking, cost-estimating, budgeting and reporting functions for the ER Program. NORM stands for normalization of data. NORM integrates and centrally maintains the information necessary to manage the program including site and activity data, site risk ranking and prioritization, and site costs. Through NORM, individual budget requirements are incorporated into the overall FEC program budget, and ultimately into the total NAVFAC budget.

NORM data supports program management and metrics, and many BRAC and ER,N reporting requirements, including:

- Defense planning goals;
- Measures of merit;
- Annual report to Congress and five-year plan;
- In-progress reviews;
- Budget exhibits;
- The clean financial statement;
- Financial Management and Budget (FMB), Office of the Secretary of Defense (OSD), and President's budgets; and
- Answers to Congressional and OSD inquiries.

Each FAC or FEC maintains and administers its own ER Program data on an ongoing basis using the centralized database, which is accessed through the Intranet. Eight integrated components comprise the functional elements of NORM. Each year NAVFAC HQ issues budget guidance that specifies which of the NORM modules are mandatory. Each of the NORM modules is described below.

NORM Activity Editor and NORM Site Editor Modules

These two components capture general information that categorize the sites and activities. The activity editor captures installation level information, including a listing of all the sites within the activity and points-of-contact. The site editor captures site level information such as applicable statutes that require site cleanup, and ER,N or BRAC funding designation.

NORM Relative Risk Module

This component uses the DoD Relative Risk Site Evaluation Model (RRSEM) to rank and prioritize each site as high, medium, or low based on site information including levels of contamination, evidence of migration pathway, and presence of receptors that might be harmed. More information regarding the RRSEM is presented in Section 4.3.1.

NORM-CTC Cost-Estimating Module

This component allows development of a budgetary cost estimate for the entire cleanup of the site. The module includes parametric cost-estimating tools to help estimators develop budgetary costs, and the flexibility to enter estimates that were generated using external tools. The cost-to-complete (CTC) should be overridden with more detailed estimates as they become available from other sources such as the Feasibility Study (FS) or Remedial Design (RD).

NORM Scheduler Module

The scheduler module is integrated within the CTC cost-estimating module to allow the RPM to schedule tasks and indicate the portions of the total estimated CTC costs that are required for each fiscal year.

NORM Budget Module

Budget planning and preparation in NORM begins with three major elements:

- Prioritization of sites – accomplished through the RRSEM
- Estimation of site CTC – accomplished in the CTC cost-estimating module
- Scheduling of program requirements – accomplished through the integrated scheduler module.

The budget module summarizes the information provided through these modules and other modules into an integrated budget for each FEC, and ultimately for all NAVFAC.

NORM Optimization Module

This module tracks optimization measures in all phases of a site cleanup, including:

- Remedial and removal action screening,
- Evaluating,
- Selecting,
- Designing,
- Implementing,
- Long-term operating, and
- Long-term managing.

RPMs plan for these optimization study efforts in the CTC and project schedule. See Chapter 10 for additional information on optimization.

NORM Munitions Response Site Prioritization Protocol (MRSPP) Module

The MRSPP is used to assign a relative priority for munitions response actions based on the overall conditions at a munitions response site and feeds into work sequencing decisions. The protocol required evaluation of three distinct modules:

- Explosive Hazard Evaluation (EHE)
- Chemical Warfare Material Hazard Evaluation (CHE)
- Human Health Evaluation (HHE).

The module with the highest priority score determines the overall site priority. Sites that do not have sufficient data available to score at least one of the three modules should be ranked as "evaluation pending." Sites that have completed all required response actions (RIP/RC) should be ranked as "no longer required." Sites may be ranked as "no known or suspected hazard" only when sufficient investigative evidence supports this determination.

14.3.2 DoD Restoration Management Information System (RMIS)

The RMIS is a centralized repository for information on DoD's ER activities at military installations. DoD uses the information in RMIS to provide status on the DERP and to prepare DoD's Annual Report to Congress. The RMIS data fields are included in the NORM database. At the end of each fiscal year, NAVFAC forwards data from NORM database to DoD for incorporation into the RMIS database.

14.3.3 Naval Installation Restoration Information Solution (NIRIS)

The Naval Installation Restoration Information Solution (NIRIS) is a centralized information management system, developed by NAVFAC to manage all DON's ER technical data (e.g., analytical and spatial), documents, and records (including the AR File and RPM site files) using a Web-based database with GIS applications and analysis tools. It provides analytical, management, and visualization tools to ensure that effective cleanup decisions are made in cooperation with a diversity of contractors, regulators, and other stakeholders.

Whereas NORM focuses primarily on the program level budgeting and schedule data for ER sites, NIRIS is primarily used by Navy RPMs and contractors to effectively analyze the spatial distribution and manage large amounts of ER data at a detailed technical level (e.g., analytical results by location and time), with validation results. NIRIS stores Navy and Marine Corps ER Program data including:

- Environmental sample and analytical results data;
- Munitions response/unexploded ordnance data;
- Site file/AR File and associated files (e.g., post-ROD documents);
- Land use control (LUC) data; and
- Geographic Information System (GIS) mapping data such as ER site boundary information.

NIRIS minimizes duplication of effort; facilitates data sharing by providing easy access to ER data, documents and records; reduces the learning curve for users; and standardizes data management over the lifecycle of the ER Program.

There are five main components of NIRIS:

1. **NIRIS central database structure.** NIRIS consists of a centralized database structure, documentation, and applications used to store and manage all Navy and Marine Corps ER data.

   NIRIS leverages and can share data with other NAVFAC and Navy-wide GIS initiatives. For example, the LUC data in NIRIS are shared with the real estate planners Regional Shore Infrastructure Management System, helping to ensure that LUCs enacted as part of a remedy are managed properly, remain effective, and data management costs are minimized. Likewise, NIRIS has access to the aerial photos, satellite imagery, base boundary, and building location information maintained in the GeoReadiness Repository.

2. **NIRIS Electronic Data Deliverable (NEDD) submittal standards and Data Checker.** The NEDD specifications standardize the data submittal process across the ER Program, ensuring correct and complete deliverables. The NEDD specification is a collection of formatted tables that specify the requirements, precision, valid values, and definitions for all ER Program tabular data submittals. There are about 50 tables total, which cover everything from the commonly used (e.g., ANALYTICAL_RESULTS) to the infrequently used (e.g., AQUIFER_TEST). The resulting standardized process ensures correct and complete deliverables. NIRIS deliverables are submitted to the Navy using the Web-based NEDD Data Checker. The Data Checker runs checks on NEDD deliverables, ensures all business rules are adhered to, and checks submittals against the NIRIS database to flag errors. A standard operating procedure, guides, and templates are available in the NIRIS Web site to assist with preparing and submitting NEDDs using the Data Checker.

   All environmental measurements, observations and scientific analysis data that is collected or generated in conjunction with ER activities shall be submitted to the Navy using the NEDD format, via the Web-based NIRIS Data Checker. In addition to the NEDD submittals, the following data shall be submitted and stored in NIRIS: spatial data created in support of an ER project, or data that might provide useful information for decision making in the ER Program, such as LUC information, maps, computer-aided design (CAD) drawings, and aerial photos.

3. **Administrative tools and operating instructions.** NIRIS has administrative tools and instructions to ensure NIRIS can be used and maintained. Administrative tools are used by the NIRIS administrators to manage, maintain and analyze the data within NIIRS. Operating instructions and training modules are available for all users of NIRIS (end user, data submitter, and administrator) that describe how to use NIRIS and the associated tools. Detailed Standard Operating Instructions are provided, along with quick start guides.

4. **End user data management, analysis, and visualization tools.** In addition to storing data, documents and records, NIRIS provides Web-based access to and supports the most commonly used data management, analysis and visualization tools. Desktop tools are supported by the data query and formatted data export tools that are used to provide data ready to be imported into advanced, or specialized desktop applications that the user has installed on a local computer. NIRIS supports many data management, analysis, and visualization tools including the following:

   - GIS tools to assist with the visualization of the data by allowing fast and easy creation of exceedance maps (all the points that exceed a specified concentration), contour plots, and mapping the results of modeling. GIS provides standard mapping tools (e.g., measure a distance or area, create a buffer around a point), and allow easy printing or .pdf file creation of customized maps. Advanced GIS tools allow data to be queried and overlaid on other maps such as aerial photos, utility lines, or previous plume maps, providing an increased

understanding of the site. NIRIS provides both simplified and full featured Web-based GIS, and also supports users of desktop GIS by providing formatted data sets;

- A document management system to manage and access the Site File, AR File, and associated files;
- Collaboration tools to allow users to manage working versions of documents, comment on draft versions electronically, and collaborate online with other members of the team using Web conferencing;
- A LUC Tracker tool to help manage, maintain and track LUCs established as part of a remedy (e.g., this module provides automatic reminders when it is time to perform an inspection, and contains forms to document the inspection and any corrective actions taken);
- Statistical tools (including geostatistics) to assist with the collection of site data suitable for their intended use, and to provide summary statistics of site characterization data, for example by showing attainment of RA Objectives or by characterizing the risk at a site; and
- Modeling tools to make predictions and assist with selection and design of remedial alternatives. Common modeling tools include groundwater flow models, and fate and transport models, which are desktop-based, but are supported with formatted data set exports from NIRIS.

5. **Web Portal.** The NIRIS Web site on the NAVFAC portal allows users to access everything they need for NIRIS including: information about NEDD and NIRIS; operating instructions and quick start guides; access to the data checker; and data management, analysis, and visualization tools. New users shall submit a request to log in. RPMs may be asked to approve access requests from their contractors (or regulators, base personnel or other stakeholders) or to verify the specific data to which they need access. Types of information available through the Web site include the following:

- NEDD specification tables
- NEDD table templates
- SOPs (NEDD, Data Checker)
- Quick-start guides
- RPM handbook
- Data checker
- Data analysis and visualization tools
- Contact information to obtain help desk guidance
- Frequently asked questions
- Training material.

CHAPTER 15

Community Involvement

This chapter outlines the public participation in the ER Program, as well as the public affairs and community involvement activities that are necessary for response actions.

Community involvement promotes communication between the public and DON concerning the status of remediation at installations. Public involvement is required by CERCLA provisions at specific stages of response actions (42 USC Sections 9613 and 9617 [2001]). Recognizing the importance of proactive community involvement, DON's community involvement requirements are more comprehensive than the minimum CERCLA requirements. DON responsibilities during the response action process include informing the community of any action taken, responding to inquiries, and providing information about any releases of hazardous substances.

15.1 DON Public Participation Guidance/Community Relations Plan

The *Navy Environmental and Natural Resources Program Manual* (OPNAVINST 5090.1B, 01 Nov. 1994) and *Marine Corps Environmental Compliance and Protection Manual* (MCO P5090.2A, 10 July 1998) provide public participation guidance. CERCLA requirements are discussed in Section 15.6.

As stated in OPNAVINST 5090.1B, DON public participation requirements are more comprehensive than the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). For example, DON requires formal Community Relations Plan (CRPs) at all ER Program sites, whether or not they are NPL sites. The CRPs are prepared and implemented on an installation-wide basis rather than for a specific environmental restoration action.

A CRP is intended to provide for various levels of community involvement in removal and remedial actions. The NCP requires the development of a CRP for Remedial Investigation/Feasibility Study (RI/FS), and Remedial Design (RD) activities as well as on-site removal actions that are expected to extend beyond 120 days from the initiation of on-site removal activities and a planning period of at least six months exists prior to initiation of the on-site removal activities. CERCLA requirements for community involvement are included in 40 CFR Section 300.415(n) for removal actions and Section 300.435(c) for remedial actions. However, because DON's policy is to prepare CRPs for specific installations rather than for specific actions, the CRP may have additional requirements beyond those specified in CERCLA and, therefore, the RPM should check the installation's CRP to ensure that all requirements are being met.

The CRP is based upon information gathered from the community through interviews conducted by FEC personnel with local officials, residents, public interest groups, and other interested or affected parties to ascertain community concerns, community information needs, and how or when citizens would like to be involved in the CERCLA process.

DoD and DON recognize the CRP program as an ideal vehicle to implement DoD strategy on Environmental Justice and to understand the socioeconomic makeup of the populations in and around its installations (DoD *Strategy on Environmental Justice* [24 Mar. 1995] and CNO ltr 5090 Ser N44EP4/5U596390 [20 Sep. 1995]). To strengthen and maintain the CRP as a useful tool for these purposes, DoD has directed that the installation combine data gathered from the U.S. Bureau of the Census and various databases maintained by the military departments, defense agencies, local and tribal agencies, and others such as U.S. EPA to ensure that the CRP addresses community needs.

With the information obtained from the community and other relevant information, DON will then, via the CRP, specify the activities it expects to undertake during the response/removal. CRPs are reviewed and updated periodically. Prior to initiation of a RD phase, DON will review the CRP to determine whether it should be revised to describe further public involvement activities during RA that are not already addressed or provided in the CRP. The contents of the CRP will vary depending on project phase but in general should include the following:

- Background and history of community involvement at the site including local activity and interest plus key issues;
- Site history including environmental history;
- Objectives of the ER Program;
- Community involvement activities to meet the ER Program objectives; and
- A list of officials, citizen/community groups, and media contacts.

15.2 Management of Restricted Information

Release of information under the CRP should focus on issues covered by the CERCLA remediation process. Public affairs matters outside the realm of the CERCLA remediation process remain subject to other established DON channels for release of information. Any restricted information should only be released subject to the applicable DON regulations regarding release of such information. For example, environmental remediation at installations in the Naval Nuclear Propulsion Program (NNPP), where information concerning potential environmental radiological contamination at installations where nuclear-powered ships were operating or serviced would require coordination with NNPP (NOON/NAVSEA Code 08) prior to release of information**.**

15.3 Restoration Advisory Board (RAB)

The DERP provides for the establishment of RABs at installations where environmental restoration activities are planned or being implemented (10 USC Section 2705(c) and (d) (2000)). RABs are the cornerstone of DoD and DON efforts to expand community involvement in decisions about cleanup at military bases. By bringing together people who reflect the many diverse interests within the community, a RAB can help identify issues of concern and reduce potential communication problems that could result in delay. In addition to providing input on cleanup activities, each RAB acts as a liaison between the community and the installation (DoD *Strategy on Environmental Justice*, 24 Mar. 1995, pp. 5, 17).

DoD has proposed regulations for the establishment, operation, and adjournment/dissolution of RABs, and published a proposed rule on 28 Jan. 2005 (70 FR 4061) that applies to all RABs regardless of when they were established. DON endorses the proposed DoD RAB Rule.

15.3.1 Determining the Need for a RAB

At installations with an ER,N-funded or BRAC-funded cleanup program, regardless of the cleanup authority (i.e., CERCLA or RCRA), the Commanding Officer/Commanding General (CO/CG) of the installation should establish a RAB where there is “sufficient sustained community interest” in the cleanup program. Regardless of the number of sites, there is only one RAB per installation. One of the following criteria must be met for community interest to be considered “sufficient and sustained”:

- Closure of the installation involves transfer of property to the community.

- 50 citizens petition for a RAB.
- Federal, state, or local government requests formation of a RAB.
- The installation CO/CG determines that a RAB is needed. To assist the CO/CG in making this determination, the following approaches are used to determine the level of interest in the community for establishing a RAB:
  - Reviewing correspondence;
  - Reviewing media coverage;
  - Consulting community members;
  - Consulting relevant government officials; and
  - Evaluating responses to communication efforts such as notices in local newspapers.

If an installation has made a good faith effort to solicit community interest and can document that no interest was found, a RAB does not need to be formed. In such circumstances, it is important that the process of identifying stakeholder interest be repeated to ensure that the public is given opportunities to express interest in participating in the installation's cleanup process. DoD policy is to reassess community interest at least every 24 months. Where the reassessment does not find sufficient and sustained community interest in a RAB, the installation will document the reassessment procedures and findings in a memorandum for the AR File.

Technical Review Committees (TRCs) were established where practicable at DoD installations to provide interested parties with a forum to discuss and provide input into environmental restoration activities. However, as stated in RAB guidance issued by CNO (09 Feb. 1994), it is DoD and DON policy to convert existing TRCs or similar advisory groups to a RAB, provided there is sufficient interest within the community. Thus, no additional TRCs will be formed or maintained. RABs expand the TRC initiative in the following ways:

- RABs involve a greater number of community members than TRCs, thereby better incorporating the diverse needs and concerns of the affected community;
- Chairmanship of the RAB is shared between the installation's representative or the RPM and community, promoting partnership and careful consideration of the community's concerns in the decision-making process.

15.3.2 Goals and Functions of a RAB

A RAB is designed to act as a focal point for the exchange of information between the installation and the local community regarding restoration activities. The purposes of the RABs are as follow:

- Provide an expanded opportunity for stakeholder involvement in the environmental restoration process at DoD installations;
- Act as a forum for the discussion and exchange of restoration program information, addressing the concerns of stakeholders, and effectively reaching key groups and representatives from DoD, regulatory agencies, tribes, and the community; and
- Provide an opportunity for RAB members to review progress and participate in a dialogue with the installation and FEC decision makers concerning environmental restoration matters. They will listen, carefully consider, and provide specific responses to the recommendations provided by the individual RAB members.

DoD considers the following types of activities to be within the scope of RAB members' functions:

- Providing advice to installation, U.S. EPA, state regulatory agency, and other government agencies on restoration activities and community involvement;
- Addressing important issues related to restoration, such as scope of studies, cleanup levels, waste management, permits and permit modifications necessary to accomplish site remediation, and remedial action alternatives;
- Reviewing and evaluating documents associated with environmental restoration activities such as plans, technical reports, and response actions;
- Identifying environmental restoration projects to be accomplished in the next fiscal year and beyond;
- Recommending priorities among environmental restoration sites or projects;
- Attending regular meetings that are open to the public and scheduled at convenient times and locations;
- Interacting with the local redevelopment authority or other land use planning bodies to discuss future land use issues relevant to environmental restoration decision-making; and
- Providing feedback to other community members on RAB activities and sharing community concerns and input with the RAB.

By establishing a RAB, DoD hopes to ensure that interested stakeholders have a voice and can actively participate in a timely and thorough manner in the planning and implementation of the environmental restoration process. A RAB serves as one method for the expression and careful consideration of diverse points of view (RABs Proposed Rule, 70 FR 4063).

The CO/CGs of the installations will establish and conduct periodic meetings of the RAB for ER sites in accordance with *Navy Environmental and Natural Resources Program Manual* (OPNAVINST 5090.1B, 01 Nov. 1994) and *Marine Corps Environmental Compliance and Protection Manual* (MCO P5090.2A, 10 July 1998).

15.3.3 Establishing/Expanding a Functioning RAB

The RAB should be fully functional within six months of determining that a RAB is needed and have set up or completed procedures for the successful development and final implementation of a working RAB. The following items are to be completed to establish or promote an efficiently functioning RAB:

- Selection of RAB members by a selection panel set up by the installation CO/CG;
- Training of RAB members;
- Development of a mission statement outlining the overall purpose of the RAB; and
- Development of RAB operating procedures.

Selecting RAB Members

An important element in the formation of the RAB is the selection of the members. The RAB will be comprised of members from the local community and representatives from DON, the state, and U.S. EPA. Community members selected for the RAB will reflect the diverse interests within the local community. RAB members should live and/or work in the affected community or be impacted by the restoration

program. The RAB composition should be developed to reflect the diverse interests and concerns of the local community.

Potential candidates for inclusion on a RAB are:

- Local residents/community members;
- Local reuse committees;
- Technical Assistance Grant (TAG) recipient;
- Current TRC members;
- Local government officials and agencies;
- Business community;
- School districts;
- Employees and residents;
- Local environmental groups and activists;
- Civic and public interest organizations;
- Religious community; and
- Other regulatory agencies.

DON membership should consist of a minimum of two members with the NAVFAC representative serving as a member or as a technical consultant to the RAB and one representative should serve as the RAB co-chair in coordination with the installation CO/CG. For BRAC sites, the BRAC PMO serves as the primary DON liaison with local communities and local redevelopment authorities; therefore, DON membership may include a member from the BRAC PMO.

If a RAB already exists at an installation and MRP sites are identified, the RAB may be expanded to consider additional issues related to the MRP sites. If the current RAB or installation determines that it is necessary to involve new stakeholders, the installation should notify potential stakeholders of its intent to expand the RAB and solicit new members who have an interest in issues related to the MRP. If there is no current RAB active at an installation and MRP sites are identified, the installation will follow the prescribed guidance for determining sufficient community interest in forming a RAB.

Training RAB Members

Once selected, RAB members require initial training in their duties. The FEC will work with the state, U.S. EPA, and environmental groups to develop methods to quickly train the new RAB members. NEHC can assist with RAB training, environmental risk communication, and other community assistance services. Potential training for RAB members may take the form of:

- Formal training sessions;
- Workshops;
- Informal briefings;
- Briefing booklets;
- Past fact sheets;
- Maps; and
- Site tours.

Developing a Mission Statement and Operating Procedures

Each RAB should develop a mission statement that articulates the overall purpose of the RAB. In addition the RAB should develop a set of operating procedures that include the following:

- Policies on attendance;
- Procedures for replacing, adding, or removing members;
- Co-chair length of service;
- Methods of resolving disputes;
- Process for responding to public comment; and
- Procedures for public participation.

15.3.4 Roles and Responsibilities of Key RAB Members

a) The RPM should serve as the RAB co-chair for DON. In certain cases, the RPM may serve as either a member of the RAB or as a technical consultant to the RAB instead of as the co-chair, in which case an alternate DON Co-Chair shall be assigned. The DON Co-Chair is responsible for:

- Coordinating with the community co-chair to prepare and distribute an agenda prior to each RAB meeting;
- Ensuring that DoD participates in an open and constructive manner;
- Attending all meetings and ensuring that the RAB has the opportunity to participate in the restoration decision process;
- Ensuring that community issues and concerns related to restoration are addressed;
- Ensuring that documents distributed to the RAB also are made available to the general public;
- Ensuring that an accurate list of interested and/or affected parties is developed and maintained;
- Providing relevant policies and guidance documents to the RAB in order to enhance the RAB's operation;
- Ensuring that adequate administrative support is provided to the RAB;
- Referring issues not related to restoration to appropriate installation officials to address;
- Reporting meeting proceedings to the installation; and
- Reporting the requirements for RAB support to NAVFAC HQ, along with other ER Program budgeting requirements.

b) The Community Co-Chair is responsible for:

- Coordinating with the DON co-chair and RAB community members to prepare an agenda prior to each meeting;
- Ensuring that community members participate in an open and constructive manner;
- Ensuring that community issues and concerns related to restoration are addressed;
- Assisting with the dissemination of information to the general public;
- Reporting meeting proceedings to the community; and
- Serving without compensation.

c) The RAB community member is responsible for:

- Attending RAB meetings;
- Providing advice and comment on restoration issues and concerns;
- Representing and communicating community interests and concerns;
- Acting as a conduit for the exchange of information between the community, DON installation, and environmental oversight agencies regarding the installation's restoration and reuse programs;
- Reviewing, evaluating, and commenting on documents and other such materials related to installation restoration and closure, if applicable; and
- Serving without compensation.

d) The state regulatory member and U.S. EPA member, for sites listed on the NPL, are responsible for:

- Attending RAB meetings;
- Serving as an information, referral, and resource bank for communities, installations, and agencies;
- Reviewing documents and other materials related to restoration;
- Ensuring that state environmental standards and regulations are identified and addressed by the DON installation (state regulatory member);
- Ensuring that federal environmental standards and regulations are identified and addressed by the DON installation (U.S. EPA member);
- Facilitating flexible and innovative resolutions of environmental issues and concerns; and
- Assisting in education and training for the RAB members.

e) The BCT member (*closing installations*) is responsible for:

- Maintaining a close working relationship with other members of the RAB; and
- Providing timely and accurate information to the RAB.

Additional information regarding RABs can be found at the DoD's *Restoration Advisory Boards* Web site, including the following documents:

- Restoration Advisory Board Resource Book (Sep. 1996)
- RAB/ Technical Assistance for Public Participation (TAPP) Resource Fact Sheet
- Updating your RAB to Meet BRAC Needs (RAB Fact Sheet #1) (June 1996)
- Joint DoD/U.S. EPA RAB Implementation Guidelines (Sep. 1994)
- Proposed Rule - Restoration Advisory Boards (Aug. 1996)
- Introduction to RABs (Aug. 1998)
- Public Affairs Involvement with RABs – Roles and Responsibilities (Aug. 1998)
- Health and Environmental Risk Communication (Aug. 1998).

15.4 Technical Assistance Grants (TAGs)

CERCLA includes provisions to establish a TAG program. The intent of the program is to foster informed public involvement in decisions relating to site-specific cleanup strategies under CERCLA. The U.S. EPA's CERCLA TAG program provides a grant of up to $50,000 to community groups to hire technical advisors to help citizens understand and interpret site-related technical information for NPL sites. Congress and U.S. EPA have established specific requirements and guidelines for recipients of TAGs. Congress also has stipulated that only one TAG award may be made per NPL site at any one time.

When U.S. EPA places an installation on the NPL, the installation should contact U.S. EPA for the appropriate information and guidance on requirements for TAG recipients. This information should be made available to the public through news releases, fact sheets, public meetings, or through any other method deemed to be appropriate, and should be included in the information repository.

15.5 Technical Assistance for Public Participation (TAPP)

Opportunities for technical assistance through DoD's Technical Assistance for Public Participation program are made available to community members of RABs, as well as TRCs, in accordance with 10 USC Section 2705(e). TAPP provides funding for RABs or TRCs to buy independent (third party) technical expertise that may assist them in understanding or evaluating technical documents, concepts or other information related to the restoration activity. Community members of a RAB may ask the CO/CG, or appropriate DoD official, for assistance.

All TAPP requests are approved by the installation CO/CG for eligibility. The installation CO/CG may approve a RAB request for a TAPP if one of the following criteria is met:

1. The RAB demonstrates that the federal, state, and local agencies responsible for overseeing environmental restoration at the installation level and DoD do not have the technical expertise necessary to achieve the objective for which the technical assistance is being obtained, or
2. The technical assistance is likely to contribute to the efficiency, effectiveness, or timeliness of environmental restoration activities at the installation, and is likely to contribute to community acceptance of environmental restoration activities at the installation.

Applicability of Projects for Technical Assistance Funding

Eligible tasks for TAPP include the following:

1. Interpreting technical documents – Review installation restoration site investigations, decision documents, and engineering plans. Examples include site characterizations, alternative remedy analyses, and health and ecological risk assessments;
2. Assessing technologies – Assist community members in understanding the functions, tradeoffs, and implications of technologies proposed to investigate or clean up sites;
3. Participating in relative risk site evaluations – Assist community members in understanding and contributing to DoD's relative risk site evaluation process;
4. Understanding health implications – Assist members in interpreting the potential health risks of site contaminants, exposure scenarios, cleanup levels or remedial technologies; and
5. Training – Provide technical training on specific restoration issues where the community needs supplemental information (e.g., evaluation of alternative technologies, risk assessment procedures, and sampling plans).

Ineligible activities for TAPP are:

1. Payment of attorney's fees, preparation of litigation or underwriting of any legal actions;
2. Political activity or lobbying as defined in OMB Circular A-122, *Cost Principles for Non-Profit Organizations*; and
3. Other activities inconsistent with the cost principles stated in OMB Circular A-122.

Eligible Applicants/Funding

Only RAB community leaders are eligible to apply for the TAPP program. The RAB shall be comprised of at least three community members and recognized by DON. They should use DD Form 2749, *Technical Assistance for Public Participation (TAPP) Application, Dec 96*, to apply for TAPP funding assistance.

The TAPP program is managed by CNO-N45 and is funded from the ER,N account for active bases and the BRAC account for closing bases. Additional information regarding the TAPP can be found at 63 FR 21 (02 Feb. 1998).

15.6 CERCLA Requirements

As noted previously, DON's public participation requirements are more comprehensive than the NCP. Although RPMs must follow the requirements in the installation's CRP, the CERCLA requirements for community involvement also shall be followed. Information and guidance regarding these can be found in U.S. EPA's *Superfund Community Involvement Handbook* (EPA/540/K-01/003, Apr. 2002).

In addition, U.S. EPA has developed two graphical timeline representations of these requirements in the preface to the *Superfund Community Involvement Toolkit*.

- The timeline titled "Community Involvement Activities Throughout the Superfund *Remedial* Process" is available at http://www.epa.gov/superfund/tools/pdfs/remedialtmln.pdf
- The timeline "Community Involvement Activities Throughout the Superfund *Removal* Process" is available at http://www.epa.gov/superfund/tools/pdfs/removaltmln.pdf.

Also, U.S. EPA outlines the minimum requirements for Superfund community involvement in Appendix A of the *Superfund Community Involvement Handbook*.

15.7 Special Considerations for BRAC Sites

In addition to environmental restoration, DoD also considers the possible economic and social effects of installation closure on the local community. When an installation is closed or realigned, DoD understands that the local community will want to return the available property to productive use as quickly as possible.

To facilitate transfer and economic reuse to the local community, DoD strives to conduct environmental restoration activities as efficiently and effectively as possible. Economic redevelopment and reuse are the responsibility of DoD's Office of Economic Adjustment (OEA). To work together with OEA, the DoD Cleanup Office created DERP management tools, such as BRAC Cleanup Teams and local redevelopment authorities, to engage the community in the cleanup and transfer processes. As discussed in Section 15.4.3, DoD also often works with communities surrounding BRAC installations through RABs; however, RABs focus solely on ER issues.

CHAPTER 16

Health and Safety

CERCLA requires the protection of the health and safety of workers engaged in hazardous waste operations and the general public during response actions (42 USC Section 9651 (f) (2002) and Section 9604 (f) (2002)). These CERCLA requirements are implemented through the NCP at 40 CFR 300.150 (2003), which specifies that actions conducted in accordance with the NCP will comply with the provisions for response action worker safety and health in Occupational Safety and Health Administration (OSHA) standards for hazardous waste operations and emergency response (29 CFR 1910.120).

The OSHA rules for health and safety during hazardous waste site operations, commonly known as "HAZWOPER" (hazardous waste operations and emergency response), apply to cleanup operations at National Priorities List (NPL) sites, corrective actions required at RCRA sites, voluntary cleanup operations, hazardous waste treatment, storage, and disposal (TSD) facilities operations, and emergency spill responses. Further, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) mandates that the requirements, standards, and regulations of the federal Occupational Safety and Health (OSH) Act and of state OSH laws not directly referenced in 40 CFR Section 300.150 (2003) shall be complied with where applicable. Applicable federal OSH Act requirements not specifically referenced in the NCP may include, among other things, general construction standards (29 CFR Section 1926), general industry standards (29 CFR Section 1910), and the general duty requirement of Section 5(a)(1) of the OSH Act (29 USC 654 (a)(1) (2002)). Finally, the NCP specifies that all governmental agencies and private employers are directly responsible for the health and safety of their own employees.

OSHA requires that the employer develop and implement a written health and safety program that provides:

- Information on how health and safety hazards are identified, evaluated, and controlled;
- Emergency response procedures;
- Organizational structure;
- Comprehensive work plan(s);
- Site-specific health and safety plans;
- Medical surveillance procedures;
- Standard operating procedures; and
- Any necessary interface between general program and site-specific activities.

The ER Program uses the NCP as the implementing regulations for accomplishing response actions. As such, consistent with the NCP requirements set forth in 40 CFR Section 300.150, ER site activities shall comply with the OSHA standards found at 29 CFR Section 1910.120 and 29 CFR Section 1926. Within DON, health and safety is dictated by the DON's *Occupational Safety and Health Program Manual* (OPNAVINST 5100.23, 30 Dec. 2005), and NAVFAC *Safety and Health Program* (NAVFACINST 5100.11J, 2000). The DON also relies on the *U.S. Army Corps of Engineers (USACE) Safety and Health Manual* (EM 385-1-1) for health and safety guidance. Specific health and safety requirements, including portions of the hazardous waste operations and emergency response (HAZWOPER) regulations, related to typical ER Program activities can be found in these manuals and are described in this chapter.

In addition, as detailed in Section 12.2.4.3, specific SOP requirements exist for operations involving ammunition or explosives. As required by NAVSEA OP 5 (*Ammunition and Explosives Ashore, Safety Regulations for Handling, Storing, Production, Renovation, and Shipping*), a written Standard Operating Procedure (SOP) shall be developed prior to starting any process involving munitions and explosives of concern (MEC). Guidance for writing SOPs is provided by *Standard Operating Procedures Development, Implementation, and Maintenance for Ammunition and Explosives* (NOSSAINST 8023.11A, 20 Aug. 2004) and applies whether the work is performed by Navy or contractor personnel at a government-owned activity or by Navy personnel at other activities. OP 5 is not available online; copies of both OP 5 and NOSSAINST 8023.11A can be requested by contacting NOSSA or NAVSEA.

16.1 Health and Safety Roles and Responsibilities

Although NAVFAC is responsible for the overall ER Program health and safety program, health and safety matters will generally be administered through the FEC. The RPM will coordinate health and safety matters with the designated FEC Safety Manager. Administrative Contracting Officers are responsible for designating the appropriate Navy personnel to ensure that contractors comply with all applicable health and safety requirements during field work.

It is the responsibility of the RPM and the FEC Safety Manager to ensure that all personnel involved in an ER project are adequately and properly trained in accordance with DON requirements (see Chapter 17 for training information) and that all DON health and safety practices and procedures are adhered to. The RPM and the FEC Safety Manager also are responsible for reviewing site-specific health and safety documentation to ensure that proposed operating procedures and monitoring are adequate to protect worker health and safety. Assistance with review of HASPs is also available from the Navy Environmental Health Center (see Chapter 2 for additional information on NEHC).

In most cases, ER Program activities will be completed at discrete sites by qualified contractors retained by the Navy. The contractor is responsible for complying with all federal, state, and local health and safety requirements, as well as meeting the ER Program health and safety requirements as outlined in the contract. The RPM and FEC Safety Manager will retain organizational and responsibility roles in cooperation with the selected contractor to ensure that ER site activities are conducted in a manner consistent or compatible with DON policy and requirements. The RPM and FEC Safety Manager will review the contractor's overall health and safety training requirements and policies, and project-specific health and safety documentation to ensure that they are consistent with DON's policies and requirements. The contractor will establish a Health and Safety Manager and a Site Health and Safety Officer (SHSO), and will use properly trained field/site personnel.

If a deficiency in health and safety protocols is noted during implementation of ER project activities, or if a health and safety incident occurs, it is the responsibility of the field/site personnel and/or contractor's SHSO to suspend/terminate site activities. In consultation with the RPM and the FEC Safety Manager, the deficiency or incident will be specifically addressed and resolved before work may resume. If a revised health and safety procedure or practice is required, all necessary documentation will be amended and re-approved in accordance with DON procedures.

16.2 Site-Specific Health and Safety Plan

The procedures for protecting the health and safety of all personnel working at an ER Program site or responding to an emergency at the site are to be set forth in a Site-Specific HASP. This document shall be prepared prior to a Site Inspection (SI), Remedial Investigation (RI), Removal and Remedial Action field activities, and concurrently with the Sampling and Analysis Plan (SAP). The HASP is written based on the anticipated hazards for the expected working conditions. The HASP contains information about

known or suspected hazards; routine and special safety procedures that will need to be followed; and other instructions for safeguarding the health and safety of site personnel, visitors, and emergency responders. In accordance with 29 CFR Sections 1910 and 1926, each Site-Specific HASP contains the following:

- An organizational structure, which at a minimum, shall identify:
  - A general supervisor who has the responsibility and authority to direct all hazardous waste operations;
  - A SHSO and alternates responsible for site safety and health; and
  - The names of other key personnel needed for hazardous waste site operations and emergency response.
- A safety and health risk analysis for existing site conditions and each site task and operation;
- Employee training assignments;
- A description of personal protective equipment (PPE) to be used by employees for each of the site tasks and operations being conducted;
- Medical surveillance requirements;
- A description of the frequency and types of air monitoring, personnel monitoring, environmental sampling techniques, and instrumentation to be used;
- Site control measures;
- Decontamination procedures;
- SOPs for handling, transporting, labeling, and disposing of hazardous wastes at the site;
- A spill containment program meeting the requirements of 29 CFR Section 1910;
- Action levels, permissible exposure levels, or threshold limit values for each contaminant; and the required actions if the limits are reached or exceeded;
- Entry procedures for confined spaces (as necessary); and
- An emergency response plan meeting the requirements of 29 CFR Section 1910.120(l) if the employees will respond to the emergency, or an emergency action plan meeting the requirements of 29 CFR 1910.38(a) if the employees will evacuate and not assist in any response actions. It is important that the RPM provide this portion of the HASP to the installation emergency response team for coordination during the contractor's work on the installation.

Before operations at a site commence, all safety aspects of site operations should be examined. During site activities, the plan shall be readily available, and discussed with all workers, supervisors, contractor and government inspectors, and emergency response personnel by the SSHO, or other designee. As information about the site is developed, the plan will need to be reviewed and revised to keep it current.
As discussed in Section 16.1, in most cases the Navy's contractor will prepare the Site-Specific HASP which includes procedures for responding to probable hazardous substances at each hazardous waste site. The RPM coordinates the review and acceptance of the HASP with the FEC Safety Manager to ensure that the plan protects the health and safety of the workers. To assist with this review, the RPM may refer to the Site-Specific HASP Review Checklist developed by NEHC based on OSHA requirements, the requirements of the *U.S. Army Corps of Engineers (USACE) Safety and Health Manual* (EM 385-1-1), and the requirements of this manual.

16.2.1 Hazard Assessment

Complete and accurate HASPs are required to prevent exposures to chemical, biological, and physical hazards, and to prevent construction-related mishaps during environmental cleanup projects. As specified in the *U.S. Army Corps of Engineers (USACE) Safety and Health Manual* (EM 385-1-1), an Activity Hazard Analysis (AHA) should be performed for each environmental cleanup project. Examples of potential site activity hazards addressed in a HASP include, but are not limited to the following:

- Flammability/explosive nature
- Slip-trip-fall
- Lifting hazards
- Tool and equipment hazards (including electrical)
- Weather extremes (heat stress, cold stress)
- Exposure to chemicals of concern (including inhalation and contact of organic vapors)
- Biological (including blood-borne pathogens)
- Flying particulate
- Objects striking head
- Contact with decontamination detergents or solvents
- High noise levels
- Contact with scorpions, snakes, spiders, or other hazardous flora or fauna
- Solar radiation
- Radium dials/radioactive contamination
- Ordnance and explosive waste.

16.2.2 Standard Procedures for Health and Safety

Personal practices and operating procedures are specified by U.S. EPA's *Standard Operating Safety Guides* (OSWER 9285.1-03, 1992) and NEHC. In addition, as indicated in Chapter 12, specific SOP requirements exist for activities involving ammunition or explosives. As required by NAVSEA OP 5, *Ammunition and Explosives Ashore, Safety Regulations for Handling, Storing, Production, Renovation, and Shipping* (Vol. 1, 7th rev.), a written SOP shall be developed prior to starting any process involving ammunition or explosives. OP 5 is not available online; copies can be requested by contacting NOSSA or NAVSEA.

Personal Practices

U.S. EPA's *Standard Operating Safety Guides* recommend the following personal practices:

- Eating, drinking, smoking, chewing gum or tobacco, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated as contaminated.
- Hands and face shall be washed upon leaving the work area.
- Contact with contaminated or suspected contaminated surfaces should be avoided.

- Prescribed drugs should not be taken by personnel on response operations where the potential for absorption, inhalation, or ingestion of toxic substances exists unless approved by a qualified physician (medicine may exacerbate the effects of exposure to toxic substances).
- Alcoholic beverages should be avoided in the off-duty hours but especially during response operations (alcohol exacerbates the effects of exposure to toxic substances).

Operating Procedures

U.S. EPA's *Standard Operating Safety Guides* (OSWER 9285.1-03, 1992) and NEHC recommend the following operating procedures:

- All personnel going onto an ER site will be trained and briefed on anticipated hazards, personal protective equipment to be worn, safety practices to be followed, emergency procedures, and communications.
- Any required respiratory protection and chemical protective clothing will be donned by all personnel prior to going into areas designated for wearing protective equipment.
- Visitors entering an exclusion/work zone requiring respiratory protection will provide their own respiratory PPE in addition to providing documentation that they are qualified to wear subject PPE.
- No facial hair that interferes with a satisfactory fit of the mask-to-face seal is allowed on personnel required to wear respirators.
- When decontamination procedures for outer garments are in effect, the entire body will be washed as soon as possible after the protective garment is removed.
- Personnel on site shall use the buddy system when entering an exclusion zone or hazardous area. A minimum of two other persons, suitably equipped, is required as safety backup during initial exclusion zone entry and for emergency response purposes.
- Visual contact will be maintained between pairs of on-site and safety personnel. Initial exclusion zone entry team members should remain close together to assist each other during emergencies.
- At all times while operations are being performed on-site, a minimum of two contractor personnel trained in adult first aid/ cardiopulmonary resuscitation (CPR) and blood-borne pathogens control will be available on-site to render emergency care. Personnel designated to provide on-site first aid/CPR shall be assigned and included by name in the site-specific HASP.
- Off-site personnel may be contacted to provide assistance and emergency transport.
- Personnel should practice unfamiliar operations off-site prior to performing the actual procedure on an ER site.
- Exclusion zone entrances and exits will be designated and emergency escape routes delineated. Warning signals for site evacuation shall be established.
- Communications using radios, hand signals, signs, or other means shall be maintained between initial entry members at all times. Emergency communications will be prearranged in case of radio failure, site evacuation, or other reasons.
- Prior to commencing site operations, the responsible company official shall establish appropriate communications with all potential emergency response organizations such as the federal On-Scene Coordinator (installation Commanding General or Commanding Officer), Local

Emergency Planning Committee, the National Response Center, local poison control centers, and local medical facilities (civilian and military).

- Wind indicators visible to all personnel should be strategically located throughout the site.
- Personnel and equipment in the contaminated area should be minimized consistent with effective site operations.
- Work areas for various operational activities will be established.
- Procedures for leaving a contaminated area will be planned and implemented prior to going on-site. Work areas and decontamination procedures will be established based on expected site conditions.

16.2.3 Health and Hazard Monitoring

The Site-Specific HASP should specify the requirements for health and hazard monitoring during the implementation of ER site activities. Air monitoring will be used to identify and quantify airborne levels of hazardous substances and other health hazards to determine the level of personal protection on site. Air monitoring shall be conducted to identify any immediately dangerous to life and health (IDLH) situations. Periodic monitoring will be conducted in accordance with the HASP but at a minimum is recommended when:

- Work begins on a different portion of the site;
- Contaminants other than those previously identified are being handled;
- A different type of operation is initiated; and
- Personnel are handling leaking drums or containers or working in areas with obvious liquid contamination.

Once ER site cleanup operations commence, those personnel with the greatest potential for exposures to hazardous substances shall be monitored.

16.2.4 Personal Protective Equipment (PPE)

Anyone entering an ER site shall be protected against potential health hazards. The purpose of PPE is to shield or isolate individuals from the chemical, physical, and biological hazards that may be encountered at the site. The Site-Specific HASP will include a PPE Program established for the ER site-specific cleanup operations and will address:

- Site conditions;
- PPE selection, use, maintenance and storage, decontamination, inspection, in-use monitoring, limitations and program evaluation;
- PPE training and proper fit procedures; and
- PPE donning and doffing procedures.

Additional information on PPE selection and testing is provided in Appendix C.1 of this manual.

16.2.5 Emergency Response

Emergencies require prompt action to prevent or reduce the effects of the cause of the emergency. Immediate hazards of fire, explosion, and release of toxic vapors or gases are of prime concern.

Coordination with installation and community emergency response teams and development of an Emergency Response Plan will ensure safe and effective emergency response. Personnel should be alert for indicators of potential hazardous situations. In addition, they should be aware of signs and symptoms in themselves and others that warn of hazardous exposure.

An Emergency Response or Emergency Action Plan for responding to emergency situations shall be developed and included in the Site-Specific HASP. If contractor personnel will provide on-site emergency response, then an Emergency Response Plan meeting the requirements of 29 CFR 1910.120 shall be provided. However, if contractor personnel will evacuate the site and not provide emergency response actions, then an Emergency Action Plan meeting the requirements of 29 CFR 1910.38 shall be included in the site-specific HASP.

16.2.5.1 Emergency Response or Emergency Action Plan

The Emergency Response Plan or Emergency Action Plan detailing procedures for dealing with on-site emergencies shall address, as a minimum, the following elements:

- Pre-emergency planning;
- Personnel roles, lines of authority, training, and communication;
- Emergency recognition and prevention;
- Name and telephone numbers of emergency points of contact;
- Safe distances and places of refuge;
- Site security and control;
- Evacuation routes and procedures;
- Decontamination procedures;
- Emergency medical treatment and first aid;
- Emergency alerting and response procedures;
- Critique of response and follow-up; and
- PPE and emergency equipment.

16.2.5.2 On-Site Emergency Response

The on-site emergency response or emergency action plan shall be compatible and integrated with the disaster, fire, and/or emergency response plans of the installation and, as appropriate, plans of local, state, and federal agencies. The plan will be rehearsed regularly as part of the overall training program for site operations. The on-site emergency response or emergency action plan will be reviewed periodically and amended to keep it current with site conditions.

16.3 Site Briefings and Site Access

As part of an effective Health and Safety Program, safety/pre-entry briefings will be held prior to initiating any site activity and at other times as necessary to ensure that workers, supervisors, inspectors, and emergency response personnel are apprised of the provisions of the site HASP and that it is followed. Prior to entering an area of known or potential contamination, all visitors (private or government) shall meet medical surveillance and training requirements established by the HASP and be briefed by the contractor's Health and Safety Officer (or designee) on standard safety operating procedures. The

contractor is responsible for establishing procedures for site access, method(s) to control access, and enforcement of access control procedures.

16.4 Medical Surveillance

Both contractor and DON personnel shall follow the medical surveillance requirements of 29 CFR 1910.120 and 1910.1030. DON personnel also will comply with the medical surveillance requirements of OPNAVINST 5100.23 (Ser). All medical examinations and procedures will be performed by or under a certified occupational medical physician and will be provided without costs to the individual, without loss of pay, and at a reasonable time and place.

Additional requirements of the medical surveillance program can be found in the OSHA standard, 29 CFR 1910.120(f).

16.4.1 Personnel Covered by the Medical Surveillance Program

The following personnel will be included in the medical surveillance program:

- All personnel who are or may be exposed to hazardous substances or health hazards at or above the established permissible exposure limits, without regard to the use of respirators, for 30 days or more a year;
- All personnel who wear a respirator for 30 days or more a year; and
- All personnel who are members of a hazardous material emergency response team.

16.4.2 Medical Examinations and Consultations

All personnel covered by a medical surveillance program will receive medical examinations. The examinations will include their medical and work history. It will place special emphasis on symptoms related to the handling of hazardous substances and other health hazards. The examination will appraise their fitness for duty to include the ability to wear required PPE under conditions that may be expected at the work site. The medical examination will determine an individual's ability to wear a respirator if wearing a respirator is a job requirement.

The examining physician will determine the content of medical examinations or consultations.

Details regarding the information requirements and record keeping for the medical examination/consultation process are provided in Appendix C.2 of this manual.

16.4.3 Frequency of Medical Examinations and Consultations

Medical examinations and consultations will be made available for personnel covered by a medical surveillance program on the following schedule:

- Prior to assignment;
- At least once every 12 months for each individual covered;
- At termination of employment or reassignment to an area where the individual would not be covered by the surveillance program. Examination is not required if the individual had received an examination within the last six months;

- As soon as possible upon notification by an individual who has developed signs or symptoms indicating possible overexposure to hazardous substances or other health hazards;
- As soon as possible when an unprotected individual has been exposed to hazardous substances or other health hazards; and
- At more frequent times if the examining physician determined that an increased frequency of examinations is medically necessary.

16.5 Radiological Waste Site Requirements

It is a Navy requirement that the Naval Radiological Affairs Support Office (RASO) be contacted whenever radiological waste is found or suspected. Additional information on radiological safety is provided in Section 13.12.

CHAPTER 17

Training

Implementation of a cost-effective and successful ER Program requires that program staff exhibit knowledge and skills over a range of technical, regulatory, and administrative areas. To support this goal, training will be required in two main categories:

1. Training that instructs ER personnel on federal and state environmental laws and regulations, as well as DoD policy; and

2. Training that facilitates making technically sound, safe, cost-effective decisions during implementation of site identification, investigation, cleanup, and closeout.

In addition to the types of training described above, ER personnel also must have strong foundations in the administrative aspects related to the work being done within the ER Program. Administrative requirements involve contractor interactions and other administrative/financial details associated with the cleanup operation. Although these issues do not deal with the technical or regulatory aspects of the site, they are of utmost importance to a successful cleanup operation. For example, Naval Facilities Engineering Command (NAVFAC) has designated many of its employees as members of the acquisition workforce under the Defense Acquisition Workforce Improvement Act (DAWIA). The DAWIA coverage helps develop and maintain ER staff expertise through continuous learning and professional development. It also will provide ER staff with the necessary exposure and understanding of the overall Navy acquisition process to enhance global interaction with other Systems Commands. The draft *DAWIA Operating Guide* (24 Apr. 2006) provides guidance for these workforce members on career management programs such as recruitment, selection, career development, retention, or strategic planning.

This chapter provides information on the typical scope of training that a Remedial Project Manager (RPM) will receive, and the sources for this training. Additional supporting guidance on training is provided in Chapter 24 of the *Navy Environmental and Natural Resources Program Manual* (OPNAVINST 5090.1B, 01 Nov. 1994).

In addition, the *Environmental Community Management Plan* (CMP) provides a framework to ensure that the DON's environmental community can meet its present and future mission. The Community Management Plan enables members to enhance their careers and their competencies: the skills, knowledge, and talents that they bring to NAVFAC and the Navy.

17.1 RPM Training

Because the RPM is the primary person responsible for directing assessment and cleanup activities at an ER site, a RPM should be capable of performing or overseeing a number of essential tasks. The courses listed here are recommended to prepare RPMs for these responsibilities; however, each Facilities Engineering Command (FEC) is responsible for establishing specific training plans for its RPMs.

- 40 Hours of Hazardous Waste Operations and Emergency Response (HAZWOPER) Training;
- Contracting Officer's Representative (COR);
- Basic Environmental Law;
- Annual HAZWOPER 8-Hour Training Refresher;

- Navy Environmental Restoration Program;
- Environmental Background Analysis;
- Human Health Risk Assessment;
- Munitions Response Site Management;
- Quality Assurance Project Planning;
- Ecological Risk Assessment;
- Environmental Negotiation;
- Health and Environmental Risk Communication;
- Environmental Data Quality Assurance;
- Optimizing Remedy Selection and Site Closeout; and
- Geostatistics and Environmental Geographic Information Systems (GIS).

Additional courses may be required for personnel working in the ER Program depending on duties and responsibilities. The following list highlights other courses that are available for supplemental training (note that this list is not exhaustive):

- Advanced Environmental Law;
- Environmental Protection;
- Environmental Quality Sampling – Soil, Hazardous Waste, Groundwater;
- Environmental Quality Sampling – Water;
- Explosive Safety;
- Introduction to Cultural Resource Management Laws and Regulations;
- National Environmental Policy Act Application;
- National Environmental Policy Act: Executive Overview; and
- Native American Traditions and Cultures.

Additional information on specific environmental training requirements applicable to specific job assignments is provided in Chapter 24 of the *Navy Environmental and Natural Resources Program Manual* (OPNAVINST 5090.1B, 01 Nov. 1994). Each FEC will provide RPMs with information on locations for each course specified in its training regime. Appendix C of the *Environmental Community Management Plan* also provides environmental development guidelines for training and developmental assignments. Each member of the environmental community should have an individual training plan that is directly related to their current competencies, needed competencies, client needs, and career aspirations. NAVFAC has developed leadership and managerial competencies that are added to the technical competencies.

17.2 Sources of Training

Navy personnel are able to obtain training from a number of sources, depending on the specific needs of the person being trained and the focus of training provided. It is the Navy's policy to prevent duplicative and redundant training efforts. Therefore, in accordance with the Navy Training System Plan, required training shall be obtained through Navy sources, unless:

1. A specific course is unavailable through Navy sources;

2. An Interservice Environmental Education Review Board (ISEERB)-approved course for Navy personnel does not exist;

3. A commercially available course equivalent to a Navy source course is determined to be time-sensitive due to an enforcement action; or

4. The training under the Navy Training System Plan does not meet the legal requirements of the state or location in which the command is located.

The Environmental Division at the Civil Engineer Corps Officer School (CECOS) is the primary source for ER Program training as well as training in Compliance, Pollution Prevention, and Natural and Cultural Resources. The CECOS Web page (https://www.cecos.navy.mil/) provides course descriptions and registration information. The CECOS Web site also contains information on how to register for courses offered by other services that have been approved by the ISEERB.

Training support for the acquisition workforce (DAWIA, other government, and industry) is provided on the DON Acquisition One Source Web site (http://acquisition.navy.mil). DON acquisition workforce members also may obtain training via the Defense Acquisition University (DAU). Registration for DAU classes, including Internet-based courses, is made using the Acquisition Training Application System, which is available at the following Web page: https://www.atrrs.army.mil/channels/registernow/.

Other organizations that provide environmental training include:

- **DoD:** Environmental training courses for DoD are advertised on the DENIX DoD page (www.denix.osd.mil [Password required]) under training or in the calendar. This page also provides information on upcoming conferences and workshops.
- **U.S. EPA:** U.S. EPA provides training on topics such as regulations, risk assessment, and innovative technologies. U.S. EPA's schedule for workshops, conferences, and meetings relating to its Superfund program is provided at the following Web address: http://www.epa.gov/superfund/conferences/index.htm. In addition, U.S. EPA provides a newsletter alerting subscribers to upcoming courses and seminars. A free online subscription to this newsletter is available through the CLU-IN Web site (http://www.clu-in.org/courses/search.cfm).
- **United States Geological Survey (USGS):** The USGS provides training on surface water, groundwater, natural resources management, and wetlands. The USGS Web site provides course offering information (http://www.usgs.gov/).
- **Interstate Technology Regulatory Council (ITRC):** The ITRC is a state-led coalition working together with U.S. EPA, DoD, industry, and stakeholders to achieve regulatory acceptance of environmental technologies. It develops guidance documents and provides training courses to meet the needs of both regulators and environmental consultants. The ITRC Web site provides information on available conferences and workshops (www.itrcweb.org).
- **Strategic Environmental Research and Development Program (SERDP):** The SERDP identifies, develops, and transitions environmental technologies that relate directly to defense mission accomplishment. The SERDP Web site provides information on their upcoming symposiums and workshops (www.serdp.org).

In addition, RPMs have the opportunity to participate in Research, Development, Testing, and Evaluation (RDT&E) programs, Navy-sponsored technology transfer seminars, and Navy-sponsored ER Program work groups. Additional information on RDT&E programs, Navy technology transfer programs, and Navy work groups is provided in Chapter 18 of this manual.

17.3 Training for Other Personnel Associated with ER Program Activities

RPM and non-RPM personnel involved in the ER Program will need training based on their roles and responsibilities in the program.

17.3.1 Contracting Officer's Representative

Training requirements for the Contracting Officer's Representative (COR) and Navy Technical Representatives are specified in NAVFAC Notice 4330 (Clarification of Duties and Responsibilities of Post Award Contract Personnel Involved in Environmental Contracts). According to NAVFAC Notice 4330, prior to their appointment, a COR must have completed the basic COR course (CTC-343), the Environmental Cost Reimbursement course (CTC-423), and ethics training. The NTR, who provides technical and administrative assistance to the COR, must complete the basic COR training (CTC-342) and ethics training. It also is recommended that the NTR complete the Environmental Cost Reimbursement course.

17.3.2 Other Related Personnel

Additional information on specific environmental training requirements for job assignments relevant to the ER Program, including Resident Officers in Charge of Construction (ROICCs), Public Works Officers, natural and cultural resource managers, and environmental planners is provided in Chapter 24 of the *Navy Environmental and Natural Resources Program Manual* (OPNAVINST 5090.1B, 01 Nov. 1994). Personnel should establish a training plan with their supervisor within the first 12 months of assignment.

CHAPTER 18

Innovative Technology Development and Transfer

This chapter discusses Research, Development, Testing, and Evaluation (RDT&E) programs and processes as they apply to innovative technologies for the ER Program, including the mechanisms and work groups used to transfer technology to end users (i.e., RPMs). Innovative technologies may be defined as non-standard technologies that can be used for site investigation or cleanup. DoD has established robust RDT&E programs that play a large role in the ER Program. This chapter is devoted to a discussion of those programs. Other state and federal technology programs are also of great value to the DON RDT&E Program; these programs often allow for simplified implementation of ER technologies at DON sites.

Innovative technologies generally fall within one of three general categories: emerging, adaptive, or available. ***Emerging technologies*** require full or partial RDT&E to meet the user's requirements. ***Adaptive technologies*** are commercially available but require some testing and evaluation to meet specific user requirements. In most cases, specifications and detailed criteria will be needed before adaptive technologies can be transferred to the field. ***Available technologies*** are commercially available and require little or no modification for the user. This also may include areas where an existing technology needs minor modification or improvement.

18.1 DoD and DON Environmental Restoration RDT&E Programs

The goals of DoD's and DON's RDT&E programs are to develop innovative technologies that address high-priority ER needs while reducing total ownership costs, enhancing mission capabilities, and fulfilling DoD environmental stewardship responsibilities. DON is very active in RDT&E projects within DoD programs. The Navy often leads DoD RDT&E-sponsored projects that address specific needs within the ER Program.

Two DoD-wide programs are designed to address the common needs of the Military Services: Strategic Environmental Research and Development Program (SERDP) for science and technology, which relates directly to the Basic Research, Applied Research and Advanced Development steps of RDT&E; and Environmental Security Technology Certification Program (ESTCP) for technology demonstration and validation, which relates to the Demonstration/Validation step of RDT&E. The Naval Shoreside Environmental Readiness Demonstration and Validation Program, also known as the 0817 Program, is the DON's program committed to investing in innovative and cost-effective technologies to support Fleet Readiness. Figure 18-1 identifies the process through which a new technology progresses and indicates how DoD and DON Programs fit into the development and implementation of environmental technologies. Each of these programs is described in more detail in the following subsections.

18.1.1 Strategic Environmental Research and Development Program (SERDP)

SERDP is the DoD corporate environmental research and development (R&D) program. It is planned and executed in full partnership with DOE and U.S. EPA, with participation by numerous other federal and non-federal organizations. Within its broad areas of interest, SERDP focuses on four thrust areas: Sustainable Infrastructure, Weapons Systems and Platforms, Environmental Restoration, and Munitions Management.

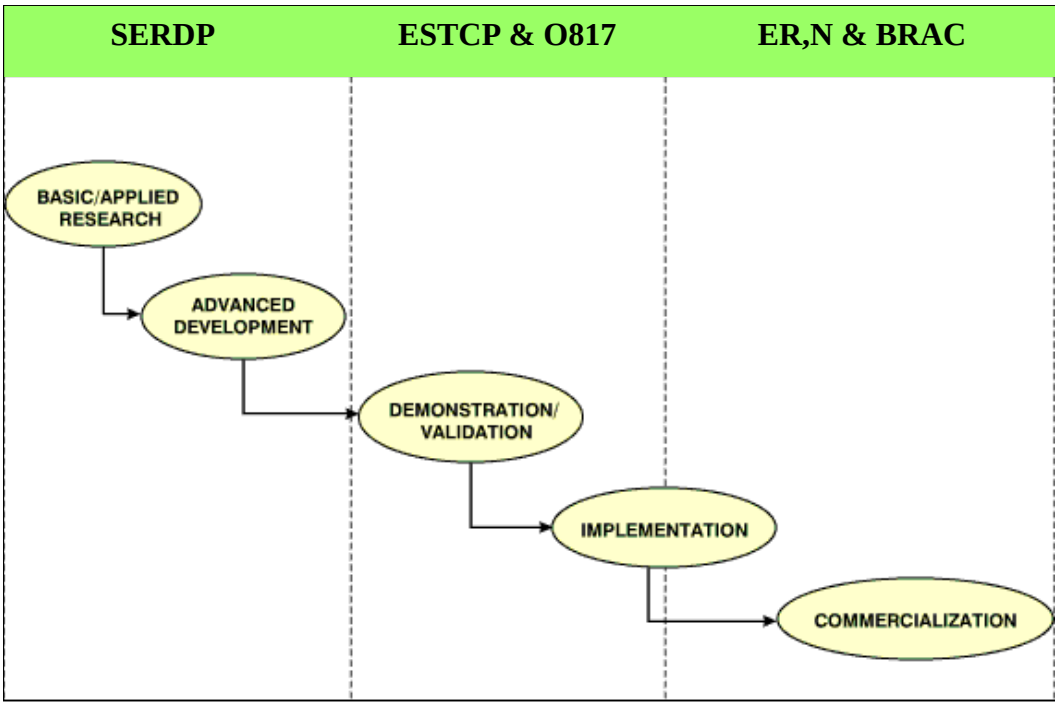

Figure 18-1. DoD/DON Cleanup R&D Structure

The SERDP Environmental Restoration Thrust Area addresses the reduction of DoD's liabilities by developing and demonstrating technologies for the cost-effective detection, characterization, containment, and remediation of contamination in soil, sediments, and water. This area includes understanding the fate, transport, and effects of contaminants in the environment.

Currently, SERDP's Environmental Restoration projects address three R&D focus areas.

1. *Improved Site Characterization and Monitoring*. Development of novel technologies and improved methodologies to detect and characterize contamination in soil, sediments, and groundwater. Topic areas: Metals, Chlorinated Solvents, Fuels, and Energetic Compounds.

2. *Remediation Technologies*. Development of cost-effective remediation technologies for subsurface contamination of soils, groundwater, and sediments. Topic areas: Biostimulation, Bioaugmentation, In Situ Passive Barriers, In Situ Containment Walls, and Flushing Technologies.

3. *Risk Assessment Methodologies*. Development of improved risk assessment methodologies and establishment of data to support environmentally acceptable endpoints for DoD unique contaminants. Topic areas: Chlorinated Solvents, Metals, and Energetic Compounds.

The SERDP Munitions Management Thrust Area focuses on the environmentally responsible management of military munitions, and is comprised of two areas. The first is the detection, discrimination, and remediation of unexploded ordnance (UXO) from "other than operational" ranges (formerly known as closed, transferred, and transferring ranges) to reduce the current liabilities associated with these ranges. The second area focuses on active range clearance and reduced generation of UXO during live fire operations.

Currently, SERDP's Munitions Management projects address three R&D focus areas:

1. *Improved Detection*. Projects pursue the raising of technical capability for detection systems beyond "mag and flag" for UXO surveys. Alternatives have been explored and promising areas of interest will be pursued.

2. *Increased Discrimination*. Projects pursue discriminating between UXO and "clutter" items. Through advanced algorithms and data processing, the overall goal is to lower the false alarm rate, thus allowing large cost savings through the reduction of needless digging and removal of "non-UXO" items.

3. *Site Surveys Using Statistical Sampling*. Projects pursue reducing the "footprint" of UXO-contaminated regions on large areas of suspect DoD lands. Developing defensible statistical sampling schemes for bounding UXO contamination areas is an important factor in reducing the cost burden for UXO clearance.

Every year, SERDP funds environmental R&D projects through a competitive process. The process involves an annual solicitation for project proposals based on specific DoD statements of needs. Any organization can apply for funding under SERDP's guidelines including academia, private industry, and federal laboratories/research centers. Because both government and private sector parties may compete for SERDP funds, two announcements are made for each solicitation: (1) a Call for Proposals to the federal sector and (2) a Broad Agency Announcement for the private sector. A limited number of proposals are accepted as projects each year, based on available DoD funding. Project teams are often composed of personnel from multiple services, agencies, industries, and academia. Detailed information about these solicitations and current or completed SERDP projects are available on SERDP's Web site (www.serdp.org).

18.1.2 Environmental Security Technology Certification Program (ESTCP)

ESTCP is the DoD environmental technology demonstration and validation program. ESTCP's goal is to identify, demonstrate, and transfer technologies that address DoD's highest priority environmental requirements. ESTCP promotes innovative, cost-effective environmental technologies through demonstration and validation at DoD sites. These technologies provide a return on investment through improved efficiency, reduced liability, and direct cost savings. Within its broad areas of interest, ESTCP focuses on four thrust areas: Sustainable Infrastructure, Weapons Systems and Platforms, Environmental Restoration, and Munitions Management.

ESTCP's strategy is to select lab-proven technologies with broad DoD and market application. Technologies selected for demonstration are teamed with a military service partner, who is responsible for assisting in the selection of the demonstration site, validating the technology's cost and performance, interfacing with the regulatory and user community, and supporting the transfer of the technology across DoD. These projects are aggressively moved to the field for rigorous trials that document their cost, performance, and market potential. Successful demonstrations typically lead to acceptance of innovative technologies by DoD end-users and the regulatory community. Within the ER Program, the ESTCP continues to be a valuable source for innovative technologies and their transfer to end-users.

Each year, ESTCP solicits proposals from DoD, the private sector, and other federal agencies. The process is similar to the SERDP solicitation process. Detailed information is available on ESTCP's Web site (www.estcp.org).

DON is actively involved in ESTCP projects as principal investigators, contracting officer representatives, or project partners. In addition, Navy RPMs are encouraged to identify and submit potential DON ER sites for upcoming ESTCP projects. Candidate sites include any sites that are available over the next few years for demonstration fieldwork and that could benefit from improved methods or technologies. If the technology requirements at a DON site match with project work in the R&D community, the site may be selected and demonstration/validation work will be funded and accomplished by ESTCP. Application of the latest principles and technologies from the R&D community could help a Navy RPM in the Feasibility Study and technology selection process, or provide potential solutions to a technical challenge. For consideration, a two-page information sheet on the candidate site should address the site description, specific technical issues, R&D technology needs, and constraints. For more information, please contact NFESC's Environmental Technology Transfer Team Lead.

18.1.3 Naval Shoreside Environmental Readiness Demonstration and Validation Program

The Naval Shoreside Environmental Readiness Demonstration and Validation Program, also known as the 0817 Program, is the DON's program committed to investing in innovative and cost-effective technologies to support Fleet Readiness. The 0817 Program is sponsored by CNO-N45 and managed by NAVFAC. The Technology Development Work Group (TDWG), responsible for direction of the program, is chaired by NAVFAC and includes representatives from NAVAIR, NAVSEA, NAVFAC, and SPAWAR.

The 0817 Program investments focus primarily on innovative and cost-effective approaches that address Fleet Readiness by addressing environmental compliance requirements and pollution prevention opportunities related to range sustainment, weapon system maintenance, air and port operations, and base operations. The 0817 Program also invests in areas related to cleanup that involve natural attenuation, long-term monitoring/risk reduction, and range sustainability.

Projects are initiated annually through a competitive process that begins with needs identification and validation. Anyone may submit shoreside environmental needs or requirements for program review and investment consideration (via the Collaborative Web site at http://cws.nfesc.navy.mil/). Once the needs are submitted, they are assessed, validated, and prioritized by experts in Field Working Groups (which includes the NAVFAC Work Groups discussed later in this chapter) and the TDWG. Pre-proposals should address one or more prioritized need(s). Following acceptance of a pre-proposal by the TDWG, the principal investigator is invited to develop and submit a full technical proposal.

The 0817 Program serves a broad range of end users and implementation sites. The list of project performers include the Naval Aviation Depots (NADEPs), Naval Air Warfare Center Aircraft Division (NAWC AD), Naval Facilities Engineering Service Center (NFESC), Naval Surface Warfare Center Carderock Division (NSWCCCD), Naval Surface Warfare Center Indian Head (NSWCIH), and Space and Naval Warfare Systems Center (SPAWAR) San Diego. The Navy Pollution Abatement Ashore Web site (http://p2ashore.nfesc.navy.mil) provides project fact sheets and presentations for on-going and completed projects.

18.2 DON Approach to Innovative Technology Implementation

DON has made the conscious decision to integrate RDT&E into its framework for the ER Program in order to develop improved investigation and cleanup technologies and make them available to RPMs for their use. These technologies are often considered innovative, and can improve the speed and quality of the investigations and cleanups at ER sites and at the same time expedite cost-effective Site Closeouts.

To overcome real or perceived barriers to using innovative environmental remediation technologies, NAVFAC has developed a strategic plan for technology transfer. It is implemented through the NAVFAC Technology Transfer (T2) Program managed by NFESC. A critical aspect to this strategic plan and the successful implementation of innovative technologies is the technical input and feedback from the end-user. This is accomplished largely through interface with the seven NAVFAC Work Groups (described in Section 18.3).

The NAVFAC T2 Program is geared toward the Navy RPM. Additionally, contractors, regulators, other federal agency personnel, and public stakeholders may benefit from the publicly available information. Technology transfer mechanisms include distribution of information through NAVFAC work groups, T2 Web tools and information sources on the Internet, innovative technology seminars and training, cost and performance reports, and innovative contracting mechanisms to assist technology implementation. The NAVFAC T2 Program is described in further detail in Section 18.4.

To make maximum use of scientific and engineering talent, DON draws upon expertise from several organizations. Often, innovative technologies have been developed in partnership with industry and academia. Overcoming technical and regulatory barriers to the use of innovative technologies also can be accomplished through association with these organizations. Some of the organizations NAVFAC interfaces with are described in Section 18.5.

18.3 NAVFAC Work Groups

NAVFAC has established various work groups to further the use of innovative technologies and methodologies in the ER Program including:

1. ER Managers Group;
2. Alternative Restoration Technology Team (ARTT) Work Group;
3. Installation Restoration Geographic Information System (GIS)/Data Management Work Group;
4. Cost-To-Complete (CTC) Work Group;
5. Munitions Response Work Group;
6. Risk Assessment Work Group (RAW);
7. Environmental Restoration Optimization Work Group.

These work groups consist generally of DON representatives, but often use the support and knowledge of academia and industry to develop guidance, tools, case studies, and fact sheets to support RPMs. Current information on these work groups and programs can be found at the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb).

18.3.1 ER Managers Group

The ER Managers work as the board of directors for the ER Program. They provide direction and formulate policies on how to effectively administer the program. The group is composed of Environmental Restoration Managers from NAVFAC HQ, each FEC, and NFESC.

The ER Managers provide guidance on all issues affecting the program, including:

- Policy Issuance
- Budget/Execution/Funding
- Contracting
- Business Practices
- Staffing
- Technical Problems
- Regulatory Issues.

The ER Managers establish individual NAVFAC work groups to address high priority issues in a consistent manner across NAVFAC. An ER Manager sits on each of the individual NAVFAC Work Groups and monitors performance. The ER Manager acts as a link, by providing leadership to the work group and by receiving feedback from the work group on technical issues or other limitations facing RPMs. Guidance documents, policy suggestions, and issue papers are often developed by work groups and brought to the ER Managers through the ER Manager Link for consideration.

18.3.2 Alternative Restoration Technology Team Work Group

The ARTT Work Group was established to promote the use of practical, cost-effective, and innovative technologies in the ER Program. The ARTT carries out its charter by fostering partnerships, supporting research and technical resources, and encouraging participation in NAVFAC-wide efforts. ARTT consists of representatives from CMC, NAVFAC HQ, NFESC, and the FECs.

ARTT members exchange scientific information and project updates about innovative technologies and approaches used at each FEC so that RPMs can benefit from the experiences of others within NAVFAC. The ARTT works closely with other NAVFAC work groups, Office of Naval Research (ONR), Interstate Technology Regulatory Council (ITRC), U.S. EPA, United States Geological Survey (USGS), and other DoD organizations to identify, evaluate, and promote new technologies. ARTT members participate on various ITRC teams addressing specific innovative technology issues, including dense, nonaqueous-phase liquid (DNAPLs), bioremediation, diffusion samplers, alternative landfill technologies, and permeable reactive barriers. ARTT representatives act as important links between these groups and cleanup personnel in the field.

The ARTT provides valuable input from the end-users perspective on environmental technology needs, and they provide input and demonstration site suggestions for DoD's ESTCP proposals and participates in DoD's SERDP final project briefings. For the 0817 Program, the ARTT submits input to and assists in prioritizing future ER technology needs.

The ARTT's focus on improving T2 efforts has resulted in a variety of products including a continually updated NAVFAC "One-Stop-Shop" Web site for project managers, Web-based multimedia learning tools, monthly T2 e-mail newsletters, a five-year T2 plan, and a feedback loop with the RPMs to guide and update the T2 process. Section 18.4 describes each of these products in further detail. The ARTT ensures training courses provided to Navy RPMs, such as the Remediation Innovative Technology Seminar (RITS) and Civil Engineer Corps Officer School (CECOS) ER classes, include the most recent and promising technological advances. The ARTT members also provide technical expertise on Cleanup Review Tiger Teams that are often initiated at sites that have high potential cleanup costs, high visibility, or would benefit from a global NAVFAC perspective.

18.3.3 IR GIS/Data Management Work Group

The IR GIS/Data Management Work Group develops, improves, and maintains business practices, guidance, and solutions to effectively manage ER Program data, documents, and records including the

AR File and associated files using efficient, standardized, Web-based systems. The work group is composed of representatives from the FECs, NFESC, and NAVFAC HQ.

The Records Management component of this work group, formerly the Installation Restoration Records Management (IRRM) Work Group, addresses issues and provides guidance to ensure Navy-wide consistency in the management of ER records. The GIS component of this work group is tasked with developing, managing and maintaining the Naval Installation Restoration Information Solution (NIRIS). NIRIS is a Web-based, standardized system that efficiently manages vast amounts of ER Program data and documents. NIRIS stores all ER data, from individual sample results to the site files and AR Files, and will effectively maintain these data for the life of the ER Program and beyond. A detailed description of NIRIS and records management is located in Chapter 14 of this manual.

The IR GIS/Data Management Work Group has completed the NIRIS database and NIRIS Electronic Data Deliverable (NEDD) data transfer standards and instructions. Administrative tools include the NEDD data checker and Standard Operating Procedures. The work group has developed a RPM Handbook to assist RPMs in using NIRIS and deciding what historic data to load. End user tools are available, and more will be added as NIRIS matures. NIRIS allows the user to query, analyze, map, and visualize data using Web-based GIS applications that only require the user to have an internet connection and Web browser.

The Administrative Record Management System User's Guide is available on the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb).

18.3.4 Cost-To-Complete (CTC) Work Group

The CTC Work Group was chartered to improve the process for developing comprehensive and credible site estimates that support ER Program cost. The work group supports the development of cost-estimating system tools and policy, as well as training and assistance for RPMs. A primary objective is promoting sound cost-estimating practices within the ER Program. The CTC Work Group consists of environmental professionals from each FEC, NFESC, and NAVFAC HQ.

The work group is responsible for the following tasks as they relate to the ER Program:

- Evaluating needs and developing requirements for improvements to the CTC system;
- Implementing improvements through test and evaluation;
- Providing input/data for cost model development;
- Serving as the primary link to the FEC in terms of training, implementation of guidance, help and support for CTC; and
- Helping to ensure credibility of CTC cost estimates and documentation of costs.

Under the oversight of this work group, the CTC system now includes nearly 300 updated parametric cost models and new functionality to increase both the usability and credibility of the system. Newly developed cost models include:

- CERCLA Five-Year Review Model;
- Remedial Action Optimization Model;
- Institutional Controls Model;

- Hot Air Vapor Extraction System Model;
- In Situ Bioremediation (Anaerobic) Model; and
- Munitions of Explosive Concern Model (under development).

The CTC Work Group leverages the use and development of the models with other government agencies. The work group created standards for cost models that allow other agencies to use the cost models in their own estimating systems, and in turn, can develop new models that can be used by the Navy CTC system.

18.3.5 Munitions Response Work Group

This work group promotes the use of best available technologies and methodologies for managing cleanup of munitions and explosives of concern (MEC) and munitions constituents (MC) on Navy installations, with the ultimate goal of reducing explosives hazards and environmental risks in a cost-effective and timely manner. Members of the Munitions Response Work Group include technical representatives from NAVFAC, the FECs, NFESC, CNO-N45, and CMC. The work group also receives technical support from Naval Ordnance Safety and Security Activity (NOSSA) and the Naval Explosive Ordnance Disposal Technology Division.

The goals of the Munitions Response Work Group are to:

- Identify programmatic and project barriers related to the implementation of the Munitions Response Program (MRP);
- Recommend procedures and guidance on Navy munitions-related restoration issues;
- Develop a MRP cleanup quality assurance program for use at Navy facilities;
- Support munitions response RPM training;
- Identify technology needs and requirements to improve implementation of the MRP;
- Participate with RDT&E programs to solve these issues; and
- Provide success stories and lessons learned to assist other RPMs implementing MRP projects.

The work group is currently focused on developing standard scopes of work and guide specifications for the MRP and developing consistent quality assurance/quality control (QA/QC) guidance with United States Army Corps of Engineers (USACE) to fully implement the program. A SI scope of work template is available to RPMs on the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb). The work group has modified the AQAPS for assessing quality assurance during MR activities to run on Navy Marine Corps Intranet (NMCI)-compatible machines.

18.3.6 Risk Assessment Work Group (RAW)

NAVFAC established the RAW to provide support to the ER Managers in the areas of ecological and human health risk assessments. This group consists of technical representatives from the FECs, NFESC, NEHC, SPAWAR, ONR, and NAVFAC HQ. The RAW addresses ecological risk assessment and human health risk assessment issues on contaminated sediments, environmental monitoring, R&D, vapor intrusion, and emerging and unregulated chemicals.

The RAW evaluates and recommends strategies to resolve difficult technical issues such as development and use of background contaminant ranges, sediment investigations, the integration of natural resource injury into the CERCLA process, the design of strategies for ecological monitoring, the analysis of PCBs,

and addressing vapor intrusion (indoor air) when conducting risk assessments. The RAW also focuses on how to consistently address emerging and unregulated chemicals. Issue papers developed by the RAW on these topics are posted on the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb). Information and innovative strategies developed at the individual facilities are also evaluated for future use in other parts of the country. The RAW also reviews risk assessment-related R&D proposed projects for technical accuracy and timeliness and recommends projects for funding.

The RAW has finalized the following guidance documents:

- *Guide for Incorporating Bioavailability Adjustments into Human Health and Ecological Risk Assessments at U.S. Navy and Marine Corps Facilities*. Part 1: Overview of Metals Bioavailability, April 1999; and Part 2: Technical Background Document for Assessing Metals Bioavailability, June 2000;
- *Guidance for Environmental Background Analysis*, Volume 1: Soils, April 2002; Volume 2: Sediments, April 2003; and Volume 3: Groundwater, April 2004;
- *Implementation Guide for Assessing and Managing Contaminated Sediments at Navy Sites* (March 2003, revised in January 2005);
- U.S. EPA's *Guidance for Monitoring at Hazardous Waste Sites: Framework for Monitoring Plan Development and Implementation*, January 2004;
- *Navy Guidance for Habitat Restoration Monitoring*, July 2004;
- *User's Guide for Determining the Sources of Contaminants in Sediments* (the "Fingerprinting Guide"), September 2003; and
- *Interim Guide for Assessing Sediment Transport at Navy Facilities*, September 2004.

The RAW has finalized Web-based guidance on both ecological risk assessments and human health risk assessments. The goal of these two tools is to make the NAVFAC guidance on risk assessments available and easily accessible to all that work on the risk assessment projects. These tools have question and answer forums, and facilitate searches for relevant and specific topics. Current efforts are underway to produce *Navy Guidance for Habitat Biomonitoring*.

18.3.7 Environmental Restoration Optimization Work Group

The goal of the ER Optimization Work Group is to promote the optimization of the ER Program. The ultimate purpose is to achieve efficient, protective, and cost-effective Site Closeouts. The work group is comprised of representatives from FECs, NFESC, and NAVFAC HQ. Emphasis is placed on the following activities:

- Developing guidance that provides clear and consistent approaches to optimization and SC;
- Tracking Navy lessons learned for obtaining cost-effective RA-O and LTMgt contract services;
- Sharing information and learning about optimization strategies through team member updates and disseminating information throughout NAVFAC; and
- Developing case studies, course material, Web site information, conference presentations, budget guidance, and other products to reach Navy RPMs.

The Optimization Work Group has developed the following four guidance documents for consideration during the Feasibility Study (FS), Record of Decision (ROD), Remedial Design (RD), Remedial Action Operation (RA-O), long-term monitoring (LTM), and Site Closeout (SC):

- *Guidance for Optimizing Remedy Evaluation, Selection, and Design*, 2004;
- *Guidance for Optimizing Remedial Action Operation*, 2001;
- *Guide to Optimal Groundwater Monitoring*, 2000; and
- *Guidance to Documenting Milestones Throughout the Site Closeout Process*, 2006.

The work group also has developed a new section within NORM to collect and track optimization data. Within this section the RPM can report baseline conditions, optimization studies and recommendations, implemented strategies, and progress in terms of cost savings and improved results. This type of information is being used by the work group to illustrate the benefit of NAVFAC's optimization activities and lessons learned.

In addition, the work group collaborates with other federal and state groups focusing on optimization, including the ITRC Remedial Process Optimization Team. Collaboration with this group has enabled NAVFAC to gain a clearer understanding of regulatory issues related to optimization, as well as provide Navy input to documents and course material developed by the group. ITRC documents and training reach nationwide and worldwide. Work group members also participate with U.S. EPA, states, and other DoD services to provide training on LTM optimization.

18.4 NAVFAC Technology Transfer (T2) Program

NAVFAC's strategy for using the most promising innovative technologies to achieve RC and SC begins with the ER T2 Program. T2 benefits NAVFAC by sharing the latest information on ER technologies and research. The T2 Program supports efforts to increase the awareness and use of innovative technologies, reduce environmental cleanup costs, and improve technology performance for the ER Program. The strategic plan is detailed in the NAVFAC Technology Transfer Five-Year Plan, with appendices that are updated yearly to reflect current needs and trends.

Figure 18-2 identifies all the partnering efforts and inputs that are integral to the NAVFAC T2 Program. The T2 Program gathers information from personnel within NAVFAC technical work groups and uses surveys and the NORM database to gain insight into overall ER Program trends and needs.

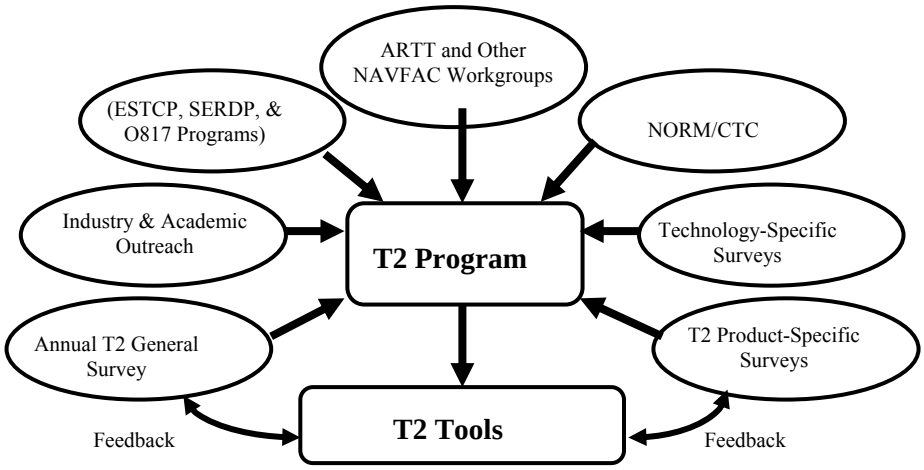

Figure 18-2. The Technology Transfer Program

One of the goals of the T2 Program is to identify and address challenges faced by Navy RPMs in achieving successful and cost-effective environmental restoration. New technologies and approaches may address RPM challenges, and the T2 Program seeks to overcome any barriers that may restrict Navy RPMs from taking advantage of these new opportunities. The program facilitates the transfer of lessons learned by one Navy RPM and/or FEC for the benefit of the entire NAVFAC ER community. Communication and learning are key, and feedback mechanisms measure customer satisfaction and improve the circulation of knowledge and ideas.

The Annual T2 Program Survey focuses NAVFAC's T2 initiatives on the most important and most prevalent technological challenges facing the Navy's RPMs each year. The Annual T2 Program Survey is traditionally released in both hard copy form at the Spring Remediation Innovative Technology Seminar (RITS) and online. Responses are received from a variety of audiences including Navy RPMs, contractors working on Navy projects, and state or federal regulators working with Navy RPMs.

The T2 Program uses several different mechanisms for outreach. All of the T2 products listed below can be accessed through the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb).

- Web-Based Training Tools
- T2 Email Updates
- RPM Newsletter Articles
- Brochures
- Guidance Documents
- Technical or Cost and Performance Reports
- Remediation Innovative Technology Seminar (RITS)
- CECOS Courses and other Workshops (Chapter 17)
- Navy and Marine Corps Cleanup Conference
- Broad Agency Announcement (BAA) Program for Innovative Technologies.

18.4.1 NAVFAC ERB Web Site

The NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb) is the Navy's "one-stop shopping" site for all ER information and links to other agency Web sites. More than 300 pages of linked information are posted, resulting in efficiency of data searches. In addition, users can easily bookmark or print any of the available pages. The information found on the Web site and on the related linked pages provides details on specific contaminants, toxicity, chemical constituents, and additional useful information. Navy guidance documents, information on innovative environmental technologies, and interactive training tools also are easily accessible.

18.4.2 Web-Based Technology Transfer Tools

Web-based T2 tools are developed under the NAVFAC T2 Program to educate professionals on select new environmental restoration technologies. Web-based applications can be updated quickly, promote interaction with the user, and track feedback. They use multi-media (video, audio, animations, Web links) and include Web Training Tools, Web Data Sheets, and Case Studies. Monthly T2 E-mail Updates announce the release of new T2 Tools or provide information and a hyperlink to the newest policies, guidance, or technical documents. Table 18-1 identifies some of the available tools.

Table 18-1. Technology Transfer Tools

Amphibians Risk Assessment	Groundwater Sampling
Benthic Flux Sampling Device	In Situ Chemical Oxidation
Biodegradation of DNAPL Through Bioaugmentation	In Situ Reactive Zone (IRZ)
Charleston Web Portal	MTBE
Chemical Fingerprinting	Nanoscale Zero Valent Iron
DCE Stall	Office of Naval Research (ONR) Sediment Investigation
Degradation of Ordnance Constituents in Marine Sediments	Optimization
Direct Push	Passive Diffusion Sampler
DNAPL Detection and Characterization	Perchlorate
Electrical Resistive Heating	Permeable Reactive Barrier (PRB)
Encapco Stabilization	Polychlorinated Biphenyls (PCBs)
Environmental Background Analysis	Pulsed Elemental Analysis with Neutrons

18.4.3 Articles, Brochures, Documents, Reports

Conventional hard copy media are still used for certain applications, venues, or topics and also are made available online through the ERB Web site (https://portal.navfac.navy.mil/go/erb). These include guidance documents, cost and performance reports, technical data sheets, success stories, journal articles, RPM Newsletter articles, conference presentations, conference posters, and technology brochures. NAVFAC guidance documents generally are developed by the NAVFAC Work Groups. Technical reports and cost and performance reports are often generated by the project team to document the results of a SERDP, ESTCP, 0817, or other R&D project and are posted on the respective Web sites and uploaded to the Federal Remediation Technologies Roundtable (FRTR) Web site (see Section 18.5.1). All T2 documents are generally disseminated via hard copy, email, and posted on the ERB Web site.

18.4.4 Remediation Innovative Technology Seminars (RITS)

RITS provide the transfer of the latest information on new and innovative technologies, methodologies, and guidance under the ER Program. RITS typically are held twice a year as one-day seminars at each FEC. RITS topics are identified by the ER Managers and developed by NFESC. RITS serve as a way for the Navy to promote innovative technologies to achieve RC and SC more efficiently, cost-effectively, and with higher performance. Although the RITS are developed primarily for the DON ER environmental professionals, these seminars are also available to other DoD personnel, the Navy's environmental clean-up contractors, and environmental regulators. Past RITS presentations are available on the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb).

18.4.5 Navy and Marine Corps Cleanup Conference

The Navy and Marine Corps Cleanup Conference is an annual event sponsored by NAVFAC. The purpose of the conference is to promote information exchange and provide training to foster fast-track cleanup of DON's past hazardous waste sites. Major topics addressed include a Washington Perspective session on environmental cleanup policy and emerging issues at active and closing installations, and technical sessions on current remediation topics. The conference is hosted by NFESC in Port Hueneme, California. The announcement for the conference is usually available mid-December before the spring conference. Registration information and proceedings from previous conferences can be found on the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb).

18.4.6 Broad Agency Announcement (BAA) for Innovative Technologies

The BAA Program, implemented by NFESC, is a streamlined and flexible contracting approach tailored towards identifying a wide range of environmental technologies and methodologies that are either new, innovative, advance the state-of-the-art, or increase knowledge or understanding of a technology or methodology.

Vendors submit abstracts online that address the evaluation criteria provided in the BAA published on the FedBizOpps Web site. Once NFESC completes the evaluation process, the abstracts that meet the BAA criteria are made available to RPMs. If selected by a RPM, the contractor will be asked to submit a detailed proposal based on Navy-provided requirements along with the specific details of the Navy-selected demonstration site.

NFESC BAA Web page on DENIX includes abstracts of all technologies and methodologies accessible through the BAA Program. Note: You must have a DENIX DoD user account to access this Web page.

18.5 State and Federal Innovative Technology Programs

DON has established partnerships with state and federal agencies, which can facilitate the development and improvement of environmental technologies to address mutual cleanup problems and enhance regulatory acceptance of innovative environmental technologies.

18.5.1 Federal Remediation Technologies Roundtable (FRTR)

The FRTR works to build a collaborative atmosphere among federal agencies involved in hazardous waste site cleanup. FRTR was established in 1990 to bring together top federal cleanup program managers and other remediation community representatives to:

- Share information and learn about technology-related efforts of mutual interest;
- Discuss future directions of the national site remediation programs and their impact on the technology market;
- Interact with similar state and private industry technology development programs; and
- Form partnerships to pursue subjects of mutual interest.

FRTR member-agencies include DoD, U.S. EPA, DOE, Department of the Interior (DOI), and National Aeronautics and Space Administration (NASA). The FRTR Web site is located at: http://www.frtr.gov.

Since its inception, collaborative efforts among the FRTR member-agencies have led to technology development and demonstration partnerships with private developers, a more consistent and unified federal approach to technology evaluation and regulatory acceptance, and a variety of T2 tools and other information resources.

FRTR member-agencies meet semi-annually, usually in the Washington, DC area. These meetings offer a unique opportunity for federal cleanup program managers and other remediation community representatives to identify and discuss priority cleanup issues; share lessons learned; and form collaborative working groups to pursue subjects of mutual interest.

The FRTR has developed important tools to assist users in evaluating and selecting time-effective and cost-effective innovative technologies to characterize and clean up their hazardous waste sites, including:

- **The Remediation Technologies Screening Matrix** – A user-friendly tool for screening potentially applicable technologies for a remediation project. The matrix allows the user to screen in situ and ex situ technologies for either soil or groundwater remediation. Variables used in screening include contaminants, development status, overall cost, and cleanup time. In-depth information on each technology is also available, including direct links to the database of cost and performance reports written by FRTR members.
- **The Field Sampling and Analysis Technologies Matrix** – This matrix and its accompanying *Reference Guide* provide project managers and site stakeholders with information for use in identifying methods involving non-intrusive or minimally intrusive technologies in order to optimize sampling locations and minimize well installation. The matrix includes techniques and instruments that can be applied in the field and are commercially available. The *Reference Guide* provides a description and additional background information on each technology.

Member-agencies of the FRTR are working jointly to make data more widely available on real experiences and lessons learned in selecting and implementing treatment and site characterization technologies to clean up soil and groundwater contamination at ER sites. The remediation case study reports describe the performance and cost of technology applications at full-scale and large-scale demonstration projects. Some of the information available includes the following:

- FRTR Remediation Case Study Searchable Database;
- Remediation Technology Assessment Reports;
- Site Characterization and Monitoring Case Studies;
- General Information on Case Studies;
- Technology Cost Analysis Links;
- Remediation System Optimization Case Studies; and
- Abstracts of Remediation Case Studies.

18.5.2 U.S. EPA Technology Innovation Program (TIP)

The mission of the U.S. EPA's Technology Innovation Program (TIP), formerly known as the Technology Innovation Office, is to advocate more effective, less costly approaches (i.e., "smarter solutions") by government and industry to assess and clean up contaminated waste sites, soil, and groundwater. Working with other federal agencies, states, consulting engineering firms, responsible parties, technology developers, and the investment community, TIP provides robust technology and market information and works to remove policy and institutional impediments related to the deployment of these technologies. The scope of the mission extends to Superfund sites, corrective action sites, underground storage tank (UST) cleanups, state voluntary cleanup programs, and Brownfields. Technologies of interest are for field sampling and analysis and management (treatment and containment) of contaminated soil and groundwater. The TIP Web site is located at: http://www.epa.gov/tio. TIP also offers a Hazardous Waste Clean-Up Information Web site (CLU-IN) at: http://www.clu-in.org.

18.5.3 U.S. EPA Superfund Innovative Technology Evaluation (SITE) Program

The U.S. EPA's Superfund Innovative Technology Evaluation (SITE) Program was established by U.S. EPA's Office of Solid Waste and Emergency Response (OSWER) and the Office of Research and Development (ORD) in response to Superfund Amendments and Reauthorization Act (SARA), which recognized a need for an "Alternative or Innovative Treatment Technology Research and Demonstration Program." The SITE Program is administered by U.S. EPA's National Risk Management Research

Laboratory (NRMRL), Land Remediation and Pollution Control Division (LRPCD), headquartered in Cincinnati, Ohio, and encourages the development and implementation of innovative treatment technologies for hazardous waste site remediation and monitoring and measurement.

In the SITE Demonstration Program, technologies are field-tested on hazardous waste materials, and engineering and cost data are gathered on the innovative technology so that potential users can assess the technology's applicability to a particular site. Data collected during field demonstrations are used to assess the performance of the technologies, the potential need for pre- and post-processing of waste, applicable types of wastes and waste matrices, potential operating problems, and approximate capital and operating costs.

At the conclusion of a SITE demonstration, U.S. EPA prepares an Innovative Technology Evaluation Report, Technology Capsule, and Demonstration Bulletin. These reports evaluate all available information on the technology and analyze its overall applicability to other site characteristics, waste types, and waste matrices. Testing procedures, performance and cost data, and quality assurance and quality standards also are presented. The SITE Web site is located at: http://www.epa.gov/ORD/SITE.

Note: The SITE Program will be terminated at the end of FY06; however, the information offered through the program is expected to remain available through the SITE Web site or other U.S. EPA Web sites.

18.5.4 Environmental Technology Verification (ETV) Program

U.S. EPA established the ETV Program to develop testing protocols and verify the performance of innovative technologies that have the potential to improve protection of human health and the environment. ETV was created to accelerate the entrance of new environmental technologies into the domestic and international marketplace. The goal of ETV is to provide credible performance data for commercial-ready environmental technologies to speed their implementation for the benefit of vendors, purchasers, permitting agencies, and the public.

The ETV Program operates as a public-private partnership through agreements between U.S. EPA and private testing and evaluation organizations. These ETV verification organizations work with U.S. EPA technology experts to create efficient and fully quality-assured testing procedures that verify the performance of innovative technologies. ETV operates six centers and one pilot program that, together, cover a broad range of environmental technology categories. Vendors and others in the private sector, as well as federal, state, and local government agencies, cost-share with U.S. EPA in order to complete priority ETV protocols and verifications. The ETV Web site is located at: http://www.epa.gov/etv.

18.5.5 Interstate Technology Regulatory Council (ITRC)

ITRC is a state-led coalition working together with federal agencies, industry, 43 states, and other stakeholders to achieve regulatory acceptance of environmental technologies and to develop technical and regulatory guidance documents and training courses. These parties cooperate to break down barriers and reduce cleanup and compliance costs, making it easier to use new technologies, and helping states maximize resources. ITRC works with state representatives to ensure that ITRC products and services have maximum impact among state environmental agencies and technology users.

DON works with the other DoD services and federal partners to support ITRC by providing funding and technical experts to participate in many of the technology and topic-specific ITRC teams. In addition to participating on ITRC teams, each DoD service has a liaison to the ITRC Board of Advisors. Navy representatives ensure that the ITRC technical teams are aware of DON and DoD issues, concerns, and policies, as well as the latest DoD R&D results. Navy project managers provide numerous case study

examples to include in ITRC documents. This ensures that the ITRC documents can be most effectively developed and used by DoD as well as other interested parties.

Once DoD has concurred with the ITRC documents, NAVFAC uses its many internal work groups to distribute and promote the ITRC products and maximize their benefits to the cleanup efforts. Table 18-2 provides examples of ITRC technical teams and recent products. Further information on all ITRC teams, products, services, and general information can be found on the ITRC Web site, located at: www.itrcweb.org.

Table 18-2. Examples of ITRC Teams with Recent Products

Bioremediation of DNAPLs Team
Strategies for Monitoring the Performance of DNAPL Source Zone Remedies, August 2004
Overview of In Situ Bioremediation of Chlorinated Ethene DNAPL Source Zones, October 2005
Diffusion Samplers Team
Diffusion Sampler Resource DC, VER. 3, July 2004
Technical and Regulatory Guidance for Using Polyethylene Diffusion Bag Samplers to Monitor Volatile Organic Compounds in Groundwater, February 2004
Ecological Land Reuse Team
Making the Case for Ecological Enhancements, January 2004
In Situ Chemical Oxidation Team
Technical and Regulatory Guidance for In Situ Chemical Oxidation of Contaminated Soil and Groundwater, 2nd edition, January 2005
Mitigation Wetlands Team
Characterization, Design, Construction, and Monitoring of Mitigation Wetlands, February 2005
MTBE and Other Fuel Oxygenates Team
Overview of Groundwater Remediation Technologies for MTBE and TBA, February 2005
Perchlorate Team
Perchlorate: Overview of Issues, Status, and Remedial Options, September 2005
Permeable Reactive Barriers Team
Permeable Reactive Barriers: Lessons Learned/New Directions, February 2005
Remedial Process Optimization Team
Remediation Process Optimization: Identifying Opportunities for Enhanced and More Efficient Site Remediation, September 2004
Unexploded Ordnance Team
Geophysical Prove-Outs for Munitions Response Projects, November 2004

18.5.6 Remediation Technologies Development Forum (RTDF)

The RTDF was established in 1992 by U.S. EPA to foster collaboration between the public and private sectors in developing innovative solutions to mutual hazardous waste problems. The RTDF fosters public- and private-sector partnerships to undertake the research, development, demonstration, and evaluation efforts needed to achieve common cleanup goals. The RTDF is dedicated to advancing the development of more permanent, cost-effective technologies for the remediation of hazardous wastes by:

- Identifying priority remediation technology development needs;
- Establishing and overseeing action teams to plan and implement collaborative research projects to address remediation problems; and
- Addressing scientific, institutional, and regulatory barriers to innovative treatment technologies.

RTDF Action Teams are currently addressing five priority areas. The activities undertaken by the five active teams focus on the development, testing, and evaluation of in situ remediation technologies. The five teams are the Bioremediation Consortium, the Permeable Reactive Barriers Action Team, the Sediments Remediation Action Team, the In-Place Inactivation and Natural Ecological Restoration Soil-Metals Action Team, and the Phytoremediation of Organics Action Team. Through the collaboration of the RTDF, companies, government agencies, and universities are voluntarily sharing knowledge, experience, equipment, facilities, and even proprietary technology to address mutual remediation problems. The RTDF Web site is located at www.rtdf.org.

APPENDIX A

ER Program Policy and Guidance

Many guidance documents, directives, instructions and policies define and guide the implementation of the ER Program. The following is a list of a few of the more important documents, followed by a table of other pertinent DoD and Navy guidance and policies.

- **Management Guidance for the Defense Environmental Restoration Program (28 Sep. 2001).** This document, also known as the DERP Management Guide, is a companion to DoD Directive (DoDD) 4715.1, *Environmental Security* (24 Feb. 1996) and DoD Instruction (DoDI) 4715.7, *Environmental Restoration Program* (22 Apr. 1996). It provides additional and new guidance on implementation of the Defense Environmental Restoration Program, consistent with DoDDs and DoDIs. The latest version (as of October 2005) was released in September 2001; however, the DERP Management Guide is scheduled to be revised in Fiscal Year 2006.

- **Navy Environmental and Natural Resources Program Manual (OPNAVINST 5090.1B, 01 Nov. 1994)** and the **Marine Corps Environmental Compliance and Protection Manual (MCO P5090.2A, 10 July 1998).**

  OPNAVINST 5090.1B is the primary guidance for Navy policies and procedures for managing environmental and natural resource programs. The manual is consistent with all applicable statutes, EOs, DoD directives, and DON instructions. IR Program guidelines are found in Chapter 15.

  MCO P5090.2A establishes policy, discusses requirements, and assigns responsibilities for the management of the environment and natural resources for Marine Corps activities. It also contains IR Program guidance, and describes both command responsibilities for environmental management and updated funding procedures.

- **OPNAVINST 8020.15/MCO 8020.13 (14 Oct. 2003).** This instruction defines the authority and responsibility for the oversight, review, and verification of the explosives safety aspects of response actions involving MEC. The policy requires all response actions involving real property known or suspected to contain MEC to have approved plans and appropriate documentation. CNO has designated NOSSA to provide explosive safety oversight of the implementation of response actions involving military munitions and, upon completion of these response actions, to verify that appropriate explosives safety actions have been properly completed consistent with the reasonably anticipated reuse of the property. In addition, all emergency responses at other than operational ranges shall be documented and indefinitely maintained by NOSSA. To the extent practical and in accordance with OPNAVINST 5090.1B, other human health and environmental responses will be integrated with those addressing explosives safety.

- **NOSSA Instruction 8020.15 (08 Mar. 2004).** NOSSAINST 8020.15 assigns responsibility and establishes procedures and reporting requirements for oversight, review, and verification of the explosives safety aspects of the Navy MRP. This includes review and approval of each site's Explosives Safety Submission (ESS) before the start of munitions response activities, oversight of munitions response activities during operations, review of the After Action Report (AAR) following response activities, and final verification of all response actions taken. See Section 12.3.1 of this manual for additional information on ESS, and Section 12.5 for AAR.

- **NAVSEA OP 5, Ammunition and Explosives Safety Ashore, Seventh Edition.** This DON manual presents Navy and Marine Corps personnel with the characteristics and hazards of

ammunition, explosives, and other related hazardous materials, and specifies standardized safety regulations for all operations where ammunition and explosives are or are intended to be present. The manual provides explosives safety information and regulations regarding conventional ammunition, ammunition components, explosives, and related hazardous material operations at all Navy activities. It identifies the responsibility of NOSSA for general supervision over explosives safety throughout DON. In particular, Section 2-1.14 discusses decontamination and disposal of contaminated facilities, land, tools, material, equipment, and ordnance. OP 5 is not available online; copies can be requested by contacting NOSSA or NAVSEA.

Table A-1. ER Program Guidance, Directives, Instructions and Policies

Subject	Type	Issued by	Document Name	Web Address
Admin Records	Guidance	NFESC	CERCLA Administrative Record Management System User's Guide (UG-2024-ENV, 01 Sep. 1997)	http://enviro.nfesc.navy.mil/erb/erb_a/support/wrk_grp/arms/ARMSGuide.pdf
	Guidance	NFESC	CERCLA Administrative Record Management System User's Guide, Interim Draft (01 Dec. 2000)	http://enviro.nfesc.navy.mil/erb/erb_a/support/wrk_grp/arms/arms-interim-draft.pdf
	Guidance	DON	Navy Records Management Program Records Management Manual (SECNAVINST M5210.1, 31 Dec. 2005)	http://neds.daps.dla.mil/
Background Concentration	Policy	CNO	Navy Policy on the Use of Background Chemical Levels (30 Jan. 2004)	http://enviro.nfesc.navy.mil/erb/erb_a/regs_and_policy/don_background-chem-levels01-04.pdf
	Guidance	NAVFAC	Guidance for Environmental Background Concentration Analysis Volume I: Soil (NAVFAC UG-2049-ENV, April 2002)	http://enviro.nfesc.navy.mil/erb/erb_a/restoration/methodologies/bg_soil_guide.pdf
	Guidance	NAVFAC	Guidance for Environmental Background Concentration Analysis Volume II: Sediment (NAVFAC UG-2054-ENV, April 2003)	http://enviro.nfesc.navy.mil/erb/erb_a/restoration/fcs_area/con_sed/ug-2054-sed-guide.pdf
	Guidance	NAVFAC	Guidance for Environmental Background Concentration Analysis Volume III: Groundwater (NAVFAC UG-2059-ENV, April 2004)	http://enviro.nfesc.navy.mil/erb/erb_a/restoration/analysis/ug-2059-bkgrnd-analysis.pdf
BRAC	Memo	Navy	95-03 Approval Authority for Finding of Suitability to Transfer (FOST), Finding of Suitability to Lease (FOSL), and Environmental Summary Documents for Federal Agency-to-Agency Property Transfer (21 Aug. 1995)	https://www.denix.osd.mil/denix/Public/Policy/policy.html
	Policy	CNO	Department of the Navy (DoN) 93-03 BRAC Clean Up Policy (15 Sep. 1993)	https://www.denix.osd.mil/denix/Public/Policy/Navy/Instructions/note3.html
	Policy	DoD	DASN(E) Memo, "DON Environmental Policy Memorandum 02-01: Third Party Sites and Affirmative CERCLA Claims" (28 Jan. 2002)	https://portal.navfac.navy.mil/go/erb
	Policy	DoD	DoD Base Reuse Implementation Manual, Appendix F-79: Additional Environmental Cleanup after Transfer of Real Property (25 July 1997)	https://www.denix.osd.mil/denix/Public/Library/Cleanup/CleanupOfc/Documents/BRAC/brac_flu.html
	Policy	DoN	DON Environmental Policy Memorandum, Environmental Requirements for Federal Agency-to-Agency Property Transfer at BRAC Installations (26 May 1995)	http://www.epa.gov/swerffrr/documents/052695.htm
	Policy	DoD	Base Redevelopment and Realignment Manual (BRRM) (01 Mar. 2006)	http://www.defenselink.mil/brac/pdf/4165-66-M_BRRM.PDF

Table A-1. ER Program Guidance, Directives, Instructions and Policies

Subject	Type	Issued by	Document Name	Web Address
Explosives	Directive	DoD	Ammunition and Explosives Safety Standards (6055.9-STD, Oct. 2004)	http://www.dtic.mil/whs/directives/corres/pdf/p60559std_100504/p60559s.pdf
	Directive	DoD	6055.9 Explosives Safety Management and the Department of Defense (DoD) Explosives Safety Board (DDESB) (19 Aug. 2005)	http://www.dtic.mil/whs/directives/corres/pdf/d60559_081905/d60559p.pdf
	Instruction	CNO	OPNAV 8020.14 Department of the Navy Explosives Safety Policy (01 Oct. 1999)	http://neds.nebt.daps.mil/Directives/8020_14.pdf
	Instruction	CNO	OPNAV 8027.6E Naval Responsibilities for Explosive Ordnance Disposal (09 Jun. 1997)	http://neds.nebt.daps.mil/Directives/8027e6.pdf
	Instruction	DoD	4145.26 DoD Contractors' Safety Requirements for Ammunition and Explosives (09 Apr. 2005)	http://www.dtic.mil/whs/directives/corres/pdf/i414526_040905/i414526p.pdf
	Memo	Navy	93-02 Resource Conservation and Recovery Act (RCRA) Hazardous Waste Management Requirements to Conventional Explosive Ordnance Operations (10 Nov. 1993)	https://www.denix.osd.mil/denix/Public/Policy/Navy/Instructions/note1.html
	Proposed Rule	DoD	Closed, Transferred, and Transferring Ranges Containing Military Munitions; Proposed Rule (26 Sep. 1997)	https://www.denix.osd.mil/denix/Public/Policy/Range/rule.html
	Instruction	CNO	Explosives Safety Review, Oversight, and Verification of Response Actions Involving Military Munitions (OPNAVINST 8020.15, 14 Oct. 2003)	http://neds.nebt.daps.mil/Directives/8020_15.pdf
	Instruction	MCO	Explosives Safety Review, Oversight, and Verification of Response Actions Involving Military Munitions (MCO 8020.13, 14 Oct. 2003)	http://neds.nebt.daps.mil/Directives/8020_15.pdf
	Instruction	NOSSA	Military Munitions Response Program Oversight (NOSSAINST 8020.15, 08 Mar. 2004)	https://intranet.nossa.navsea.navy.mil/open/instructions/nossa8020-15.pdf
	Guidance	NAVSEA	Ordnance Pamphlet 5 (OP 5), Vol. 1, 7th Rev., Ammunition and Explosives Ashore, Safety Regulations for Handling, Storing, Production, Renovation, and Shipping	OP 5 is not available online; copies of OP 5 can be requested by contacting NOSSA or NAVSEA.
	Instruction	NOSSA	Standard Operating Procedures: Development, Implementation, and Maintenance for Ammunition and Explosives (NOSSAINST 8023.11A, 20 Aug. 2004	NOSSAINST 8023.11A is not available online without password permission; copies can be requested by contacting NOSSA or NAVSEA.
	Policy	DoD	DoD Policy to Implement the U.S. EPA's Military Munitions Rule (01 Jul. 1998)	https://www.denix.osd.mil/denix/Public/Policy/Range/rule.html
	Guidance	NAVSEA	Ammunition and Explosives Safety Ashore, Seventh Edition (NAVSEA OP 5, 15 Jan. 2001)	http://www.mfp.usmc.mil/TeamApp/G4Ammunition/Topics/20060726192424/OP_5.pdf

Table A-1. ER Program Guidance, Directives, Instructions and Policies

Subject	Type	Issued by	Document Name	Web Address
Explosives (cont'd)	Instruction	CNO	Interservice Responsibilities For Explosive Ordnance Disposal (OPNAV 8027.1G, 14 Feb. 1992)	http://neds.nebt.daps.mil/Directives/8027g1.pdf
	Directive	DoD	Department of Defense Physical Security of Sensitive Conventional Arms, Ammunitions, and Explosives (12 Aug. 2000)	http://www.dtic.mil/whs/directives/corres/pdf2/d510076p.pdf
	Guidance	CNO	Navy Munitions Program Guidance (30 Jun. 2005)	https://portal.navfac.navy.mil/go/erb, under the Munitions Response Workgroup page
	Instruction	DoD	Management and Disposition of Material Potentially Presenting an Explosive Hazard (03 Dec. 2004)	http://www.dtic.mil/whs/directives/corres/pdf/i414062_120304/i414062p.pdf
	Memo	DoD	DoD Memorandum of Definitions Related to Munitions Response Actions (18 Dec. 2003)	http://www.epa.gov/fedfac/pdf/MRP_Definitions_12-18-03.pdf
	Principles	DoD-U.S. EPA	Interim Final Management Principles for Implementing Response Actions at Closed, Transferring, and Transferred Ranges (07 Mar. 2000)	http://www.epa.gov/fedfac/pdf/Interim_Final_DoD-EPA_UXO_mgmt_principles.pdf
	Technical Manual	NAVSEA	Electromagnetic Radiation Hazards, Vol. 2, Rev. 13 (Hazards to Ordnance) (NAVSEA OP 3565/NAVAIR 16-1-529, 01 May 2004)	https://www.navaire3.com/documents/NAVSEA%20OP%203565_Vol_1%20Sixth%20Rev-Feb%202003.pdf
	Technical Publication	DDESB	Minimum Qualifications for UXO Technicians and Personnel, TP18 (20 Dec. 2004)	http://www.ddesb.pentagon.mil/TP18_122004.pdf
Funding	Policy	DON	Policy on Availability of ER,N Funding for Response Actions (04 Jun. 2001)	http://enviro.nfesc.navy.mil/erb/erb_a/regs_and_policy/don-policy-ern-funding.pdf
	Guidance	NAVFAC	NAVFAC DSMOA/Cost Reimbursement Implementation Guidance document (Ser 9900019/ENC-WS, 26 Mar. 1999)	http://www.denix.osd.mil/denix/State/DSMOA/Guidance/note1.html
	Memo	NAVFAC	Clarification of Duties and Responsibilities of Post Award Contract Personnel Involved in Environmental Contracts (NAVFACNOTE 4330, June 2005)	http://acq.navfac.navy.mil/acqmemo.asp
Health and Safety	Directive	DoD	Environmental Safety & Occupational Health (4715.1E, 19 Mar. 2005)	http://www.dtic.mil/whs/directives/corres/pdf/d47151e_031905/d47151ep.pdf
	Instruction	CNO	Occupational Safety And Health (NAVOSH) Program Manual (OPNAV 5100.23G, 30 Dec. 2005)	http://doni.daps.dla.mil/allinstructions.aspx
	Instruction	CNO	Navy Safety and Occupational Safety And Health Program (OPNAV 5100.8G, 02 July 1986)	http://neds.nebt.daps.mil/Directives/5100_8g.pdf
	Instruction	DoD	Safety And Occupational Health (SOH) Program (6055.1, 19 Aug. 1998)	http://www.dtic.mil/whs/directives/corres/html/60551.htm
	Instruction	DoD	Industrial Hygiene and Occupational Health (6055.5, 10 Jan. 1989, Updated 06 May 1996)	http://www.dtic.mil/whs/directives/corres/pdf/i60555wch1_011089/i60555p.pdf

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Subject	Type	Issued by	Document Name	Web Address
Health and Safety (cont'd)	Instruction	DoD	Occupational Health Surveillance Manual (6055.5M, May 1998)	https://www.denix.osd.mil/denix/Public/ES-Programs/Safety/Documents/6055.5/manual.html
	Instruction	DoD	Hazard Communication Program 6050.5 (06 May 1996)	http://www.dtic.mil/whs/directives/corres/html/60505.htm
	Instruction	NAVFAC	Safety and Health Program (NAVFACINST 5100.11J, 2000)	http://www2.navfac.navy.mil/doclib/files/5100_11J.pdf
Land Use Controls	Guidance	DoD	Guidance on Land Use Control Agreements with Environmental Regulatory Agencies (Mar. 2001)	http://enviro.nfesc.navy.mil/erb/erb_a/regs_and_policy/dod-luc-3-2-01.PDF
	Policy	DoD	Policy on Land Use Controls Associated with Environmental Restoration Activities (17 Jan. 2001)	http://enviro.nfesc.navy.mil/erb/erb_a/regs_and_policy/dod-luc-1-17-01.pdf
	Policy	DON	Land Use Controls, Interim Final (Policy Memorandum 99-02, 25 May 1999)	http://enviro.nfesc.navy.mil/erb/erb_a/regs_and_policy/luc-interim5-25-99.pdf
	Principles	DoD	Principles and Procedures for Specifying, Monitoring and Enforcement of Land Use Controls and Other Post-ROD Actions (02 Oct. 2003)	http://www.ert2.org/downloads/DoD%20Post%20ROD%20policy%20w%20Principles%201-04.pdf
Optimization	Policy	CNO	Policy for Optimizing Remedial and Removal Actions Under the Environmental Restoration Program (23 Apr. 2004)	http://enviro.nfesc.navy.mil/erb/erb_a/regs_and_policy/don-policy-ra-optimiz.pdf
	Guidance	NAVFAC	Guidance for Optimizing Remedy Evaluation, Selection, and Design (Apr. 2004)	http://enviro.nfesc.navy.mil/erb/erb_a/support/wrk_grp/raoltm/ug-2060-opt.pdf
	Guidance	NFESC	Guidance for Optimizing Remedial Action Operation (RA-O) (01 Apr. 2001)	http://enviro.nfesc.navy.mil/erb/erb_a/support/wrk_grp/raoltm/rao_interim_final2.pdf
	Guidance	NFESC	Guide to Optimal Groundwater Monitoring (01 Jan. 2000)	http://enviro.nfesc.navy.mil/erb/erb_a/support/wrk_grp/raoltm/case_studies/Int_Final_Guide.pdf
Perchlorate	Policy	Navy	Perchlorate Sampling Policy (05 Dec. 2003)	https://www.denix.osd.mil/denix/Public/Library/Water/Perchlorate/Policy/navy_perchlorate_policy-05Dec03.pdf
	Policy	DoD	Interim Policy on Perchlorate Sampling (29 Sep. 2003)	https://www.denix.osd.mil/denix/Public/Library/Water/Perchlorate/Policy/perchlorate_sampling_policy.pdf
	Guidance	DoD	Interim Guidance on Sampling and Testing for Perchlorate (05 Feb. 2004)	http://www.navylabs.navy.mil/Archive/PerchlorateInterim.pdf
	Policy	DoD	Policy on DoD Required Actions Related to Perchlorate (26 Jan. 2006)	https://www.denix.osd.mil/denix/Public/Library/MERIT/Perchlorate/efforts/policy/documents/PerchloratePolicy.pdf
	Guidance	DoD	Perchlorate Handbook (Mar. 2006)	https://www.denix.osd.mil/denix/Public/Library/MERIT/Perchlorate/efforts/policy/documents/Perchlorate-Handbook-Final-3-30-06.pdf
	Policy	DON	Perchlorate Sampling and Management Policy (5090, N456J Ser/6U838120, 16 May 2006)	https://www.denix.osd.mil/denix/Public/Library/MERIT/Perchlorate/efforts/policy/documents/navy-perch-policy.pdf

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Subject	Type	Issued by	Document Name	Web Address
Program Guidance/ Policy	Guidance	DoD	Management Guidance for Defense Environmental Restoration Program (DERP) (Sep. 2001)	https://www.denix.osd.mil/denix/Public/ES-Programs/Cleanup/guida; and https://www.denix.osd.mil/denix/Public/ES-Programs/Cleanup/derp_mgt_guidance_final_sept2001.pdf
	Directive	DoD	Natural Resources Management Program (4700.4, 24 Jan. 1989)	http://www.dtic.mil/whs/directives/corres/pdf/d47004_012489/d47004p.pdf
	Directive	DoD	Archaeological and Historic Resources Management (4710.1, 21 Jun. 1984)	http://www.dtic.mil/whs/directives/corres/pdf/d47101_062184/d47101p.pdf
	Instruction	DoD	Environmental Education, Training and Career Development (4715.10)	https://www.denix.osd.mil/denix/Public/ES-Programs/Education/Policy/note1.html
	Instruction	DoD	Environmental Restoration Program (4715.7, 22 Apr. 1996)	https://www.denix.osd.mil/denix/Public/ES-Programs/Cleanup/DoDI/4715-7.html
	Instruction	DoD	Environmental Remediation For DoD Activities Overseas (4715.8, 02 Feb. 1998)	https://www.denix.osd.mil/denix/Public/Library/Intl/Policy/note3.html
	Instruction	DON	Department Of The Navy Cultural Resources Program (SECNAV 4000.35A, 09 Apr. 2001)	http://doni.daps.dla.mil/allinstructions.aspx
	Instruction	DoD	Regional Environmental Coordination (4715.23, May 1996)	https://www.denix.osd.mil/denix/Public/ES-Programs/Compliance/Policy/note4.html
	Instruction	CNO	Environmental and Natural Resources Program Manual (OPNAVINST 5090.1B, 01 Sep. 1999)	http://neds.nebt.daps.mil/5090.htm
	Instruction	MCO	Marine Corps Environmental Compliance and Protection Manual (MCO P5090.2A)	https://www.denix.osd.mil/denix/Public/Policy/Marine/5090.2A/contents.html
	Policy	DON	Defense Acquisition Operating Workforce Improvement Act (DAWIA) Guide (Apr. 2006)	http://acquisition.navy.mil/navyaos/acquisition_career_management/policy_and_guidance_library
	Policy	NAVFAC	Memorandum: Procedures for Federal Interagency Acquisition (18 Sep. 2002)	http://acq.navfac.navy.mil/pdffiles/02-14.pdf
	Instruction	OMB	Cost Principles for Non-Profit Organizations (10 May 2004)	http://www.whitehouse.gov/omb/circulars/a122/a122_2004.pdf
	Policy	DON	DON Environmental Policy Memorandum 95-04: Guidance for Environmental Restoration Program at Active Bases (26 Oct. 1995)	https://portal.navfac.navy.mil/go/erb
	Fact Sheet	DoD	CERCLA/RCRA Overlap in Environmental Cleanup	https://www.denix.osd.mil/denix/Public/Library/Cleanup/CleanupOfc/Documents/Cleanup/brac_RCRAfinal.pdf
	Policy	CNO	Policy for Conducting Five-Year Reviews Under the Installation Restoration Program (21 May 2004)	http://enviro.nfesc.navy.mil/erb/erb_a/regs_and_policy/don-policy-5yrreview.pdf
	Policy	CNO	Policy for Conducting CERCLA Statutory Five-Year Reviews (April 2004)	http://enviro.nfesc.navy.mil/erb/erb_a/regs_and_policy/don-policy-5yrreview.pdf (attachment)

Table A-1. ER Program Guidance, Directives, Instructions and Policies

Subject	Type	Issued by	Document Name	Web Address
Program Guidance/ Policy (cont'd)	Policy	DoD	Interim Policy on Integration of Natural Resource Injury (NRI) Responsibilities and Environmental Restoration Activities (02 May 2000)	http://enviro.nfesc.navy.mil/erb/erb_a/regs_and_policy/dod-nri.pdf
	Policy	CNO	Policy on Natural Resource Injury and Damages in the Installation Restoration Program (21 Dec. 2001)	http://enviro.nfesc.navy.mil/erb/erb_a/regs_and_policy/don-policy-nri.pdf
	Guidance	NAVFAC	Navy Guidance for Habitat Restoration Monitoring (July 2004)	http://web.ead.anl.gov/ecorisk/related/documents/HabitatRestorationMonitorGuide0704.pdf
	Summary	DON	Environmental Restoration Report for Fiscal Years 2005-2009 (Five Year Plan)	http://5yrplan.nfesc.navy.mil/
	Policy	CNO	Memorandum, FY06 Environmental Restoration Salary/Support Funds (26 Sep. 2005)	https://portal.navfac.navy.mil/go/erb
	Policy	DON	Environmental Policy Memorandum 03-01: Delegation of Authority To Sign State Cleanup Agreements (14 Oct. 2003)	https://portal.navfac.navy.mil/go/erb
	Policy	DON	CNO-N45 Memorandum: Remediation Costs Associated With Defense Logistics Agency/Defense Energy Support center MILCON Projects on Navy Installations (15 Nov. 2005)	https://portal.navfac.navy.mil/go/erb
	Policy	DON	Assignment of Responsibilities to the BRAC PMO and Delegation of Authority (15 Nov. 2004)	https://portal.navfac.navy.mil/go/erb
	Policy	DoD	Strategy on Environmental Justice (24 Mar. 1995)	https://www.denix.osd.mil/denix/Public/Library/Planning/Justice/note7.html
	Guidance	DoD	Early Transfer Authority, A Guide to Using ETA to Dispose of Surplus Property	http://www.oea.gov/OEAWeb.nsf/All+Docs/859FA93E45F979DC85256F4F0074A921?OpenDocument
	Policy	DON	Policy for Streamlining the Assessment, Documentation, and Disclosure of the Environmental Condition of Property (ECP) for Non-BRAC Real Estate Actions (05 July 2006)	https://portal.navfac.navy.mil/go/erb
	Guidance	NAVFAC	Environmental Community Management Plan (CMP)	https://portal.navfac.navy.mil/pls/portal/docs/PAGE/TFD/CM/ENVIRONMENTAL/ENVIRONMENTAL_COMMUNITY_MANAGEMENT_PLAN.PDF
	Guidance	NAVFAC	NAVFAC Contracting Manual (NAVFAC P-68)	https://portal.navfac.navy.mil/
	Guidance	NAVFAC	NAVFAC Real Estate Procedural Manual (NAVFAC P-73)	https://portal.navfac.navy.mil/
	Guidance	NAVFAC	NAVFAC Environmental Cost Reimbursement Contract Manual (NAVFAC P-1160)	https://portal.navfac.navy.mil/

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Subject	Type	Issued by	Document Name	Web Address
Program Guidance/ Policy (cont'd)	Guidance	DON	Guidance for Documenting Site Closeout Milestone (NAVFAC UG-2072-ENV, Mar. 2006)	http://enviro.nfesc.navy.mil/erb/erb_a/regs_and_policy/UG-2072-ENV.pdf
	Guidance	DoD-U.S. EPA	DoD/U.S. EPA Joint Guidance on Streamlined Site Closeout and NPL Deletion Process for DoD Facilities	https://www.denix.osd.mil/denix/Public/Library/Cleanup/CleanupOfc/Documents/Signed_RACR_Guidance.pdf
QA/QC	Guidance	DoD	Quality Systems Manual for Environmental Laboratories, Final Version 2 (July 2002)	https://www.denix.osd.mil/denix/Public/Library/Compliance/EDQW/dod_v2_jul02_final.pdf
	Guidance	DoD-DOE-U.S. EPA	Intergovernmental Data Quality Task Force – Draft QA Project Plan Policy and Guidance	http://www.epa.gov/swerffrr/documents/data_quality/ufp_sep00_appx_c.htm
	Guidance	DoD	Quality Systems Manual for Environmental Laboratories, Draft Version 3 (Dec. 2004)	http://www.navylabs.navy.mil/ManualsDocs.htm#Guidance
	Manual	DoD	Best Practices for Data Quality Oversight of Environmental Sampling and Testing Activities, Final Report (May 1999)	http://www.navylabs.navy.mil/ManualsDocs.htm#Guidance
	Guidance	NAVFAC	Quality Assurance in Cost-to-Complete for the Environmental Cleanup Program (in draft)	https://portal.navfac.navy.mil/go/erb
	Manual	DON	Navy Installation Restoration Chemical Data Quality Manual (IR CDQM) (01 Sep. 1999)	http://enviro.nfesc.navy.mil/erb/erb_a/support/lab_qa/ircdqm.pdf
	Guidance	DoD-DOE-U.S. EPA	Uniform Federal Policy for Quality Assurance Project Plans (Mar. 2005)	http://www.epa.gov/swerffrr/documents/qualityassurance.htm
Risk Assessment	Instruction	DoD	Occupational Radiation Protection Program (6055.8, 31 Mar. 1989, Updated 06 May 1996)	http://www.dtic.mil/whs/directives/corres/pdf/i60558wch1_033189/i60558p.pdf
	Guidance	DoD	Guide for Incorporating Bioavailability Adjustments into Human Health and Ecological Risk Assessments at DoD Facilities (01 Jun. 2003)	http://enviro.nfesc.navy.mil/erb/erb_a/support/wrk_grp/bio_a/DoDbioa-guide-part1.pdf, and http://enviro.nfesc.navy.mil/erb/erb_a/support/wrk_grp/bio_a/DoDbioa-guide-part2.pdf
	Guidance	DoD-DOE-U.S. EPA-NRC	Multi-Agency Radiation Survey and Site Investigation Manual (NTIS document number PB97-117659, Aug. 2000)	http://www.epa.gov/radiation/marssim/
	Guidance	DoD	Relative Risk Site Evaluation Primer (1997)	https://www.denix.osd.mil/denix/Public/Library/Cleanup/CleanupOfc/Documents/Cleanup/relrisk_toc_pdf.html
	Guidance	DON	Navy Human Health Risk Assessment (HHRA) Guidance (Web-based; last updated: 20 Apr. 2006)	http://www-nehc.med.navy.mil/HHRA
	Guidance	DON	Navy Human Ecological Risk Assessment (ERA) Guidance (Web-based; last updated: 23 Jan. 2006)	http://web.ead.anl.gov/ecorisk
	Policy	DON	Department of the Navy Environmental Policy Memorandum 97-04; Use of Ecological Risk Assessments (16 May 1997)	http://enviro.nfesc.navy.mil/erb/erb_a/regs_and_policy/don_pol97-04.pdf

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Subject	Type	Issued by	Document Name	Web Address
Risk Assessment (cont'd)	Policy	CNO	Navy Policy for Conducting Human Health Risk Assessments Under the Environmental Restoration Program (12 Feb. 2001)	http://enviro.nfesc.navy.mil/erb/erb_a/regs_and_policy/HRApolicy.pdf
	Policy	CNO	Navy Policy for Conducting Ecological Risk Assessments (05 Apr. 1999)	http://enviro.nfesc.navy.mil/erb/erb_a/regs_and_policy/cno-era-policy.pdf
Sediment	Fact Sheet	CNO	Watershed Contaminated Source Document (WCSD) (01 Mar. 2003)	http://web.ead.anl.gov/ecorisk/case/docs/WCSD_Factsheet_Final_v2.pdf
	Guidance	SPAWAR	Interim Guide for Assessing Sediment Transport at Navy Facilities (Sep. 2004)	http://web.ead.anl.gov/ecorisk/methtool/pdf/InterimGuideforAssessingSedimentTransport_atNavySites.pdf
	Guidance	SPAWAR	User's Guide for Determining the Sources of Contaminants in Sediments (the "Fingerprinting Guide") (Sep. 2003)	http://www.spawar.navy.mil/sti/publications/pubs/tr/1907/tr1907cond.pdf
	Guidance	NAVFAC	Implementation Guide for Assessing and Managing Contaminated Sediment at Navy Facilities (01 Mar. 2003)	http://enviro.nfesc.navy.mil/erb/erb_a/restoration/fcs_area/con_sed/ug-2053/ug-2053-sed.pdf
	Guidance	NAVFAC	Implementation Guide for Assessing and Managing Contaminated Sediment at Navy Facilities (Jan. 2005)	http://enviro.nfesc.navy.mil/erb/erb_a/restoration/fcs_area/con_sed/ug-2053/ug-2053-sed-rev-2.pdf
	Policy	DON	Installation Restoration Policy on Sediment Investigation and Response Action	http://enviro.nfesc.navy.mil/erb/erb_a/regs_and_policy/don_policy_sediment.pdf
	Policy	CNO	Policy on Sediment Site Investigation and Response Action (08 Feb. 2002)	http://web.ead.anl.gov/ecorisk/policy/pdf/Navy_IR_Sediment_Policy.pdf

APPENDIX B

Summary of Selected Technologies for Environmental Restoration

B.1 Screening Technologies for Remedial Investigation

B.1.1 Geophysical Surveys/Technologies

Geophysical surveys can help to determine the presence of buried utilities, buried structures, or subsurface variabilities. Geophysical surveys are completed at the surface without the need for intrusive monitoring. They typically evaluate variability in subsurface response to an induced signal in order to generate a profile of the subsurface. Trained and qualified personnel can interpret signal responses to determine the presence of various geologic features, including depth to bedrock and depth to water. In addition, geophysical methods are capable of determining the presence and distribution of MEC in the subsurface (see Chapter 12 for a description of munitions and explosives of concern [MEC]). Common geophysical methods include ground-penetrating radar, seismic reflection, magnetometry, and electro-magnetics:

Ground-Penetrating Radar (GPR) has been developed over the past 30 years for shallow, high-resolution, subsurface investigations. GPR uses high-frequency pulsed electromagnetic waves (generally 10 MHz to 1,000 MHz) to acquire subsurface information. It is used to map geologic conditions such as depth to bedrock, depth to water table, and location of drums, pipes, and tanks. Energy is propagated downward into the ground and is reflected back to the surface from boundaries at which there are electrical property contrasts.

Seismic Methods involve transmission of acoustic waves into the subsurface and measurement of travel times for the reflected and refracted waves. These data can yield useful information about thickness and depths of geological layers, depth of groundwater, and location of burial pits and trenches; and can yield useful geologic structural information such as faults and bedding plane orientation and depth.

Magnetometry is a technology used for locating subsurface iron, nickel, cobalt, and their alloys which are typically referred to as ferrous materials (non-ferrous metals will not be detected). The technology has been widely used for quickly locating buried or subsurface ferrous objects. Some examples of applications include: locating buried ferrous drums, tanks, pipes, ordnance, abandoned well casing, and boundaries of landfills (if the landfill contains ferrous metal).

Electromagnetic Technologies allow for measurement of subsurface electrical conductivities, including subsurface lithologic materials and porous fluids. Electrical conductivity is a function of the type of material, the porosity, the permeability, and the fluids in the pores. In general, conductivity of the pore fluids will dominate the measurement. Measurements can be made as stationary measurements or within a continuous profiling application. The method provides the means for delineating trenches, buried waste, utility lines, and in some cases contaminant plumes. Electro-magnetic technologies are also used for UXO detection and thus play an important role in MRP sites.

Additional information is provided at the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb), as well as the document *Engineering and Design – Geophysical Exploration for Engineering and Environmental Investigations* (USACE EM 1110-1-1802, 31 Aug. 1995).

B.1.2 Field Radiation Surveys

Field radiation surveys can be implemented to detect radioactive anomalies, to locate buried radioactive materials, and to guide additional sampling efforts. Field radiation surveys are completed at the surface without the need for intrusive sampling, and are generally conducted using common screening equipment such as *gamma*-iodide scintillators.

B.1.3 Cone Penetrometer Testing (CPT)

CPT can be used to characterize the subsurface geology without the need for a pilot boring or traditional monitoring wells. CPT is typically conducted from a large, mobile platform (e.g., a 20-ton rig) equipped with a retractable probe system that is deployed from the vehicle. The penetrometer probe is driven into the subsurface under hydraulic pressure, and sensitive sensors on the probe record differences in resistivity during penetration. These differences in resistivity, which are based on variability in grain-size distribution in different subsurface horizons, are processed by a computer and output as an interpretation of the subsurface geology at the test location. CPT rigs are commonly equipped with a grouting system to seal the boring upon completion.

B.1.4 Site Characterization Analysis and Penetrometer System (SCAPS)

SCAPS is a field screening technology that has many uses, including in situ detection of petroleum hydrocarbons and/or metals contamination, and obtaining geotechnical/hydrogeologic information such as soil type, water table elevation, hydrostatic head distribution, effective porosity, and hydraulic conductivity. The SCAPS is typically a standard 20-ton truck equipped with a cone penetrometer. The penetrometer probe is pushed into the subsurface and detects subsurface contamination using a secondary sensor. Laser-induced fluorescence (LIF) is used to detect hydrocarbon contamination, and x-ray fluorescence (XRF) is commonly used to detect metals. In some cases fluorescence probes have been successful in identifying dense, nonaqueous-phase liquid (DNAPL) source zones through commingled NAPL detection where petroleum-based fluorophores are mixed with halogenated organics. Also, membrane interface probes (MIPs) and ion trap mass spectrometers have been deployed to detect and quantify contaminants such as methyl-*tert*-butyl ether (MTBE) and other organics down to regulatory levels.

SCAPS is commonly used to screen a large land area and/or to locate a migrating plume of petroleum hydrocarbons. Groundwater modeling software allows the data to be presented in maps depicting three-dimensional contaminant flux distribution.

SCAPS is fully self-contained and includes soil/groundwater sample retrieval capabilities, a grouting system to seal the boring upon probe withdrawal, and can be equipped with a decontamination system. SCAPS is intended as a field-screening tool. It gathers, processes, and displays real-time geotechnical and semi-quantitative contamination data. The rapid optical screening tool is a commercially available LIF probe that is compatible with a standard CPT or SCAPS rig. Additional information on SCAPS can be found at the following Web sites: http://www.spawar.navy.mil/sti/publications/pubs/td/2744r1/; and http://www.liquefaction.com/insitutests/scaps.htm.

Customized monitoring wells can be designed and installed in appropriate locations using SCAPS and direct-push wells, which compare favorably to conventional monitoring wells. Additional information can be found at the following Web sites: http://www.clu-in.org/download/char/nfesc_dp_well_eval.pdf; and http://www.estcp.org/projects/cleanup/200011o.cfm.

B.1.5 Membrane Interface Probe (MIP)

MIP is a semi-quantitative screening tool for the delineation of volatile organic compounds (VOCs) such as chlorinated solvents and petroleum hydrocarbons. MIPs can be attached to common direct-push

equipment such as Geoprobe and CPT rigs (Geoprobes can be mounted on various types of rigs allowing these devices to be generally more available and mobile than a CPT but cannot generate as much push force), and detect the presence of VOCs using three detectors (flame ionization detector [FID], photo-ionization detector [PID], and electron capture detector [ECD]). Contamination can be detected in groundwater and soil including the vapor phase, absorbed phase, and dissolved phase.

The MIP is composed of a semi-permeable membrane consisting of a thin film polymer impregnated into a stainless steel screen for support. The membrane is placed in a heated block attached to the probe. The block is heated to approximately 100-120°C. Heating the block accelerates the diffusion of the contaminants through the membrane. Diffusion occurs as a result of a concentration gradient between the contaminated matrix and a clean carrier gas directly behind the membrane. The carrier gas sweeps behind the membrane and transports the contaminants to gas phase detectors located at the surface. The FID is best used for straight chain hydrocarbons (e.g., methane and butane), the PID is best for aromatic hydrocarbons (e.g., benzene, toluene, ethylbenzene, and xylene [BTEX] compounds), and the ECD is best for chlorinated compounds (e.g., TCE and PCE).

B.1.6 Nonaqueous-Phase Liquid Screening Tools

Field screening tools are available that allow rapid and effective evaluation for the presence of DNAPLs or LNAPLs. Such field screening tools include hydrophobic dyes, ultraviolet (UV) fluorescence, ribbon NAPL sampler, geophysics, organic vapor analyzer, groundwater profiling (i.e., MIP), and Partitioning Interwell Tracer Test (PITT):

Hydrophobic Dyes – When agitated in the presence of a hydrophobic dye, an organic contaminant, including petroleum or chlorinated hydrocarbons, will display a colorimetric reaction, thus indicating the presence of the contaminant.

Ultraviolet (UV) Fluorescence – Petroleum and chlorinated hydrocarbons tend to fluoresce when observed under UV light. A field-portable UV light can be shone on a sample of environmental media, and will elicit a visible fluorescence if NAPL is present. Field screening using a field portable UV light shall be conducted in dark or near-dark conditions, requiring some additional mobilization effort.

Ribbon NAPL Sampler – This is a flexible membrane with a color-reactive hydrophobic cover that is installed downhole. NAPL wicks into the cover, leaches dye from its surface, and visibly stains the white backside of the reactive material. The liner/cover is inverted out of the hole to prevent cross-contamination of the cover. The liner then is stripped from the cover to inspect the white side of the cover for stains, which are indicative of contact with NAPL.

Surface Geophysical Surveys – These can be used to delineate subsurface stratigraphy, buried metal, and conductive fluids. Although this does not typically provide direct evidence of NAPL, this information can be very important for NAPL characterization efforts. Additionally, several less-widely used high resolution techniques can be used to delineate DNAPL traps and infer DNAPL presence. These methods should be used with caution, because they are subject to numerous interferences and interpretation errors. DNAPL is generally a poor target for geophysical methods and direct detection of DNAPL is unlikely.

Organic Vapor Analyzers – These can be applied as a quick, inexpensive technique that can detect high concentrations of VOCs associated with the presence of NAPL.

Groundwater Quality Profiling – This technique involves using direct-push tools, such as a MIP, to locate NAPL source zones by collecting depth-discrete water samples in coarse sediments. Detailed

groundwater concentration profiles developed using this technique can be used to infer the location of upgradient NAPL sources.

Partitioning Interwell Tracer Test (PITT) – This test estimates residual DNAPL saturation by comparing the retardation of tracers which partition into the DNAPL phase (i.e., alcohols) to tracers that are not retarded (i.e., bromide).

Additional information can be found at the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb), and in U.S. EPA's *Site Characterization Technologies for DNAPL Investigations* (EPA/542/R-04/017, Sep. 2004).

B.1.7 Field Analytical Methods

X-Ray Fluorescence (XRF)

XRF is a method of detecting metals and other elements, such as arsenic and selenium, in soil and sediment by exciting the electrons in the metals valence and measuring the response from this electron excitation. Some of the primary elements of environmental concern that XRF can identify are arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, silver, and zinc. Field-portable XRF units that run on battery power and use a radioactive source were developed for use in analysis for lead-based paint and now are accepted as a standalone technique for lead analysis. In response to the growing need for field analysis of metals at hazardous waste sites, many XRF units have been adapted for use in the environmental field. The field-rugged units use analytical techniques that have been developed for analysis of numerous environmental contaminants in soils. They provide data in the field that can be used to identify and characterize contaminated sites and guide remedial work, among other applications.

Field portable XRF units have been shown to provide rapid (<5 minutes/dried sample) quantification of more than 20 elements at a time. Detection limits for portable units have typically been reported in the 100-1,000 ppm range for most metals, while laboratory-based XRF units have greater resolution and are capable of lower detection limits in the range of 2-25 ppm. XRF analyses, unlike other metal analyses that rely on digestion of samples with various acids, do not destroy the sample and require only a small amount of material. XRF has produced results that correlate strongly with results produced using conventional atomic absorption and inductively coupled plasma (ICP) spectroscopy.

Chloride Detectors

Chloride detectors are available that can measure the in situ organic chloride content and semi-quantitatively express the concentration of polychlorinated biphenyls (PCBs) in a soil sample. A chloride-specific electrode in the detector measures only organic chloride while ignoring inorganic chloride.

Fiber-Optic Chemical Sensors

Fiber-optic chemical sensors have primarily been developed to measure volatile petroleum constituents such as benzene, toluene, ethylbenzene, and xylenes (BTEX) and chlorinated VOCs such as trichloroethylene (TCE), tetrachloroethylene (PCE), and carbon tetrachloride in water, air, or soil gas. The sensors have been developed to be placed down monitoring wells to provide in situ measurements of c concentrations in ground water. The sensors typically measure total VOC concentrations and are not capable of distinguishing individual volatile organic chemicals. With appropriate chemically selective layers, the sensors also can measure semivolatile organic compounds (SVOCs).

Gas Chromatography (GC) and Mass Spectrometry (MS)

Gas chromatography (GC) analysis is a widely used technique for field-based analysis. Analysis of organic compounds is possible for a variety of matrices such as water, soil, soil gas, and ambient air. GC analysis with photoionization detection has been used extensively to characterize sites contaminated with VOCs. Likewise, GCs coupled with an electron capture detector are used for analysis on sites contaminated with chlorinated pesticides. The recent development of truly field portable quadruple mass spectrometers now permits GC/MS analysis which provides definitive identification.

Immunoassay

Immunoassay technology uses antibodies developed to bind with a target compound or class of compounds in order to identify and quantify organic and inorganic compounds. The antibodies can be highly specific to the target compound or group of compounds and the immunoassay kits are relatively quick and simple to use. The determination of the target analyte's presence is made by comparing the color developed by a sample of unknown concentration with the color formed by the standard containing the analyte at a known concentration. The concentration can be estimated roughly by eye or can be determined more accurately with a photometer or spectrophotometer.

Laser-Induced Fluorescence (LIF)

LIF provides real-time, in situ field screening of hydrocarbons in undisturbed subsurface soils and groundwater. The LIF sensors are deployed as part of integrated CPT or SCAPS systems. LIF can detect gasoline, diesel fuel, jet fuels, fuel oil, motor oil, grease, and coal tar in the subsurface.

Test Kits

Various test kits have been developed for many analytes. These kits use a chemical reaction that produces color to identify contaminants, both qualitatively and quantitatively. Test kits are available that can provide quantitative testing for definitive site characterization as well as for monitoring the operating conditions of a remediation system or to confirm that contaminated soils have been removed.

B.1.8 Field Screening for Rapid Sediment Characterization

Because traditional methods available to analyze contaminated marine sediments are often both slow and expensive, new methods for rapid sediment characterization (RSC) are being developed to quickly characterize contaminated marine sediments during the screening phase. Using these methods, analysis is done on site, and results are available within a few minutes or hours instead of a few days or weeks. These methods can be used to reduce the number of laboratory samples that are needed to determine the nature and extent of contamination in marine sediments.

New rapid screening tests are continually being developed and a check of the literature for recent developments should be conducted prior to selecting screening tests for a site. Sources of information on sediment characterization include the Navy's ERB Web site (https://portal.navfac.navy.mil/go/erb) under Field Screening; and the Rapid Sediment Characterization (RSC) tools available at *RSC Tools for Ecological Risk Assessments* (http://web.ead.anl.gov/ecorisk/issue/pdf/rsc.pdf). More information on assessing sediments at Navy sites can be found in the *Implementation Guide for Assessing and Managing Contaminated Sediment at Navy Facilities, Rev. 2* (SPAWAR Systems Center (SSC) San Diego and Battelle, Jan. 2005). Several screening techniques taken from the above references are summarized below.

Total PAH by Fluorometry

The total PAH assay using fluorometry is based on measurement of fluorescence observed following UV excitation of organic solvent extracts of sediments. It is fairly rapid (20 samples/day) and inexpensive, and is strongly correlated with GC/MS and high-performance liquid chromatography (HPLC) analyses. This method is particularly sensitive to compounds containing aromatic rings, such as polycyclic aromatic hydrocarbons (PAHs), but does not respond to a wide range of organic compounds found in sediment, such as aliphatic hydrocarbons from oils, fatty acid methyl esters from natural and anthropogenic sources and phthalate esters.

Total PCBs, Chlorinated Pesticides, and Other Organic Chemicals by Enzyme Immunoassay

Enzyme immunoassays are biochemical procedures that utilize the binding of specific chemicals in a sample (with an enzyme-labeled version of the chemical) to antibodies provided with a test kit. For sediments, a small sample is quickly extracted and purified. The extract is then tested with the immunoassay kit. Chemicals bound to the antibodies are separated from the rest of the sample and associated interferences by simple washing. The labeled component is detected by adding a color indicator. Enzyme immunoassays are inherently free of most confounding factors and are available for several aromatic compounds (e.g., PCBs, pesticides, petroleum hydrocarbons, PAHs, trinitrotoluene, benzene). These assays typically identify the presence or absence of chemical mixtures such as total PCBs at some predetermined concentration. Typical detection limits are usually 1-3 orders of magnitude higher than sediment-specific laboratory methods; however, they are sufficient to identify problem areas that may warrant more investigation. The detection limit for total PCBs in sediments for various test kits ranges from <0.1-5 ppm (wet weight). This method is most efficient at sites that have a limited number of contaminants of concern, where only a single immunoassay is required. Several different immunoassays would be required to fully characterize sediments containing a wide range of compound classes of concern, because each kit is sensitive to only one of the compounds or classes of compounds described above.

Total Petroleum Hydrocarbons by Infrared Spectroscopy

The infrared assay is intended to be a field version of the extractable residue analysis of U.S. EPA Method 418.1. This analysis is useful for estimating total petroleum hydrocarbons (TPH) because it measures responses in selected narrow ranges of the infrared spectrum. A variety of hydrocarbon structures are simultaneously detected in a sample by characteristic changes in carbon-hydrogen or carbon-carbon bonds (e.g., stretching and bending vibrations). These changes are induced by exposure to infrared radiation. Detection limits are typically in the range of 1-10 ppm. The infrared method has the advantage of providing a rapid, quantitative determination of TPH concentrations, but also has some limitations that can produce either negative or positive analytical bias. As a result, this screening method may be less accurate than other techniques for measuring hydrocarbons such as field gas chromatography or TLC, which have a higher cost.

Semivolatile Organic Compounds by Thin-Layer Chromatography (TLC)

The TLC field method can be used for a wide range of semivolatile organic compounds with detection limits of approximately 10 ppm. Lower detection limits to approximately 1 ppm are feasible for some compounds. This method involves placing a drop of sample extract near the bottom of a silica gel-coated glass plate. The end of the plate is immersed in an appropriate solvent. As the solvent front moves upward on the plate, the compounds of interest are separated out of the mixture based on their mobility in the solvent-solid phase system, and can then be identified both qualitatively and quantitatively, using ultraviolet light or iodine to visualize the separated chemicals. Caution should be used to ensure that detection limits achieved by this method are adequate.

Metals by X-ray Fluorescence (XRF)

As discussed in Section B.1.7, field portable XRF units have been used to analyze soils and sediments for various metals. The advantages of this method include rapid quantification of more than 20 elements at a time making this an excellent tool for RSC. Additional information about XRF is included in Section B.1.7.

Rapid Toxicity Tests

The Microtox® test is a rapid, sensitive method of toxicity testing based on light emission by the luminescent bacterium *Photobacterium phosphoreum* in the presence and absence of aqueous toxicants. The emitted light is a product of the bacterial electron transport system and thus directly reflects the metabolic state of the cells. Accordingly, decreased luminescence following exposure to chemical contaminants provides a quantitative measure of toxicity. Two or more rapid toxicity tests may be performed in tandem to increase sensitivity and coverage; for example, with Microtox® and Mutatox®.

QwikSed is a rapid bioassay system developed by the Navy for marine sediments. This method is based on measurement of a reduction in light from a bioluminescent dinoflagellate such as *Gonyaulux polyedra* or *Ceratocorys horrida* following exposure to a toxicant. The toxic response is usually measured within 24 hours from the start of the test and can be conducted for a 4-day acute test or a 7- to 11-day chronic test. A measurable reduction or inhibition in bioluminescence is an adverse effect. This method also shows correlation to amphipod toxicity tests.

B.2 Remediation Technologies

Common technologies for remediation of groundwater, free product/NAPL, sediment, and soil are listed in Tables B-1 through B-4, respectively. Information about these technologies can be found at the NAVFAC ERB Web site (https://portal.navfac.navy.mil/go/erb).

Other valuable resources include:

- RITS: https://portal.navfac.navy.mil/go/erb;
- VOC Off-Gas Treatment Technologies Database: https://portal.navfac.navy.mil/go/erb;
- Ex Situ Groundwater Treatment Technology Evaluation Tool: http://er.battelle.org/ExsituGW;
- FRTR: http://www.frtr.gov; and
- U.S. EPA Hazardous Waste Clean-Up Information: http://clu-in.org.

Table B-1. Groundwater Technologies

Containment	In Situ Treatment	Ex Situ Treatment
• Slurry Wall • Sheet Pile • Pump and Treat	• Air Sparging • Chemical Oxidation • Enhanced Bioremediation • In Situ Heating • Permeable Reactive Barriers • Monitored Natural Attenuation • Phytoremediation	• Air Stripping • Bioreactors • Chemical Oxidation/Reduction • Constructed Wetlands • Granular Activated Carbon • Ion Exchange • Precipitation

Table B-2. Free Product/NAPL Technologies

Containment	In Situ Treatment	Ex Situ Treatment
• Slurry Wall • Sheet Pile • French Drain Collection Trench	• Bioslurping • Drawdown Pumping • Skimming • Surfactants • In Situ Heating	• Oil/Water Separator • Dissolved Air Floatation

Table B-3. Sediment Technologies

Containment	In Situ Treatment	Ex Situ Treatment
• In Situ Capping • Confined Disposal Facility • Contained Aquatic Disposal	• In Situ Bioremediation • Natural Recovery • Phytoremediation	• Chemical Leaching • Off-Site Disposal • Bioremediation • Vapor Extraction • Soil Washing • Thermal Treatment • Stabilization/Solidification

Table B-4. Soil Technologies

Containment	In Situ Treatment	Ex Situ Treatment
• Capping	• Bioventing • Enhanced Bioremediation • In Situ Heating • Land Tilling • Natural Attenuation • Soil Flushing • Soil Vapor Extraction	• Chemical Leaching • Off-Site Disposal • Bioremediation • Vapor Extraction • Soil Washing • Thermal Treatment • Stabilization/Solidification

APPENDIX C.1

Personal Protective Equipment Selection and Testing

1. Personal Protective Equipment (PPE) Selection

PPE programs at ER Program sites shall be implemented in accordance with the requirements of 29 CFR 1910.120(g), 1910.95, 1910.132, and 1910.134. PPE will be selected and used in accordance with the requirements of 29 CFR Section 1910, Subpart I, 29 CFR Section 1910.120, and OPNAVINST 5100.23 (Ser). Selection will be based on an evaluation of the performance characteristics of the PPE relative to the task-specific conditions and duration and the hazards identified at the site. PPE is separated into four levels of protection based on four levels of hazards as identified in 29 CFR Section 1910 (2000), Appendix B. Typical PPE ensembles are summarized below; these lists can be used as the starting point for ensemble creation; however, each ensemble shall be tailored to the specific situation in order to provide the most appropriate level of protection.

LEVEL A:

TYPICAL ENSEMBLE:
- Vapor protective suit (meets National Fire Protection Association [NFPA] 1991)
- Pressure-demand, full-facepiece self-contained breathing apparatus (SCBA)
- Inner chemical-resistant gloves, chemical-resistant safety boots, two-way radio communication

OPTIONAL: Cooling system, outer gloves, hard hat

Protection Provided: Highest available level of respiratory, skin, and eye protection from solid, liquid, and gaseous chemicals.

Used When: The chemical(s) have been identified and have high level of hazards to respiratory system, skin, and eyes. Substances are present with known or suspected skin toxicity or carcinogenity. Operations shall be conducted in confined or poorly ventilated areas.

Limitations: Protective clothing shall resist permeation by the chemical or mixtures present. Ensemble items shall allow integration without loss of performance.

LEVEL B:

TYPICAL ENSEMBLE:
- Liquid splash-protective suit (meets NFPA 1992)
- Pressure-demand, full-facepiece SCBA
- Inner chemical-resistant gloves, chemical-resistant safety boots, two-way radio communications
- Hard hat

OPTIONAL: Cooling system, outer gloves

Protection Provided: Provides same level of respiratory protection as Level A, but less skin protection. Liquid splash protection, but no protection against chemical vapors or gases.

Used When: The chemical(s) have been identified but do not require a high level of skin protection. Initial site surveys are required until higher levels of hazards are identified. The primary hazards associated with site entry are from liquid and not vapor contact.

Limitations: Protective clothing items shall resist penetration by the chemicals or mixtures present. Ensemble items shall allow integration without loss of performance.

LEVEL C: TYPICAL ENSEMBLE: Support Function Protective Garment (meets NFPA 1993) Full-facepiece, air-purifying, canister-equipped respirator Chemical resistant gloves and safety boots Two-way communications system, hard hat OPTIONAL: Faceshield, escape SCBA *Protection Provided:* The same level of skin protection as Level B, but a lower level of respiratory protection. Liquid splash protection but no protection to chemical vapors or gases. *Used When:* Contact with site chemical(s) will not affect the skin. Air contaminants have been identified and concentrations measured. A canister is available which can remove the contaminant. The site and its hazards have been completely characterized. *Limitations:* Protective clothing items shall resist penetration by the chemical or mixtures present. Chemical airborne concentration shall be less than IDLH levels. The atmosphere shall contain at least 19.5% oxygen. **Not Acceptable for Chemical Emergency Response**
LEVEL D: TYPICAL ENSEMBLE: Coveralls, safety boots/shoes, safety glasses or chemical splash goggles OPTIONAL: Gloves, escape SCBA, face-shield *Protection Provided:* No respiratory protection, minimal skin protection. *Used When:* The atmosphere contains no known hazard. Work functions preclude splashes, immersion, potential for inhalation, or direct contact with hazard chemicals. *Limitations:* This level should not be worn in the Hot Zone. The atmosphere shall contain at least 19.5% oxygen. **Not Acceptable for Chemical Emergency Response**

Reference: *OSHA Technical Manual* (TED 01-00-015).

Consideration of the defined levels of protection will aid in the selection of PPE. The selection of appropriate PPE involves three steps:

1. Identifying the hazards;

2. Evaluating the hazards; and

3. Providing proper PPE to suit the conditions and the individual.

The following factors should also be considered in the selection of PPE:

- Permeation;
- Degradation;
- Penetration;
- Heat transfer;
- Durability;

- Flexibility;
- Temperature effects;
- Ease of decontamination;
- Compatibility with other equipment; and
- Duration of use.

Heat stress-related injuries are always a significant concern when wearing personal protective clothing, regardless of ambient conditions. The use of PPE decreases the body's ability to eliminate excess heat and care needs to be taken in order to not "over-protect" employees. Only as much PPE should be used as required to prevent employee exposure to hazardous materials. Heat stress also should be monitored in accordance with the Health and Safety Plan (HASP). Additional information on PPE selection and usage is provided in the *OSHA Technical Manual* (TED 01-00-015).

2. Immediately Dangerous to Life and Health Situations

Either positive-pressure, self-contained breathing apparatus or positive-pressure, air-line respirators equipped with an escape air supply shall be used where conditions are identified as Immediately Dangerous to Life and Health (IDLH) or potentially IDLH. Totally encapsulating chemical protective suits (Level A) protection, as defined in Appendix B of 29 CFR Section 1910 (2000), will be used in conditions where contact of the skin by the hazardous substances may result in an IDLH situation.

Alternatively, the work area should be evacuated until engineering measures can be implemented to mitigate the IDLH conditions, allowing workers to reenter the work zone under reduced PPE levels.

3. Testing of Personal Protective Equipment

In accordance with 29 CFR Sections 1910 and 1926 (2000), certain testing capabilities are required for particular items of PPE. Appendix A of 29 CFR Section 1910 (2000), sets forth non-mandatory examples of tests that may be used to evaluate compliance with the PPE's required capabilities. 29 CFR Section 1910 (2000) requires that the fit of respirators be determined when they are issued and that the fit be checked each time that the respirator is worn. The two types of fit tests for respirators are:

- Qualitative fit-testing consisting of a negative pressure check, a positive pressure check, and an irritant smoke test; and
- Quantitative fit-testing to determine actual protection factor.

APPENDIX C.2

Information Requirements for Medical Examinations and Consultations

1. Information Provided to the Physician

The following information will be provided to the examining physician:

- A copy of 29 CFR Section 1910 (2000);
- A description of the individual's duties where occupational exposure occurs;
- The individual's exposure levels or anticipated exposure levels;
- A description of any PPE used or to be used including the associated exposure level of hazard; and
- Additional information from any previous medical examination that is not readily available to the examining physician.

2. Physician's Written Opinion

A copy of the examining physician's written opinion will be obtained and furnished to the individual. The physician's written opinion will include the following:

- The physician's opinion as to whether the individual has any detected medical conditions which would place the individual's health at increased risk of material impairment from work in hazardous waste operations or emergency response or from respirator use;
- The physician's recommended limitations upon the individual's assigned duties;
- The results of the medical examination and tests;
- A statement that the physician informed the individual of the results of the medical examination and any medical conditions which require further examination or treatment; and
- The written opinion obtained by the individual will not reveal specific findings or diagnoses unrelated to occupational exposure.

3. Record Keeping

An individual's medical record should contain the following information:

- Any occupational exposure;
- Use of respirators and personal protective clothing;
- Any work-related injuries;
- Physician's written opinion of medical problems and treatment; and
- Record of all medical examinations.

An accurate record of medical surveillance will be maintained. As specified in OPNAVINST 5100.23 (Ser), maintenance, retention and disposition of personnel medical records shall follow existing directives.