



This appendix provides reference tools to help readers understand the material in this report. Terms and acronyms used in the report are defined. Information on the types and number of sites at the Department of Defense (DoD) installations provides readers with insight into past site operations and history. Contact information and Web site addresses will help readers obtain information beyond the scope of this report. Reference sections are—

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Site Category	Site Type	Site Description*	Primary Contaminants**	
Base Operations/ Engineered Structures	Building Demolition/ Debris Removal	Building demolition/debris removal sites consist of buildings and/or debris that are unsafe and/or must be removed.	Asbestos Construction debris	Lead paint Solvents
	Contaminated Building	Contaminated building sites result when substances contained within a building are released, resulting in contamination in and around the building.	POLs Plating waste Metals POL sludge	Asbestos PCBs Propellants Pesticides Solvents Acids
	Dip Tank	Dip tanks typically are metal or concrete units located in coating shops. They range in size from 50 gallons to more than 500 gallons. The tanks are used to clean parts before treatment or to coat parts with various materials, including metals and plastics.	POLs Acids	Metals Chlorinated solvents
	Incinerator	Incinerators typically consist of a furnace and stack unit used for a variety of disposal activities, including the incineration of medical waste or of an installation's dunnage. These units vary in size and may be either freestanding or part of other operations, such as hospitals.	Ash Metals Ordnance compounds	
	Maintenance Yard	Maintenance yards consist of paved or unpaved areas where vehicles and other maintenance equipment are stored and often serviced. Typically, maintenance supplies are stored at these units.	POLs Solvents Metals	
	Oil/Water Separator	Oil/water separators typically are small units that skim oil from stormwater runoff. The oil/water separator site consists of the unit and any associated piping.	POLs Solvents	Industrial wastewater PCBs

*The site descriptions provided in this table are not intended to be all-encompassing or exact regulatory definitions. They provide only general descriptions of the different categories of DERP sites.

** Examples of petroleum, oil, and lubricants (POLs) include heating oil, jet fuel, gasoline, and other fuels; examples of solvents include spent paint thinners and degreasing agents.

Site Category	Site Type	Site Description*	Primary Contaminants**		
Engineered Structures	Storage Area	Storage area sites are areas where spills and leaks from stored containers or equipment have occurred.	POLs Solvents	Metals Acids	POL sludge PCBs
	Washrack	Washrack sites typically consist of a building designed for washing vehicles, such as tanks, aircraft, and other military vehicles. This unit also may consist of a paved area where vehicles are washed.	POLs		
Storage Tanks	Aboveground Storage Tank	Aboveground storage tank sites result from release of substances to surrounding areas from aboveground tanks, containers, and associated piping.	POLs POL sludge		
	POL Lines	POL distribution lines are used to transport petroleum, oil, and lubricant products from storage to dispensing facilities.	POLs POL sludge		
	Underground Storage Tank	Underground storage tank sites result from the release of substances from underground storage tanks or from piping associated with the tanks.	POLs POL sludge	Solvents Metals	
	Underground Storage Tank Farm	Underground storage tank farm sites result from the release of substances from the multiple, generally large, underground storage tanks and associated piping that make up a tank farm complex.	POLs POL sludge Solvents	Metals	
Industrial Operations	Optical Shop	Optical shops typically consist of laboratory units located within a building. Activities include grinding lenses used in eye glasses or other optical instruments.	Solvents		
	Pesticide Shop	Pesticide shops typically are used to store and prepare large volumes of pesticides and solvents for maintenance activities. The units may be located in a freestanding building or may be attached to another building. Areas near the unit may have been used for the disposal of off-specification pesticides.	Pesticides Metals POLs		
	Plating Shop	Plating shops typically consist of a building, or a room within a building, used for coating metal parts. The unit contains several tanks of solvents that are used in the plating process.	Metals Solvents Acids	Industrial wastewater	

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Industrial Operations	Sewage Treatment Plant	Sewage treatment plants typically consist of a complex of tanks, piping, and sludge management areas used to treat sanitary sewage generated at an installation. The unit may use chemical or biological treatment methods. Lagoons associated with the biological treatment of sewage may be considered separate units.	Metals Industrial wastewater Solvents POLs	
	Waste Lines	Waste lines are underground piping used to carry industrial wastes from shop facilities to a wastewater treatment plant.	Solvents Plating sludge Metals	Explosive chemicals Pesticides
	Wastewater Treatment Plant	Waste treatment plant sites result from releases of substances at plants that were used to treat and dispose of domestic and/or industrial wastes.	POLs Solvents Plating sludge	Industrial wastewater Explosive chemicals
Training Areas	Burn Area	Burn area sites consist of pits or surface areas that were used for open-air incineration of waste.	Explosives Propellants Solvents	POLs Ordnance
	Explosive Ordnance Disposal Area	Ordnance disposal areas consist of open-air areas that were used for detonation, demilitarization, burial, or disposal of explosives.	UXO Metals	Explosive chemicals Ordnance compounds
	Fire/Crash Training Area	Fire/crash rescue training areas consist of trenches and/or pits where flammable materials were ignited periodically for demonstrations and training exercises.	POLs Solvents	POL sludges Metals
	Firing Range	Firing ranges consist of large areas of land used for practice firing large artillery or mortars or as a practice bombing range for aircraft. These areas typically are contaminated with unexploded ordnance, which may be found both on and below the ground surface.	Metals Explosives UXO	Radionuclides Ordnance compounds
	Pistol Range	Pistol ranges may be located indoors or outdoors and are used for target practice. Outdoor units include a soil or sandbag berm located behind the targets to prevent bullets from traveling outside the range area.	Metals	
	Small Arms Range	Small arms ranges typically are located outdoors and are used for target practice with small arms, usually 50 caliber or less. The unit may include a soil or sandbag berm or a hill located behind the targets to prevent bullets from traveling outside the range area.	Metals	Ordnance compounds
	Unexploded Munitions/ Ordnance Areas	Unexploded munitions/ordnance areas are areas that have been used for munition and ordnance training.	UXO Metals	Explosive chemicals Ordnance compounds

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Site Category	Site Type	Site Description*	Primary Contaminants**	
Radioactive Areas	Mixed Waste Area	Mixed waste areas are used to store or dispose of hazardous wastes that have been mixed with or contaminated by radioisotopes.	Solvents Mixed waste	
	Radioactive Waste Area	Radioactive waste areas are used to store or dispose of low-level radioactive materials of various types (for example, radium paint and radioactive instruments and propellants).	Low-level radioactive waste	
Surface Discharge Areas	Drainage Ditch	Drainage ditch units typically consist of a natural or man-made ditch used as a runoff control structure for rainfall. The unit also may be used for runoff from other sources, such as process operations. Man-made units may be concrete lined.	POLs Solvents PCBs	Metals Explosive chemicals
	Industrial Discharge	Industrial discharge units consist of a pipe system used to discharge industrial effluent to the environment. The unit may discharge to a natural or man-made water body, a dry creek bed, or other natural feature.	Metals Industrial wastewater	
	Sewage Effluent Settling Pond	Sewage effluent settling ponds consist of a lagoon, or lagoons, used for settling solids and/or for biological treatment of sewage. The units also may be used as infiltration galleries.	Metals Ordnance compounds Solvents	
	Spill Site Area	Spill site areas are small areas where spills from drums, tanks, or other waste storage units have taken place.	POLs Solvents Paint Pesticides	Metals Acids PCBs
	Storm Drain	Storm drains typically consist of a natural or man-made drain used as a runoff control structure for rainfall. The unit also may be used for runoff from other sources, such as process operations. Man-made units may be concrete lined.	POLs Metals POL sludge	Pesticides Industrial wastewater Solvents
	Surface Disposal Area	Surface disposal area sites consist of small areas formerly used for disposal of solid wastes with little or no free liquids. Typical materials include rags, filters, paint cans, small capacitors, and batteries.	POLs Metals	Solvents Explosive chemicals
	Surface Impoundment/Lagoon	Surface impoundments/lagoons are unlined depressions, excavations, or diked areas that were used to accumulate liquid waste, waste containing free liquid, or industrial wastewater.	POLs Solvents Metals	Industrial wastewater Ordnance compounds Explosive chemicals
	Surface Runoff	Surface runoff sites are areas that typically experience sheet runoff from rain. The runoff may contain contaminants.	POLs Solvents PCBs	Metals POL sludge

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Site Category	Site Type	Site Description*	Primary Contaminants**	
Subsurface Disposal Area	Chemical Disposal	Chemical disposal units are areas that have been used for the disposal of chemicals, typically of an unknown type. The unit may be a burial area where bottles or packages of chemicals were placed or an area where liquids were disposed of on the soil.	Unknown contaminants	
	Disposal Pit/Dry Well	Disposal pit/dry well sites consist of small, unlined excavations and structures that were used over a period of time for disposing of small quantities of liquid wastes.	POLs Metals Solvents Acids	Explosive chemicals Ordnance compounds
	Landfill	Landfill sites typically are areas formerly used for disposing of both domestic and industrial hazardous waste.	POLs Solvents Paint	Pesticides Metals Ordnance compounds
	Leach Field	Leach fields typically consist of a subsurface area generally associated with septic tanks. The unit serves the purpose of biologically treating sanitary sewage; however, in cases where these units were used at industrial facilities, there is also contamination from non-biodegradable industrial contaminants.	Metals Solvents	
Contaminated Media	Contaminated Fill	Contaminated fill areas consist of contaminated fill resulting from excavations for construction, tanks, and other purposes.	POLs Metals Paint waste	Explosive chemicals Ordnance compounds
	Contaminated Groundwater	Contaminated groundwater results from various types of releases of known or unknown origin, such as migration of leachate from disposal areas and migration of substances from contaminated surface and subsurface soil.	Metals Chlorinated POLs	Nonchlorinated solvents Explosive chemicals solvents
	Contaminated Sediments	Contaminated sediments include sediments of bodies of water that have been contaminated by surface runoff, subsurface migration, or direct discharge of contaminants.	POLs PCBs Pesticides	Metals Solvents Explosive chemicals
	Contaminated Soil Pile	Contaminated soil piles consist of soil that has been staged after an excavation activity.	POLs Sludge Metals	Solvents PCBs Ordnance compounds
	Soil Contaminated After Tank Removal	Soil contaminated after tank removal consists of soil that has been removed during a tank removal operation and staged before treatment.	POLs POL sludge	

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Site Type	Army		Navy		Air Force		DLA		DTRA		FUDS		
	Total Sites	Sites in Progress	Total Sites	Sites in Progress	Total Sites	Sites in Progress	Total Sites	Sites in Progress	Total Sites	Sites in Progress	Total Sites	Sites in Progress	
Base Operations/ Engineered Structures	Building Demolition/Debris Removal	28	7	24	11	32	24	0	0	0	0	471	119
	Contaminated Building	721	92	61	26	53	4	62	0	0	0	41	14
	Dip Tank	44	3	5	3	5	0	5	0	0	0	0	0
	Incinerator	101	16	19	6	8	1	5	0	0	0	7	4
	Maintenance Yard	134	19	56	30	33	15	2	0	0	0	3	2
	Oil/Water Separator	420	9	45	8	108	28	2	0	0	0	1	0
	Storage Area	2800	161	586	153	227	67	110	22	0	0	65	17
	Washrack	198	21	12	2	24	13	2	0	0	0	2	2
TOTAL	4446	328	808	239	490	152	188	22	0	0	590	158	
Storage Tanks	Aboveground Storage Tank	331	24	88	46	94	34	13	0	0	0	127	51
	POL (Petroleum/Oil/Lubricants) Lines	32	12	78	34	125	76	10	2	0	0	30	7
	Underground Storage Tank	1332	71	782	211	1059	312	65	8	0	0	834	253
	Underground Tank Farm	84	12	91	43	26	14	1	0	0	0	28	7
TOTAL	1779	119	1039	334	1304	436	89	10	0	0	1019	318	
Industrial Operations	Optical Shop	2	0	0	0	0	0	0	0	0	0	1	1
	Pesticide Shop	50	5	17	9	13	5	6	0	0	0	1	1
	Plating Shop	8	2	17	12	3	2	1	0	0	0	1	0
	Sewage Treatment Plant	72	10	12	1	42	25	1	0	0	0	6	3
	Waste Lines	142	13	71	32	36	20	3	0	0	0	5	3
	Waste Treatment Plant	234	23	40	12	55	27	0	0	0	0	5	4
TOTAL	508	53	157	66	149	79	11	0	0	0	19	12	

	Site Type	Army		Navy		Air Force		DLA		DTRA		FUDS	
		Total Sites	Sites in Progress	Total Sites	Sites in Progress	Total Sites	Sites in Progress	Total Sites	Sites in Progress	Total Sites	Sites in Progress	Total Sites	Sites in Progress
Training Areas	Burn Area	231	90	70	25	28	9	19	3	0	0	28	21
	Explosive Ordnance Disposal Area	160	41	72	40	39	13	0	0	0	0	98	67
	Fire/Crash Training Area	91	26	130	49	332	156	3	0	0	0	13	9
	Firing Range	83	17	20	6	17	9	0	0	0	0	113	82
	Pistol Range	20	6	12	4	3	2	4	1	0	0	3	2
	Small Arms Range	70	9	18	13	17	8	0	0	0	0	45	13
	Unexploded Munitions & Ordnance Area	272	147	218	190	270	254	0	0	0	0	1440	710
TOTAL	927	336	540	327	706	451	26	4	0	0	1740	904	
Radioactive Areas	Mixed Waste Area	29	4	46	18	14	9	2	0	0	0	13	9
	Radioactive Waste Area	38	5	10	1	88	26	0	0	0	0	10	4
TOTAL	67	9	56	19	102	35	2	0	0	0	23	13	
Surface Discharge Areas	Drainage Ditch	38	12	24	9	35	17	4	1	0	0	2	1
	Industrial Discharge	146	87	21	11	18	12	0	0	0	0	3	3
	Sewage Effluent Settling Pond	16	2	3	1	7	1	0	0	0	0	3	2
	Spill Site Area	752	126	439	138	1596	695	43	6	1	1	19	11
	Storm Drain	24	2	16	13	97	69	7	1	0	0	4	3
	Surface Disposal Area	582	96	699	219	391	132	13	8	0	0	43	21
	Surface Impoundment/Lagoon	290	88	101	34	43	24	10	3	0	0	28	13
	Surface Runoff	52	4	12	1	12	7	1	1	0	0	5	2
TOTAL	1900	417	1315	426	2199	957	78	20	1	1	107	56	
Subsurface Disposal Areas	Chemical Disposal	68	35	8	7	45	16	0	0	0	0	20	9
	Disposal Pit and Dry Well	355	86	145	54	561	218	49	23	0	0	23	15
	Landfill	916	272	431	211	826	382	17	7	0	0	123	68
	Leach Field	59	15	11	8	16	5	1	0	0	0	1	0
TOTAL	1398	408	595	280	1448	621	67	30	0	0	167	92	
Contaminated Media	Contaminated Fill	57	10	36	12	13	4	79	2	0	0	121	64
	Contaminated Groundwater	204	128	122	63	59	47	18	14	0	0	265	162
	Contaminated Sediments	145	34	124	55	35	15	14	0	0	0	76	40
	Contaminated Soil Piles	44	9	16	6	11	1	20	0	0	0	29	13
	Soil Contamination After Tank Removal	71	10	10	7	14	5	31	5	0	0	116	48
TOTAL	521	191	308	143	132	72	162	21	0	0	607	327	
Other	Other	868	21	82	36	368	365	33	2	0	0	555	294
	TOTAL	868	21	82	36	368	365	33	2	0	0	555	294
GRAND TOTAL		12,414	1,882	4,900	1,870	6,898	3,168	656	109	1	1	4,827	2,174



- Administrative Record** CERCLA requires establishment of an administrative record, which is a compilation of decision documents and supporting materials that together form the basis for the selection of a response action. The administrative record should include all the final documents that are a part of the decision-making process.
- Air Sparging** A remedial process in which pressurized air is injected below the groundwater table for removal of contaminants through volatilization.
- Applicable or Relevant and Appropriate Requirements (ARARs)** Other laws and requirements that must be met in complying with CERCLA. ARARs include cleanup standards, standards of control, and other substantive environmental protection criteria for hazardous substances, as specified by federal and state law and regulations.
- Base Realignment and Closure** A DoD program that focuses on compliance and cleanup efforts at military installations undergoing closure or realignment, as authorized by Congress in four rounds of base closures for 1988, 1991, 1993, and 1995. The first base realignment and closure (BRAC) round was conducted in 1988 based on recommendations by the Defense Secretary’s Commission on Base Realignment and Closure. Congress enacted the Defense Base Closure and Realignment Act of 1990 to authorize base closure rounds in 1991, 1993, and 1995. The DERP goal within the BRAC program is to conduct environmental remediation as efficiently as possible to speed transfer to and reuse by the community.
- Bioslurping** A process used to extract free-phase fuel from groundwater. The bioslurper uses a vacuum to draw petroleum to a well, then “slurps” the petroleum from the top of the groundwater. The vacuum action also draws air into the soil, which promotes microbial biodegradation. Bioslurping removes the contamination source and cleans up the contaminated soil as well.
- Bioventing** A process by which oxygen is delivered to contaminated unsaturated soil by forced air movement (extraction or injection) to stimulate biodegradation by increasing oxygen concentrations.
- BRAC Cleanup Plan (BCP)** A plan developed by a closing or realigning installation’s cleanup team to map the restoration work needed to make property available for transfer, including MMRP requirements. The BCP includes schedules and estimated costs for the environmental restoration work needed to support the transfer and reuse of property at an installation.
- BRAC Cleanup Team (BCT)** A group composed of the DoD BRAC Environmental Coordinator, the U.S. Environmental Protection Agency, and state remedial project managers that coordinates fast-track cleanup at BRAC installations. The BCT is the primary forum for addressing issues that affect the execution of cleanup to facilitate reuse. The purpose of the BCT is to adopt a common-sense approach to environmental cleanup by developing common goals and then make decisions and set priorities based on these goals.

CERCLA	See Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).
Characterization	Facility or site sampling, monitoring, and analysis to determine the extent and nature of a contaminant release. Site characterization is the first step in acquiring the necessary technical information to develop, screen, analyze, and select appropriate cleanup techniques.
Chemical Residues from Military Munitions	The chemical constituents of a military munition, including the chemical byproducts of detonation, deflagration, or other reactive processes. Examples include such constituents as unconsumed explosives (even in trace concentrations) from the detonation of a military munition, explosives released by the structural compromise of an unfired waste military munition, and chemical agents released from chemical munitions.
Clean Air Act (CAA)	The CAA's purpose is to "protect and enhance the quality of the Nation's air resources." Its primary programs regulate the release of contaminants to air from new and existing polluting facilities.
Cleanup	The act of constructing and implementing interim removal and remedial activities and a final remedy.
Clean Water Act (CWA)	The CWA's objective is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." One of the act's major enforcement tools is the National Pollutant Discharge Elimination System permit.
Closed Range	A military range that has been taken out of service as a range and that either has been put to new uses that are incompatible with range activities or is not considered by the military to be a potential range area. A closed range is still under the control of a Component.
Closure Plan	Documentation prepared under RCRA to guide the deactivation, stabilization, and surveillance of a waste management unit or facility.
Community Environmental Response Facilitation Act of 1992 (CERFA)	Law requiring the federal government to identify, for each facility, real property that is not contaminated and that offers the greatest opportunity for expedited reuse and redevelopment by the community. Real property identified under CERFA must be free of hazardous substances and petroleum products, or the remediation of contamination by such substances should be expedited to facilitate transfer of the property to the public.
Community Redevelopment	These community-prepared plans identify the desired and anticipated reuse of excess installation property. The plans help direct environmental restoration efforts in areas with the greatest potential for reuse and for providing economic benefit to the community.
Community Relations Plan (CRP)	The plan for community relations activities that will be used to meet stated objectives at an installation. A CRP must be developed and implemented for all removal actions and remedial actions at Installation Restoration program sites, except emergency responses.
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	A federal statute that establishes a comprehensive framework for identifying, investigating, and cleaning up past releases of hazardous substances to the environment. It provides the statutory authority for cleanup of hazardous substances that could endanger public health, public welfare, or the environment.
Corrective Action Plan	A plan that describes and explains the remedial measures to be taken at a leaking UST site.
Corrective Measures Implementation	The RCRA corrective action phase in which the selected cleanup technology is constructed, installed, implemented, and/or operated until confirmatory sampling and analysis indicate that cleanup levels have been reached. Similar to a CERCLA remedial action.

- Corrective Measures Study** A RCRA corrective action phase in which alternative cleanup technologies are evaluated in relation to specific site characteristics, such as contaminants, soil conditions, and hydrogeologic conditions. Similar to a CERCLA remedial investigation.
- Defense Planning Guidance (DPG)** The DPG establishes goals and milestones for the Defense Environmental Restoration Program. The goals include protecting human health and the environment and making BRAC property environmentally suitable for transfer and reuse. Measures of Merit are performance metrics established to gauge progress toward these goals.
- Defense Site Environmental Restoration Tracking System** A database system used to track environmental restoration activities at active, closing, and realigning installations. The system collects and maintains site-related information about environmental restoration and provides reports that detail information at the DoD Component level.
- Decision Document** The Department of Defense has adopted the term Decision Document for the documentation of removal or interim remedial action (IRA) and remedial action (RA) decisions at non-National Priorities List (NPL) installations, and sites at NPL installations at which removal or IRA decisions have been made. The decision document shall address the following: Purpose, Site Risk, Remedial Alternatives, Public/Community Involvement, Declaration, and Approval and Signature. A Decision Document for sites not covered by an interagency agreement or federal facility agreement is still required to follow a CERCLA response. All Decision Documents will be maintained in the installation Administrative Record and the installation’s permanent environmental restoration files.
- Environmental Baseline Survey (EBS)** Survey identifying real and excess property that can be considered uncontaminated as defined by CERFA. In addition to documenting uncontaminated property, the EBS numerically describes the environmental condition of the remaining property according to its status in the restoration process. The EBS is based on CERFA requirements, and is used to identify property available for transfer to the community.
- Explosive Compound** As used in the phrase “explosive compounds released to soil, surface water, sediments, or groundwater as a result of ammunition or explosives production or manufacturing at ammunition plants,” explosives compounds such as the trinitrotoluene found in “red water” or “pink water” from TNT manufacturing.
- Facility (in relation to classification)** A building, structure, or other improvement to real property. (10 USC §2801)
- Finding of Suitability for Early Transfer** The process to document the conclusion that property is environmentally suitable for early transfer by deed according to CERCLA §120(h)(3)(C).
- Feasibility Study (FS)** A step in the CERCLA environmental restoration process. The objectives of the FS are to identify alternatives for remediation and to select and describe a remedial action that satisfies the ARARs for mitigating confirmed environmental contamination. Successful completion of the FS should lead to unimpeded development of a remedial design for implementation of the selected remedial actions.
- Federal Facility Agreement (FFA)** A legal agreement between DoD and U.S. Environmental Protection Agency concerning the cleanup of sites on the National Priorities List. This agreement is intended to establish roles, responsibilities, and schedules and to improve communications among all parties. An FFA becomes an interagency agreement when the statutory requirements are incorporated into the document.
- Finding of Suitability to Lease (FOSL)** The process that documents the determination that BRAC property can be leased, even while cleanup is under way. The FOSL also identifies any applicable restrictions that must accompany the lease and provides a statement of notice and access requirements under CERCLA and other lease restrictions, as appropriate.

Finding of Suitability to Transfer (FOST)	The process that documents the determination that BRAC property is environmentally suitable for transfer by deed for an intended use. The FOST also identifies any applicable restrictions on future use and provides a statement of the notice, covenant, and access requirements under CERCLA.
Five-Year Review	If waste is left in place at a site, a review of the remedial action under CERCLA that must take place at least every five years after the remedial action is initiated to verify the effectiveness of the remedy.
Formerly Used Defense Sites Program (FUDS)	FUDS are properties (1) that DoD or one of its Components formerly owned or leased and (2) on which DoD is responsible for cleaning up any contamination. The FUDS program is implemented by the U.S. Army Corps of Engineers. The remediation process at FUDS parallels the installation environmental restoration process.
Groundwater Remediation	Treatment of groundwater to remove pollutants.
Hazardous and Solid Waste Amendments (HSWA)	HSWA refers to the 1984 amendments to RCRA, providing authority for the investigation and cleanup of waste sites, creating a corrective action program for cleanup substantially similar to that under CERCLA, although some of the requirements are different. HSWA also created the Underground Storage Tank Program.
Hazardous Waste	As defined in RCRA, a solid waste or a combination of solid wastes that, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or pose a substantial present or potential hazard to human health or the environment if improperly treated, stored, transported, disposed of, or otherwise managed.
Information Repository	An installation's repository for copies of Installation Restoration program (IRP) items that are made available to the public, including brochures, fact sheets, press releases, documents in the administrative record, information on the IRP, and the applicable laws. The repository should be available to the public during removal actions and remedial actions at hazardous waste sites and should be located at or near the site of the response action.
Initial Site Characterization	A term used under the RCRA Underground Storage Tank (UST) program to describe the collection of site information, such as the nature and estimated quantity of contaminant releases; surrounding populations; water quality, use, and well locations; stormwater and wastewater systems; climatology; land use; results of the site check and initial abatement measures; and results of any free-product removals. Similar to a CERCLA preliminary assessment, the site characterization should be performed after the discovery of a release from a UST.
Installation Restoration Program (IRP)	Program designed to clean up contamination associated with DoD facilities. Includes identification, investigation, and cleanup of hazardous substances, pollutants, and contaminants as defined by CERCLA; DoD-unique materials; and petroleum/oil/lubricants contamination at operating and closing or realigning installations (including off-installation areas to which contamination has migrated) and at FUDS.
Interagency Agreement (IAG)	A formal document in which two or more federal agencies agree to cooperate. For any installation listed on the National Priorities List, the Component must enter into an IAG within 180 days of the required U.S. EPA review of the remedial investigation and feasibility study. This IAG must identify all remedial actions required at the site.

- Interim Action (IA)** An early measure to reduce the risk of releases of hazardous substances before the initiation of more complicated, comprehensive, and long-term cleanup remedies. Examples of IAs are placing fences around contaminated areas and removing and treating or disposing of contaminated soil. This report uses the term interim action to refer to both interim remedial actions and removal actions.
- Interim Remedial Action** An interim measure that can be implemented at any time in the restoration process and that is designed to abate contamination until the final remedial action can be implemented.
- Investigation** Analysis used to characterize the nature, extent, and risk of releases of hazardous substances into the environment and to develop and select a cleanup remedy.
- Land Use Controls (LUCs)** Physical, legal, or administrative mechanisms that restrict or limit access to contaminated property in order to reduce risk to human health and the environment. Physical mechanisms encompass a variety of engineered remedies to contain or reduce contamination and/or physical barriers to limit access to property, such as fences or signs. The legal mechanisms are generally the same as those used for institution controls (ICs) as discussed in the National Contingency Plan. ICs are a subset of LUCs and are primarily legal mechanisms imposed to ensure the continued effectiveness of land use restrictions imposed as part of a remedial decision. Legal mechanisms include restrictive covenants, negative easements, equitable servitudes, and deed notices. Administrative mechanisms include notices, adopted local land use plans and ordinances, construction permitting, or other existing land use management systems that may be used to ensure compliance with use restrictions. Examples include posting signs or constructing fences around contaminated areas and restricting incompatible land uses through restrictive covenants.
- Land Reuse Plan** A plan that identifies the proposed land use for given portions of surplus DoD property.
- Liability** A probable and measurable outflow of resources arising from past transactions or events.
- Local Redevelopment Authority** Any authority or instrumentality established by a state or local government and recognized by the Secretary of Defense, through the Office of Economic Adjustment, as the entity responsible for developing the redevelopment plan with respect to an installation, or for directing implementation of the plan.
- Long-Term Management (LTM)** Term used for environmental monitoring, review of site conditions, and/or maintenance of a remedial action to ensure continued protection as designed once a site achieves response complete (RC). Examples of LTM include landfill cap maintenance, leachate disposal, fence monitoring and repair, five-year review execution, and land use control enforcement actions. This term should be used until no further environmental restoration response actions are appropriate or anticipated. LTM is reserved for monitoring once a site achieves RC, and should not be used to refer to monitoring after Remedy in Place (this includes sites for which the selected remedy is natural attenuation).
- Long-Term Monitoring** Comprehensive evaluation of a site or sites through physical and/or electronic sampling and analysis to demonstrate that a particular remedial action has worked or is continuing to work or to show a continual low concentration of contaminants that does not require remedial action.

- Management Action Plan (MAP)....** A planning document for managing environmental restoration program requirements, including installation restoration, military munitions response, and building demolition/debris removal at an active installation or FUDS property. MAPs describe an integrated, coordinated approach to achieving the installation's or property's overall environmental restoration goals and serve as the basis for program planning, budget development, and execution decisions. In addition, the MAP is used to identify and monitor site-level environmental restoration requirements, schedules, and estimates of cost, and serves as a communication tool with stakeholders on the installation's or property's environmental restoration program.
- Maximum Contaminant Level** Concentration limits established by the Safe Drinking Water Act for certain elements and pollutants that may occur in drinking water.
- Military Installation** A base, camp, post, station, yard, center, or other activity under the jurisdiction of the Secretary of a Military Department. (10 USC §2801)
- Military Munitions** All ammunition products and components produced or used by or for the U.S. Department of Defense (DoD) or the U.S. Armed Services for national defense and security, including military munitions under the control of the DoD, the U.S. Coast Guard, the U.S. Department of Energy (DOE), and National Guard personnel. The term military munitions includes confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes and incendiaries used by Components, including bulk explosives and chemical warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components thereof. Military munitions do not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components thereof. The term, however, does include non-nuclear components of nuclear devices, managed under DOE's nuclear weapons program, after all required sanitization operations under the Atomic Energy Act of 1954, as amended, have been completed.
- Military Range** A designated land or water area set aside, managed, and used to conduct research on, develop, test, and evaluate military munitions and explosives, other ordnance or weapon systems, or to train military personnel in their use and handling. Ranges include firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, and buffer zones with restricted access and exclusionary areas. Military ranges also include bodies of water located within the boundaries of a military range (e.g., a stream, lake, or pond) or that are themselves a range (e.g., an offshore range in the Atlantic or Pacific Ocean). Such water areas include all waters of the U.S. (as defined under the Clean Water Act) and those ocean waters extending out to 200 nautical miles from the U.S. coast. A military range may be a single site, or may comprise several sites.
- National Contingency Plan (NCP)** The National Oil and Hazardous Substances Pollution Contingency Plan, commonly referred to as the NCP, is a set of regulations describing the procedures that lead agencies must follow when implementing CERCLA and the Federal Water Pollution Control Act.
- National Environmental Policy Act (NEPA) Analysis** An analysis conducted to evaluate an installation's disposal decisions in terms of their environmental impact. The NEPA analysis is useful to the community's planning efforts and the installation's property disposal decisions. It is used to support DoD decisions on transferring property for community reuse.
- National Priorities List** A formal list of the nation's highest risk hazardous waste sites, as established by CERCLA.
- Natural Attenuation** A passive remedial approach that depends on natural processes to degrade and dissipate contaminants in soil and groundwater. Processes involved in natural attenuation include aerobic and anaerobic biodegradation, dispersion, volatilization, and adsorption. Natural attenuation is also known as passive bioremediation, intrinsic bioremediation, or intrinsic remediation.

- No DoD Action Indicated** A FUDS Program classification where it is determined that a site poses no threat to human health or safety or the environment and no additional environmental restoration activities are required.
- No Further Action** Phrase applying to any site where risks due to contamination no longer exist and where no additional remedial action is required.
- No Further Remedial Action Planned** Phrase referring to sites at which no further site evaluation is warranted, according to U.S. EPA or the governing authority.
- Not Required** A relative-risk evaluation category. Sites that have remedy in place, response complete, or no-further-action-required designations do not require relative-risk evaluation. These sites are categorized as not required.
- Off-Base Contamination** Contaminants found to be migrating off the installation or coming onto the installation from off-base sources.
- Operable Unit (OU)** An OU is a discrete part of a response action, such as groundwater cleanup or removal of contaminated soil. The cleanup of a site can be divided into a number of operable units depending on the complexity of the problems associated with the site.
- Operational Range** A military range that is currently in service and is being regularly used for range activities, or a military range that is not currently being used, but that is still considered by the Military to be a potential range area, and that has not been put to a new use that is incompatible with range activities.
- Pollutant and Contaminant** These terms include, but are not be limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring; except that the term pollutant or contaminant shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of paragraph (14) of the DERP Management Guidance and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).
- Preliminary Assessment (PA)** The PA is a limited-scope investigation designed to distinguish sites that pose little or no threat to human health and the environment from sites that require further investigation. The PA typically is based on installation records searches, visual site inspections, and interviews with personnel. The PA formerly was referred to as an initial assessment study.
- RCRA** See Resource Conservation and Recovery Act (RCRA).
- RCRA Corrective Action** The RCRA corrective action program is a cleanup program designed to ensure the remediation of hazardous releases associated with RCRA-regulated facilities. The program is enforced principally through the statutory authorities established by the Hazardous and Solid Waste Amendments of 1984 and is similar to CERCLA's cleanup process in the NCP.
- RCRA Facility Assessment Program** Initial RCRA process for determining whether corrective action is warranted for a RCRA past practice or for defining what additional data must be gathered to make this determination. Similar to a CERCLA preliminary assessment.

- RCRA Facility Investigation** RCRA process for determining the extent of hazardous waste contamination. Similar to a CERCLA remedial investigation.
- Record of Decision** The document containing the final decision and agreement among the installation, the state, and U.S. EPA concerning selection of the remedial action at a site or a group of sites.
- Remedial or Remedial Action** Those actions consistent with permanent remedy taken instead of or in addition to removal actions in the event of a release or threatened release of a hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health, welfare or the environment. The term includes, but is not limited to, such actions at the location of the release as storage; confinement; perimeter protection using dikes, trenches, or ditches; clay cover; neutralization; cleanup of released hazardous substances and associated contaminated materials; recycling or reuse; diversion; destruction; segregation of reactive wastes; dredging or excavations; repair or replacement of leaking containers; collection of leachate and runoff; onsite treatment or incineration; provision of alternative water supplies; and any monitoring reasonably required to assure that such actions protect the public health, welfare and the environment. The term includes the costs of permanent relocation of residents and businesses and community facilities where the President determines that, alone or in combination with other measures, such relocation is more cost-effective and environmentally preferable to the transportation, storage, treatment, destruction, or secure disposition offsite of hazardous substances, or may otherwise be necessary to protect the public health or welfare. The term includes offsite transport and offsite storage, treatment, destruction, or secure disposition of hazardous substances and associated contaminated materials.
- Remedial Action-Construction** The period during which the final remedy is being put in place. The end date signifies that the construction is complete, all testing has been accomplished, and that the remedy will function properly.
- Remedial Action-Operation (RA-O)** The period during which the remedy is in place and operating to achieve the cleanup objective identified in the Record of Decision or equivalent agreement. Any system operation or monitoring requirements during this time shall be termed RA-O.
- Remedial Design** CERCLA phase during which construction parameters and equipment specifications for a selected cleanup technology are defined on the basis of the unique characteristics of the site.
- Remedial Investigation (RI)** CERCLA process for determining the extent of hazardous substance contamination and, as appropriate, for conducting treatability studies. The RI provides site-specific information for the feasibility study.
- Remedial Project Manager (RPM)** The person assigned to manage remedial actions or other response actions taken (or needed) at sites in the Installation Restoration program (IRP). The RPM is responsible for coordinating, directing, and reviewing IRP work; ensuring compliance with the National Contingency Plan; and recommending action on decisions.
- Remedy in Place** Designation that a final remedial action has been constructed and implemented and is operating as planned in the remedial design. An example of a remedy in place is a pump-and-treat system that is installed, is operating as designed, and will continue to operate until cleanup levels have been attained. Because operation of the remedy is ongoing, the site cannot be considered response complete.
- Removal Action** Part of the response process for, and often the first response to, an actual or threatened contaminant release. A removal action will employ any means necessary to abate, minimize, stabilize, mitigate, or eliminate the release or threat of release.

- Resource Conservation and Recovery Act (RCRA)** RCRA was enacted in 1976 to address the issue of how to safely manage and dispose of the huge volumes of municipal and industrial waste generated nationwide. Specifically, the RCRA program regulates solid waste recycling and disposal; federal procurement of products containing recycled materials; waste minimization; hazardous waste generators and transporters; hazardous waste treatment, storage, and disposal facilities; and underground storage tanks.
- Response Complete (RC)** Term indicating that the Installation Restoration program (IRP) actions at a site or installation are deemed complete and that the site or installation is no longer a threat to public health or the environment. RC also can mean that the DoD Component is satisfied that IRP actions at a site are complete and that the proper authorities have been or are being notified, where necessary, of this determination. Long-term monitoring can still occur after a site achieves the RC milestone.
- Restoration Advisory Board (RAB)** An advisory group for the environmental restoration process that includes members of the public, the installation, and regulatory agencies. The purpose of a RAB is to gain effective input from stakeholders on cleanup activities and to increase installation responsiveness to community environmental restoration concerns.
- Restoration Management Information System** A database designed to manage information about the Installation Restoration program. By using this management tool, key personnel can track cleanup progress and expenditures throughout the restoration process for any site on any installation.
- Site** A unique name given to a distinct area of an installation containing one or more releases or threatened releases of hazardous substances treated as a discreet entity or consolidated grouping for response purposes. Includes any building, structure, impoundment, landfill, storage container, or other site or area where a hazardous substance was or has come to be located, including formerly used sites eligible for building demolition/debris removal. Installations and ranges may have more than one site.
- Site Inspection** A CERCLA process for acquiring the necessary data for confirming the existence of environmental contamination at identified potential sites and for assessing the associated potential risks to human health, human welfare, and the environment. The data collected at each site must be sufficient to support the decision to either continue with an remedial investigation/feasibility study or to remove the site from further investigation.
- Soil Vapor Extraction** A process that treats unsaturated soil contaminated with volatile organic compounds (VOCs). It induces the VOCs to flow through the soil to an extraction well by applying a vacuum device to the extraction wells, creating a pressure gradient that causes diffusion. The process includes a system for handling the gases. This technology is also known as in situ soil venting, in situ volatilization, enhanced volatilization, or soil vacuum extraction.
- Solid Waste Management Unit (SWMU)** Any unit at a RCRA facility from which hazardous constituents might migrate, irrespective of whether the unit was intended for management of solid or hazardous waste. SWMU types include, but are not limited to, container storage areas, tanks, surface impoundments, waste piles, land treatment units, landfills, incinerators, injection wells, recycling operations, miscellaneous units, and releases from such units.
- Technical Assistance Grants** Specific allotments (of up to \$50,000 for a single recipient) that are made available by U.S. EPA to any group of individuals that may be affected by a release or threatened release at an installation that is listed on the National Priorities List under the National Contingency Plan. Such grants may be used to obtain technical assistance in interpreting information about the nature of the hazard, document review, remedy selection, construction of the remedial action, operation and maintenance, or removal action at such an installation.

- Technical Assistance for Public Participation (TAPP)** A DoD program designed to assist community members of Restoration Advisory Boards and technical review committees in participating more fully in the cleanup process affecting DoD installations and FUDS. TAPP allows community members to obtain objective, independent scientific and engineering support concerning the restoration process through the issuance of government purchase orders to small businesses. TAPP purchase orders are limited to \$25,000 or 1 percent of restoration cost to complete (the total cost of installation cleanup) annually.
- Technical Review Committee (TRC)** A group of technical experts that is responsible for reviewing technical reports and data for a site. A TRC is established at an installation for the purpose of reviewing and commenting on actions and proposed actions concerning releases or threatened releases at the installation. The TRC consists of at least one representative from the installation, a representative of U.S. EPA, appropriate state and local authorities, and a public representative of the community involved.
- Transferred Range** A property formerly used as a military range that is no longer under military control and had been leased by the DoD, transferred, or returned from the DoD to another entity, including federal entities. This includes a military range that is no longer under military control but was used under the terms of a withdrawal, executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the federal land manager.
- Transferring Range** A military range that is proposed to be transferred or returned from the DoD to another entity, including federal entities. This includes a military range that is used under the terms of a withdrawal, executive order, act of Congress, public land order, special-use permit or authorization, right-of-way, or other instrument issued by the federal land manager or property owner. An operational or closed range will not be considered a “transferring range” until the transfer is imminent.
- Underground Storage Tank (UST) Program** The UST program regulates tanks that store either petroleum products or hazardous substances. RCRA Subtitle I establishes requirements for the management of USTs that contain petroleum products or any substance defined as hazardous under CERCLA. Investigation and cleanup of past contamination at UST sites are eligible for funding under the Defense Environmental Restoration Program.
- Unexploded Ordnance** Military munitions that have been primed, fuzed, armed, or otherwise prepared for action, and have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material and remain unexploded either by malfunction, design, or any other cause.
- Waste Military Munition** For purposes of this report, a waste military munition is defined as an unused munition that was abandoned by being disposed of, burned, or incinerated, or treated prior to disposal; or, a used or fired munition that was recovered, collected, and disposed of by burial, landfilling, or land treatment.



AEC	Army Environmental Center	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
AFB	Air Force Base	CERFA	Community Environmental Response Facilitation Act
AFBCA	Air Force Base Conversion Agency	CFR	Code of Federal Regulations
AFCEE	Air Force Center for Environmental Excellence	CMD	Corrective Measures Design
AFRPA	Air Force Real Property Agency	CFI	Corrective Measures Implementation
AOC	Area of Concern	CMS	Corrective Measures Study
ARAR	Applicable or Relevant and Appropriate Requirement	CON/HTRW	Containerized Hazardous, Toxic, and Radioactive Waste
AREE	Area Requiring Environmental Evaluation	CRP	Community Relations Plan
ARTT	Alternative Restoration Technology Team	CS	Confirmation Study
AST	Aboveground Storage Tank	CTC	Cost to Complete
ATSDR	Agency for Toxic Substances and Disease Registry	CTT	Closed, Transferred, or Transferring
BCP	BRAC Cleanup Plan	CWM	Chemical Warfare Materiel
BCT	BRAC Cleanup Team	CY	Calendar Year
BD/DR	Building Demolition and Debris Removal	DAS	Deputy Assistant Secretary
BEC	BRAC Environmental Coordinator	DDESB	Department of Defense Explosives Safety Board
BES	Budget Estimate Submission	DDT	Dichlorodiphenyltrichloroethane
BRAC	Base Realignment and Closure	DERA	Defense Environmental Restoration Account
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene (solvents)	DERP	Defense Environmental Restoration Program
CA	Cooperative Agreement; Corrective Action	DERTF	Defense Environmental Response Task Force
CAP	Corrective Action Plan	DLA	Defense Logistics Agency
CAR	Contamination Assessment Report	DNA	Defense Nuclear Agency

DNAPL	Dense Nonaqueous Phase Liquid	FFS	Focused Feasibility Study
DoD	Department of Defense	FOSET	Finding of Suitability for Early Transfer
DOJ	Department of Justice	FOSL	Finding of Suitability to Lease
DOE	Department of Energy	FOST	Finding of Suitability to Transfer
DON	Department of Navy	FR	Federal Register
DPG	Defense Planning Guidance	FS	Feasibility Study
DRMO	Defense Reutilization and Marketing Office	FUDS	Formerly Used Defense Sites
DSERTS	Defense Site Environmental Restoration Tracking System	FY	Fiscal Year
DSMOA	Defense and State Memorandum of Agreement	GIS	Geographic Information System
DTRA	Defense Threat Reduction Agency	GPR	Ground-Penetrating Radar
DUSD(I&E)	Deputy Under Secretary of Defense (Installations & Environment)	GPRA	Government Performance and Results Act
EA	Environmental Assessment	GPS	Global Positioning System
EBS	Environmental Baseline Survey	GSA	General Services Administration
EDC	Economic Development Conveyance	GWTP	Groundwater Treatment Plant
EE/CA	Engineering Evaluation and Cost Analysis	HHRA	Human Health Risk Assessment
EFD/A	Engineering Field Division/Activity	HRS	Hazard Ranking System
EIS	Environmental Impact Statement	HSWA	Hazardous and Solid Waste Amendments
EO	Executive Order	HTRW	Hazardous, Toxic, and Radioactive Waste
EPA	U.S. Environmental Protection Agency	IA	Interim Action
ER	Environmental Restoration	IAG	Interagency Agreement
ERA	Ecological Risk Assessment	IAS	Initial Assessment Study
ESD	Explanation of Significant Differences	INPR	Inventory Project Report
ESI	Expanded Site Inspection	IPR	In-Progress Review
ESTCP	Environmental Security Technology Certification Program	IR	Installation Restoration
ETA	Early Transfer Authority	IRA	Interim Remedial Action
FAA	Federal Aviation Administration	IRP	Installation Restoration Program
FFA	Federal Facility Agreement	ISC	Initial Site Characterization
FFCA	Federal Facilities Compliance Act	IWTP	Industrial Wastewater Treatment Program
FFID	Federal Facility Identification number	LFI	Limited Field Investigations

LNAPL	Light Nonaqueous Phase Liquid	NOAA	National Oceanic and Atmospheric Administration
LRA	Local Redevelopment Authority	NPL	National Priorities List
LRP	Land Reuse Plan	NRC	Nuclear Regulatory Commission
LTM	Long Term Management	NTCRA	Non-Time-Critical Removal Action
LTO	Long-Term Operations	NWIRP	Naval Weapons Industrial Reserve Plant
LUCs	Land Use Controls	O&M	Operation and Maintenance
MAP	Management Action Plan	OB/OD	Open Burning/Open Detonation
MCAS	Marine Corps Air Station	ODUSD(I&E)	Office of the Deputy Under Secretary of Defense (Installations & Environment)
MCB	Marine Corps Base	OEW	Ordnance and Explosives Waste
MCL	Maximum Contaminant Level	OMB	Office of Management and Budget
MCLB	Marine Corps Logistics Base	OP&S	Operating Properly and Successfully
MILCON	Military Construction	OSD	Office of the Secretary of Defense
MMRP	Military Munitions Response Program	OU	Operable Unit
MOA	Memorandum of Agreement	PA	Preliminary Assessment
MoM	Measure of Merit	PAE	Preliminary Assessment of Eligibility (FUDS)
MOU	Memorandum of Understanding	PAH	Polyaromatic Hydrocarbons
NAS	Naval Air Station	PBC	Performance-based Contracting
NASA	National Aeronautics and Space Administration	PCB	Polychlorinated Biphenyl
NAVFAC	Naval Facilities Engineering Command	PCP	Pentachlorophenol
NAWC	Naval Air Warfare Center	PDBS	Passive Diffusion Bag Sampler
NAWS	Naval Air Weapons Station	PHA	Public Health Assessment
NCP	National Oil and Hazardous Substances Pollution Contingency Plan	POL	Petroleum, Oil, and Lubricants
NCS	Naval Communication Station	POM	Program Objective Memorandum
NDAI	No Defense Action Indicated	PPBS	Planning, Programming, and Budgeting System
NELP	Navy Environmental Leadership Program	ppm	Parts per Million
NEPA	National Environmental Policy Act	PRAP	Proposed Remedial Action Plan
NFA	No Further Action	PRP	Potentially Responsible Party
NFESC	Naval Facilities Engineering Service Center	PSE	Preliminary Source Evaluation
NFRAP	No Further Remedial Action Planned	RA	Remedial Action

RA-C	Remedial Action Construction	SI	Site Inspection
RA-O	Remedial Action Operation	SSEBS	Site-Specific Environmental Baseline Survey
RAB	Restoration Advisory Board	SSI	Screening Site Inspection
RAC	Risk Assessment Code	SVE	Soil Vapor Extraction
RACER	Remedial Action Cost Engineering and Requirements	SWMU	Solid Waste Management Unit
RAP	Remedial Action Plan	TAG	Technical Assistance Grant
RBCA	Risk-Based Corrective Action	TAPP	Technical Assistance for Public Participation
RC	Response Complete	TCA	Trichloroethane
RCRA	Resource Conservation and Recovery Act	TCE	Trichloroethylene
R&D	Research and Development	TCRA	Time-Critical Removal Action
RD	Remedial Design	TERC	Total Environmental Restoration Contract
RDT&E	Research, Development, Testing, and Evaluation	TNT	Trinitrotoluene
RDX	Cyclonite/Hexahydro-1,3,5-trinitro-1,3,5-triazine (royal demolition explosive)	TPH	Total Petroleum Hydrocarbons
RFA	RCRA Facility Assessment	TRC	Technical Review Committee
RFI	RCRA Facility Investigation	TS	Treatability Study
RI	Remedial Investigation	TSCA	Toxic Substances Control Act
RIP	Remedy in Place	USACE	U.S. Army Corps of Engineers
RMIS	Restoration Management Information System	USC	United States Code
RPO	Remedial Process Optimization	USD(AT&L)	Under Secretary of Defense (Acquisition, Technology & Logistics)
ROD	Record of Decision	USFWS	U.S. Fish and Wildlife Service
RPM	Remedial Project Manager	USGS	U.S. Geological Survey
RRSE	Relative-Risk Site Evaluation	UST	Underground Storage Tank
RSE	Removal Site Evaluation	UXO	Unexploded Ordnance
SADBU	Small and Disadvantaged Business Utilization	VOC	Volatile Organic Compound
SARA	Superfund Amendments and Reauthorization Act of 1986	VSI	Visual Site Inspection
SBA	Small Business Administration		
SC	Site Closeout		
SEBS	Supplemental Environmental Baseline Survey		
SERDP	Strategic Environmental Research and Development Program		



REPORTING REQUIREMENTS SUMMARY

CERCLA §120(e)(5); 42 U.S.C. §9620(e)(5)

Location in DERP Annual Report to Congress

Each department, agency, or instrumentality responsible for compliance with this section shall furnish an annual report to Congress concerning its progress in implementing the requirements of this section. Such reports shall include, but shall not be limited to, the following:

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| <ul style="list-style-type: none"> A) A report on the progress in reaching interagency agreements under this section. B) The specific cost estimates and budgetary proposals involved in each interagency agreement. C) A brief summary of the public comments regarding each proposed interagency agreement. D) A description of the instances in which no agreement was reached. | <p>Appendix D: Interagency Agreements, DSMOA, ATSDR, and Cooperative Agreements</p> |
| <ul style="list-style-type: none"> E) A report on progress in conducting investigations and studies under paragraph (1). F) A report on progress in conducting remedial actions. G) A report on progress in conducting remedial actions at facilities that are not listed on the National Priorities List. | <p>Appendix B: IRP Status Tables</p> |

With respect to instances in which no agreement was reached within the required time period, the department, agency, or instrumentality filing the report under this paragraph shall include in such report an explanation of the reasons why no agreement was reached. The annual report required by this paragraph shall also contain a detailed description on a state-by-state basis of the status of each facility subject to this section, including a description of the hazard presented by each facility, plans and schedules for initiating and completing response action, enforcement status (where appropriate), and an explanation of any postponements or failure to complete response action. Such report shall also be submitted to the affected states.

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| <p>Appendix A: Installation Narrative Summaries</p> <p>Appendix B: IRP Status Tables</p> <p>Appendix D: Interagency Agreements, DSMOA, ATSDR, and Cooperative Agreements</p> |
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If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section 9604 or 9606 of this title, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

Appendix A: Installation Narrative Summaries
Appendix B: IRP Status Tables

(a) Report on Environmental Restoration Activities.

- 1) The Secretary of Defense shall submit to the Congress each year, not later than 45 days after the date on which the President submits to the Congress the budget for a fiscal year, a report on the progress made by the Secretary in carrying out environmental restoration activities at military installations.
- 2) Each such report shall include, with respect to environmental restoration activities for each military installation, the following:

- A) A statement of the number of sites at which a hazardous substance has been identified.
- B) A statement of the status of the response actions proposed for or initiated at the military installation.
- C) A statement of the total cost estimated for such response actions.
- D) A statement of the amount of funds obligated by the Secretary for such response actions, and the progress made in implementing the response actions during the fiscal year preceding the year in which the report is submitted, including an explanation of
 - i) any cost overruns for such response actions, if the amount of funds obligated for such response actions exceeds the estimated cost for those response actions by the greater of 15 percent of the estimated cost or \$10,000,000; and
 - ii) any deviation in the schedule (including a milestone schedule specified in an agreement, order, or mandate) for such response action of more than 180 days.
- E) A statement of the amount of funds allocated by the Secretary for, and the anticipated progress in implementing, such response actions during the fiscal year in which the report is submitted.
- F) A statement of the amount of funds requested for such response action for the five fiscal years following the fiscal year in which the report is submitted, and the anticipated progress in implementing such response actions for the fiscal year for which the budget is submitted.
- G) A statement of the total costs incurred for such response actions as of the date of submission of the report.

Appendix B: IRP Status Tables

- H) A statement of the estimated cost of completing all environmental restoration activities at the military installation.
- I) A statement of the estimated schedule for completing all environmental restoration activities at the military installation.
- J) A statement of the activities, if any, including expenditures for administration and technical assistance under section 2705 of this title, of the technical review committee or restoration advisory board established for the installation under such section during the preceding fiscal year.

Appendix H: Restoration Advisory Board Appendix

Public Law 105-85; FY98 National Defense Authorization Act; 10 U.S.C. §2702 (Note)

Location in DERP Annual Report to Congress

In the annual report required under title 10, United States Code §2706(a), the Secretary shall include the following information with respect to cooperative agreements entered into under this section:

- 1) The number of such partnerships.
- 2) A description of the nature of the technology involved in each such partnership.
- 3) A list of all partners in such partnerships.

Appendix A: Installation Narrative Summaries
 Appendix D: Interagency Agreements, DSMOA, ATSDR, and Cooperative Agreements

Public Law 107-107; FY02 National Defense Authorization Act; 10 U.S.C. §2710

Location in DERP Annual Report to Congress

- a) Inclusion in 2003 Report on Environmental Restoration Activities. The Secretary of Defense shall include in the report submitted to Congress under section 2706(a) of title 10, United States Code, in 2003 a comprehensive assessment of unexploded ordnance, discarded military munitions, and munitions constituents located at current and former facilities of the Department of Defense. The assessment shall include, at a minimum, the following—
 - 1) Separate estimates of the aggregate projected costs of the remediation of unexploded ordnance, discarded military munitions, and munitions constituents at—
 - A) all operational ranges; and
 - B) all other defense sites.
 - 2) A comprehensive plan for addressing the remediation of unexploded ordnance, discarded military munitions, and munitions constituents at defense sites, including an assessment of the funding required and the period of time over which such funding will be required.
 - 3) An assessment of the technology currently available for the remediation of unexploded ordnance, discarded military munitions, and munitions constituents.
 - 4) An assessment of the impact of improved technology on the cost of such remediation and a plan for the development and use of such improved technology.

Chapter 4: Military Munitions Response Program
 Appendix C: MMRP Status Tables

Subpart (b) omitted.

- c) Interim Assessment—The report submitted to Congress under section 2706(a) of title 10, United States Code, in 2002 shall include the assessment required by subsection (a) to the extent that the information required to be provided as part of the assessment is available. The Secretary shall include an explanation of any limitations on the information available or qualifications on the information provided.

Chapter 4: Military Munitions Response Program
Appendix C: MMRP Status Tables

Requirements identified in subpart (c) were fulfilled in the FY01 DERP Annual Report to Congress

Public Law 107-64, Section 131; FY02 Military Construction Act

Location in DERP Annual Report to Congress

- (a) Requests for funds for environmental restoration at BRAC sites in future fiscal years- In the budget justification materials submitted to Congress in support of the Department of Defense budget for any fiscal year after fiscal year 2002, the amount requested for environmental restoration, waste management, and environmental compliance activities in such fiscal year with respect to military installations approved for closure or realignment under the base closure laws shall accurately reflect the anticipated cost of such activities in such fiscal year.

Chapter 2: Defense Environmental Restoration Program Funding
Appendix A: Installation Narrative Summaries
Appendix B: IRP Status Tables
Appendix C: MMRP Status Tables
Appendix E: Environmental Condition of BRAC Property



ACQUISITION,
TECHNOLOGY
AND LOGISTICS

OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON
WASHINGTON, DC 20301-3000

SEP. 03 2002

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY
(INSTALLATIONS AND ENVIRONMENT)
ASSISTANT SECRETARY OF THE NAVY
(INSTALLATIONS AND ENVIRONMENT)
ASSISTANT SECRETARY OF THE AIR FORCE
(INSTALLATIONS, ENVIRONMENT, AND LOGISTICS)
DIRECTOR, DEFENSE LOGISTICS AGENCY (D)
DIRECTOR, THREAT REDUCTION AGENCY

SUBJECT: Guidance for Fulfilling the Cost Estimating Requirements in Section 313 of the Defense Authorization Act for FY2002

My office has developed the attached guidance in response to reporting requirements contained in Section 313 of the *National Defense Authorization Act for Fiscal Year 2002* (Public Law 107-107). The guidance, which was developed in consultation with the Components, provides explicit instructions on preparing and submitting data to meet the requirements for the high and low aggregate estimates for both Military Munitions Response Program (MMRP) sites (described as “defense sites” in Section 311), which are included in the Defense Environmental Restoration Program (DERP), and for operational ranges. Although operational ranges are not part of the DERP or included in the inventory required by Section 311, aggregate estimates are required for these ranges. Our objective is to ensure that the Department’s response to Congress is based on consistent and credible data for which both the Components and my office can support and explain to the Congress.

For the DERP MMRP, which consists of the “defense sites” identified in Section 311, Components will submit their base-case cost estimates for each MMRP site with their remaining site data to DUSD(I&E) as is normally required the DERP annual report. In addition to the requirements outlined in the attached guidance, each Component shall provide an explanation and analysis of their method, underlying assumptions, as well as identify opportunities for enhanced technology to decrease the cost estimates. It is imperative that the Components be able to support their estimates and assumptions to the Office of the Secretary of Defense and the Congress.

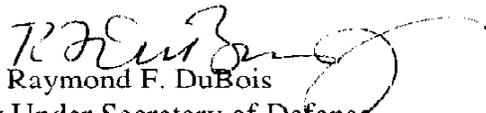
The Annual Report to Congress for Fiscal Year 2002 will be submitted on March 31, 2003. The Department will maintain the inventory of munitions response sites, as required by Section 311, in the Restoration Management Information System (RMIS). Also, as required in Sec 311, the initial inventory will be made publicly available by May



31, 2003. Regarding the Section 313 requirements, we have:

- Developed consistent assumptions to be applied, but adopted a decentralized approach to developing the estimates, tasking the Components to develop the necessary information, prepare and document high and low estimates based on their existing site-level estimates, and supply that information to DUSD(I&E). For MMRP sites, six aggregate estimates will be included in the annual report: base case, high, and low estimates for unexploded ordnance and discarded military munitions; and, base case, high, and low estimates for munitions constituents.
- Allowed the Components the flexibility to use parametric, engineering, or a combination of cost estimating methodologies in the preparation of these estimates.

The Section 313 requirements are only a small fraction of the statutory requirements that the DERP annual report fulfills. My annual memorandum requesting Component support and participation in the development of the DERP report was issued in August. If you have any questions or suggestions on this effort, please contact Mr. Robert Turkeltaub at (703) 695-2712 or Mr. Shah Choudhury at (703)697-7475.



Raymond F. DuBois

Deputy Under Secretary of Defense
(Installations & Environment)

Attachment



HIGH/LOW COST ESTIMATE GUIDANCE

1 Introduction

Section 313(a)(1) of the *Defense Authorization Act for Fiscal Year 2002* (Public Law 107-107) directs the Secretary of Defense to include in the Annual Report to Congress on the Defense Environmental Restoration Program (DERP) in the year 2003¹ “... a comprehensive assessment of unexploded ordnance, discarded military munitions, and munitions constituents located at current and former facilities of the Department of Defense (DoD). The Act directs that the one-time assessment include, at a minimum, the following: “(1) Separate estimates of the aggregate projected costs of the remediation of unexploded ordnance, discarded military munitions, and munitions constituents at (A) all operational ranges; and (B) all other defense sites.”²

Section 313(b) requires these estimates of aggregate projected costs be stated as a range of projected costs, including a low estimate and a

high estimate. It also requires that the report set forth the differing assumptions underlying both the low and high estimates, including:

- ❖ Any public uses for the operational ranges and other defense sites concerned that will be available after the remediation is completed;
- ❖ The extent of the remediation required to make the operational ranges and other defense sites concerned available for such uses; and
- ❖ The technologies to be applied to achieve such level of remediation.

The report is also to include, and identify separately, an estimate of the aggregate projected costs of the remediation of any groundwater contamination that may be caused by unexploded ordnance (UXO), discarded military munitions, or munitions constituents at the operational ranges and other sites of concern.

¹This annual report is required under Section 2706(a) of title 10, United States Code.

²The complete text of Section 313 is provided at Attachment A.

This document describes the requirements for cost estimating at “operational ranges” and at “all other defense sites” (i.e., locations other than operational ranges. These sites are currently identified in the DERP as part of the Military Munitions Response Program (MMRP)) and provides guidance to the Components for preparing the low and high aggregate cost estimates for these sites required by Section 313.

2 Guidance for Preparing the Low and High Aggregate Cost Estimates for Operational Ranges

To fulfill the requirements of Section 313 for estimating the costs associated with the remediation of UXO, discarded munitions, and munitions constituents at operational ranges requires four aggregate Component-level estimates. These include:

- 1) A low estimate and a high estimate for affecting the remediation of the unexploded ordnance and discarded military munitions present at operational ranges, and
- 2) A low estimate and a high estimate for affecting the remediation of the munitions constituents³ present at operational ranges.

The aggregate estimates (with supporting documentation) shall be submitted to ODUSD (I&E) by December 9, 2002. The supporting documentation will include summary information on the range inventory used in preparing the estimates including the number of ranges, acreage anticipated to contain a high density of UXO, and acreage anticipated to contain a low density of UXO.

Unlike MMRP sites where Components are required to prepare site-specific cost estimates for addressing UXO, discarded munitions, and munitions constituents at part of the MMRP, no such requirement currently exists for operational ranges. The lack of site-specific data, together with the one-time nature of this reporting requirement, makes it desirable to minimize data gathering costs. To this end, low and high estimates will be prepared for each operational range using the RACER™ cost model for estimating the costs associated with UXO and discarded military munitions, and the cost model described in this guidance for munitions constituents.

³ Section 313 requires DoD to, “include, and identify separately, an estimate of the aggregate projected costs of the remediation of any ground water contamination that may be caused by unexploded ordnance, discarded military munitions, or munitions constituents at the operational ranges and other defense sites concerned.” Further, Section 313 requires that the estimate of the aggregate projected costs of remediation of ground water contamination, “be based on a comprehensive assessment of the risk of such contamination and of the actions required to protect the ground water supplies concerned.”

2.1 Assumptions for Unexploded Ordnance and Discarded Military Munitions at Operational Ranges

To prepare cost estimates for operational ranges, DoD is selecting assumptions based on its experience with large range complexes in the BRAC and FUDS programs. Some of the significant assumptions included:

- The cost estimates do not include any costs associated with:
 - Ongoing range management (including UXO clearance) at operational ranges (e.g., target maintenance and removal and range clearance conducted to ensure continued safe use)
 - Stockpile or non-stockpile chemical, biological, or radiological weapons
- Indoor small arms, skeet, or recreational shooting ranges
- Water ranges⁴, and
- Operational ranges outside the United States and its territories.
- The low and high estimates will be based on the total acreage of each range. For purposes of these estimates, the total range acreage will be divided into areas that are anticipated to contain a high density of UXO, (e.g., target areas, range fans, firing points, OB/OD sites, demolition areas, etc.) and areas anticipated to contain a low density of UXO (e.g., buffers, surface danger zones, training areas, maneuver areas, etc.)⁵.

⁴ At present, DoD does not have a validated cost model for estimating these costs.

⁵ Each range will require at least four RACER estimates. A low and a high estimate for areas with a high UXO density and a low and a high estimate for areas with a low density of UXO.

Table 2-1. Operational Ranges - Assumptions and Default Values

Model Name	Assumptions	Defaults Used for Low and High Estimates	
		Low	High
Archives Search Report (ASR)	<ul style="list-style-type: none"> ASR or PA/SI cost per site 	Complexity = Low	Complexity = High
OE Site Characterization and Removal Assessment	EE/CA or RI/FS Total range acreage Sampling acreage Survey technology	Complexity = Low Characterization Acreage = 85% of total acreage RACER default Geophysical Survey	Complexity = High Characterization Acreage = 130% of total acreage RACER default Geophysical Survey
<ul style="list-style-type: none"> Acreage with a high density of UXO 	<ul style="list-style-type: none"> System definition 	<ul style="list-style-type: none"> Include all tasks 	<ul style="list-style-type: none"> Include all tasks
<ul style="list-style-type: none"> Acreage with a low density of UXO 	<ul style="list-style-type: none"> System definition Site Characterization Intrusive Investigations 	<ul style="list-style-type: none"> Run Scoping/Management, Site Planning, and Alternative Analysis once for each range Run Site Characterization as many times as needed to cover the required acreage Anomalies per acre = 1 	<ul style="list-style-type: none"> Run Scoping/Management, Site Planning, and Alternative Analysis once for each range Run Site Characterization as many times as needed to cover the required acreage Anomalies per acre = 10

Table 2-1. Operational Ranges - Assumptions and Default Values (Continued)

Model Name	Assumptions	Defaults Used for Low and High Estimates	
		Low	High
OE Removal Action			
<ul style="list-style-type: none"> • Acreage with a high density of UXO 	<ul style="list-style-type: none"> • System Definition • Removal area • Scrap • Anomalies • Ordnance Destruction 	<ul style="list-style-type: none"> • Include all tasks • 5% of total acreage • 95% per Acre • 50% of default for range type • 5% Electrical, 95% Mass Detonation 	<ul style="list-style-type: none"> • Include all tasks • 50% of total acreage • 85% per Acre • 150% of default for range type • 5% Electrical, 95% Mass Detonation
<ul style="list-style-type: none"> • Acreage with a low density of UXO 	<ul style="list-style-type: none"> • System Definition 	<ul style="list-style-type: none"> • Do not run OE Removal Action model 	<ul style="list-style-type: none"> • Do not run OE Removal Action model
OE Institutional Controls	<ul style="list-style-type: none"> • Complexity • Fencing 	<ul style="list-style-type: none"> • Complexity = Low • none 	<ul style="list-style-type: none"> • Complexity = High • Perimeter of high density acreage⁶
OE Monitoring	<ul style="list-style-type: none"> • Monitoring Frequency = 6 Events over 30 Yrs 	Complexity = Low	Complexity = High

⁶ Perimeter (in feet) is assumed to be $\sqrt{(Acres) \times (43,560)} * 4$.

- ◆ The characterization acreage for UXO and discarded military munitions will be from 85 percent to 130 percent of the range acreage.
- ◆ If the only type of munitions use is “small arms”, the estimates assume the site may have environmental contamination (often lead), but no UXO or discarded military munitions issues (the cost for UXO and discarded military munitions is assumed to be zero).
- ◆ Costs are in FY2002 dollars.

Due to the significant number of unknown factors associated with conducting responses at operational ranges, DoD developed a standard set of assumptions for developing low and high cost estimates for operational ranges. Table 2-1 summarizes the key RACER™ assumptions and default values that should be used.

2.2 Assumptions for Munitions Constituents at Operational Ranges

The low and high estimates for munition constituents at operational ranges will be calculated using the cost model described in Section 3.2.

The model assumes work will be performed at a site-level, and requires the Components to subdivide each range or range complex into “site-level” parcels. Examples of “site-level” parcels include firing points, target areas, OB/OD areas, demolition areas, burial sites, small arms ranges, etc. Each small arms range will be considered a

separate parcel. Other types of areas may be grouped into larger parcels.

Components should estimate the number of parcels for a range based on a range map and site-specific information where possible. For areas where this is not practical the following assumptions may be used:

Table 2-2. Operational Ranges - Assumptions for Number of Sites

Operational Range Acreage	Number of “site – level” parcels
1-100	1 + # of small arms ranges
101-10,000	3 + # of small arms ranges
10,001- 1 million	10 + # of small arms ranges
Over 1 million	20 parcels for each 1 million acres + # of small arms ranges

3 Guidance for Preparing The High And Low Aggregate Cost Estimates for MMRP sites

The DERP Annual Report to Congress already reports DoD’s total baseline cost-to-complete estimate⁷ for MMRP sites. For the 2003

report, Components will also develop high and low cost estimates as required by Section 313 for MMRP sites. Overall, six aggregate estimates will be prepared for MMRP sites:

- ◆ Estimated costs for addressing UXO and discarded military munitions.

1. High estimate
2. Baseline estimate
3. Low estimate

- ◆ Estimated costs for addressing munitions constituents⁸.

4. High estimate
5. Baseline estimate
6. Low estimate

The aggregate estimates (with supporting documentation if needed) shall be submitted to ODUSD (I&E) by December 9, 2002.

The methodology for developing low and high estimates has two parts:

- ◆ Section 3.1 contains site-level assumptions for unexploded ordnance and discarded military munitions.

- ◆ Section 3.2 addresses munitions constituents.

The assumptions provided in Section 3.1 should be used for low and high cost estimates unless the Component has site-specific information indicating that either different assumptions would yield a more accurate estimate for a given site or that different program-level assumptions should be used. In these cases, the specific assumptions used and the rationale (site specific information) for using them will be documented and provided with the Component's submittal.

In addition, the Components will also provide, and the Department shall disclose, the estimates of the costs of response actions at locations other than operational ranges prepared pursuant to the *DERP Management Guidance* (i.e., baseline estimates), as these values

⁷ The Office of the Deputy Under Secretary of Defense (Installations and Environment) (ODUSD (I&E)) *Management Guidance for the Defense Environmental Restoration Program* (September 28, 2001) requires the DoD Components to prepare a cost-to-complete estimate for each site identified when there is sufficient site-specific data to make a "probable" estimate without making unsubstantiated assumptions. In this guidance, these estimates are referred to the baseline estimates.

⁸ When added together, the aggregate baseline estimate for UXO and discarded military munitions and the aggregate baseline estimate for munitions constituents, should equal a Component's total baseline cost-to-complete for MMRP sites. Section 313 requires DoD to, "include, and identify separately, an estimate of the aggregate projected costs of the remediation of any ground water contamination that may be caused by unexploded ordnance, discarded military munitions, or munitions constituents at the operational ranges and other defense sites concerned." The high and low estimates to address this requirement will be based on the total estimated cost to address munitions constituents at each site. This may include the cost of addressing soil contamination as well as ground water.

are an integral component of the DERP Annual Report to Congress and the Department's annual financial statement. For the reporting period in September 2002, Components are directed to report the costs of responses to address UXO and discarded military munitions separately from the costs for responding to munitions constituents.

Consistent with the *DERP Management Guidance* the Components are tasked to develop a site-level cost estimate for each identified site, using all the site-specific knowledge that they possess. Where data are lacking, the Components are responsible for selecting and documenting specific assumptions to be used at each site to support development of the aggregate cost estimate. In general, high and low estimates for each site should be developed using the same site-level estimating factors as the baseline estimate, except as discussed in this guidance. The assumptions described in Sections 3.1 and 3.2 below should be used for high and low cost estimates unless site-specific information indicates that different assumptions would yield a more accurate estimate for a given site. In these cases, the specific assumptions used and the rationale for using them will be documented.

The cost estimates for MMRP sites do not include any costs associated with:

- ❖ Ongoing range management (including UXO clearance) at operational ranges (e.g., target maintenance and removal and range clearance conducted to ensure continued safe use);
- ❖ Stockpile or non-stockpile chemical, biological, or radiological weapons;
- ❖ Indoor small arms, skeet, or recreational shooting ranges; and
- ❖ Water ranges⁹.

3.1 Site-Level Assumptions for Unexploded Ordnance and Discarded Military Munitions at MMRP Sites

Various reviews of cost estimating related to munitions responses have identified certain variables having the greatest impact on cost. These variables include:

- ❖ Complexity of characterization;
- ❖ Characterization Acreage and Removal Acreage;
- ❖ Site topography and vegetation;
- ❖ Technology;

⁹Some land-based ranges that include areas of shallow water or swampy areas are included in the estimate.

- ◆ Extent of unexploded ordnance and discarded military munitions present at the site;
- ◆ Public use after remediation; and
- ◆ Engineering controls (e.g., fencing).

3.1.1 Summary of RACER™ Assumptions

For sites where RACER™ will be used to produce the site-level high and low estimates, Table 3-1 summarizes the key assumptions. Additional details for the assumptions shown in Table 3-1 and guidance for sites where RACER™ will be used are provided following the table.

Table 3-1. MMRP Sites – Summary of RACER™ Assumptions

Model Name	Assumptions	Defaults Used for Low and High Estimates	
		Low	High
Archives Search Report (ASR)	<ul style="list-style-type: none"> • ASR or PA/SI cost per site 	<ul style="list-style-type: none"> • Complexity = Low 	<ul style="list-style-type: none"> • Complexity = High
OE Site Characterization and Removal Assessment	<ul style="list-style-type: none"> • EE/CA or RI/FS complexity • Characterization acreage • Characterization technology • Scoping - Tasks to include 	<ul style="list-style-type: none"> • Complexity = Low • 85% of baseline • Geophysical Survey • All 	<ul style="list-style-type: none"> • Complexity = High • 130% of baseline • Geophysical Survey • All
OE Removal Action	<ul style="list-style-type: none"> • System definition • Removal Area • Percent Scrap • Remediation Technology • Number of Anomalies • Search depth 	<ul style="list-style-type: none"> • Include all tasks • 85% of baseline removal area • 95% per Acre • RACER defaults • 50% of baseline • 5 feet 	<ul style="list-style-type: none"> • Include all tasks • 130% of baseline removal area • 85% per Acre • RACER defaults • 150% of baseline • 5 feet
OE Institutional Controls	<ul style="list-style-type: none"> • Complexity • Engineering controls (security fence) 	<ul style="list-style-type: none"> • Complexity = Low • None 	<ul style="list-style-type: none"> • Complexity = High • Perimeter of high density acreage
OE Monitoring	<ul style="list-style-type: none"> • Complexity 	<ul style="list-style-type: none"> • Complexity = Low 	<ul style="list-style-type: none"> • Complexity = High

3.1.2 Complexity of Characterization

Sites are at various stages of the response process. In some cases there are limited data. In other cases, there are extensive data. In varying

estimate of the complexity of characterization for purposes of generating the low and high estimates, use the values shown in Table 3-2.

Table 3-2. MMRP Sites – Characterization Complexity

Variable	Assumptions	Assumptions for Low and High Cases	
		Low	High
• Preliminary Assessment/ Site Inspection	If the preliminary assessment/site inspection is incomplete	Complexity = Low	Complexity = High
	If the preliminary assessment/site inspection is complete	Use baseline cost (if any) for this cost element	
• Remedial Investigation/ Feasibility Study	If the investigation and response selection is incomplete	Complexity = Low	Complexity = High
	If the investigation and response selection is complete	Use baseline cost (if any) for this cost element	

3.1.3 Site Size

Given that most sites have yet to be characterized to determine the extent of UXO and discarded military munitions present, site size will be varied in development of the high and low estimates.

In varying site size for purposes of generating the low and high estimates, the Components are directed to use the values in the

following table. For example, if the site characterization is incomplete and the baseline site is 1000 acres, then the low estimate would be calculated using a characterization acreage of 850 acres and the high estimate calculated using a characterization acreage of 1300 acres. Further, if the baseline removal area is 5 percent of the site, or 50 acres, then the low estimate would be calculated using a removal area of 42.5 acres¹⁰ and the high estimate calculated using a removal area of 65 acres¹¹.

¹⁰ 50 acres x 0.85 = 42.5 acres

¹¹ 50 acres x 1.30 = 65 acres

Table 3-3. MMRP Sites – Characterization Acreage and Removal Area

Variable	Assumptions	Assumptions for Low and High Cases	
		Low	High
<ul style="list-style-type: none"> • Characterization Acreage • Removal Area 	<ul style="list-style-type: none"> • If site characterization is incomplete • If OE removal is incomplete 	<ul style="list-style-type: none"> • 85% of baseline • 85% of baseline 	<ul style="list-style-type: none"> • 130% of baseline • 130% of baseline

3.1.4 Site Topography and Vegetation

Site topography and vegetation are important cost estimating variables, but do not change from the baseline values for the low and high estimates.

3.1.5 Technology

Assumptions related to the technologies upon which the estimates are based are summarized in Table 3-4.

Table 3-4. MMRP Sites – Technology

Variable	Assumptions	Assumptions for Low and High Cases	
		Low	High
Characterization technology	• If the investigation and response selection is incomplete	• Geophysical Survey	• Geophysical Survey
	• If the investigation and response selection is complete	• Use baseline cost (if any) for this cost element	
Removal/remedial action technology	• If ordnance activities are incomplete	• RACER Defaults	• RACER Defaults
	• If ordnance activities are complete	• Use baseline cost (if any) for this cost element	

The Department has committed to using the most appropriate and effective detection technologies at each site, and to the maximum extent practicable, use of systems that generate sensor data that is digitally-recorded and geo-referenced. For this reason, technologies for characterization will not be varied. Similarly, the current technologies for removal and remedial actions are not to be varied. In the report submitted in response to Section 313, the Department will reassert the current commitment to the use of the most appropriate and effective detection technologies and to the maximum extent practicable, use of systems that generate sensor data that is digitally-recorded and geo-referenced.

3.1.6 Extent of Unexploded Ordnance and Discarded Military Munitions Present

Given that the extent of UXO and discarded munitions at many sites has yet to be determined with a high degree of accuracy, the number of anomalies will be varied in development of the high and low estimates as shown in Table 3-5. For example, if the investigation and response selection is complete, but removal/remedial action is incomplete, and the baseline number of anomalies per acre was set at 100, then the low estimate would be calculated using an anomaly value of 50 per acre and the high estimate calculated using a value of 150 per acre. If no baseline value for number of anomalies per acre has been established, use the default value generated by RACER™ 2002 or the range type as a baseline value.

Table 3-5. MMRP Sites – Number of Anomalies per Acre

Variables	Assumptions	Assumptions for Low and High Cases	
		Low	High
Number of Anomalies per Acre	• If the site characterization is incomplete	• 50% of baseline	• 150% of baseline
	• If the site characterization is complete, but removal/remedial action is incomplete	• 90% of baseline	• 110% of baseline
	• If the removal/remedial action is complete	• Use baseline cost (if any) for this cost element	

3.1.7 Public Use After Remediation

Section 313 requires DoD to address public use after remediation. Historically, ranges that have been transferred from DoD control have included a combination of public uses after remediation to include:

- ◆ No public access
- ◆ Limited public access
- ◆ Restricted public access, and
- ◆ Unrestricted public access.

Public use after remediation is not a variable that appears in the RACER™ 2002 cost models. However, the data set used to develop

the RACER cost relationships includes projects that represent the major categories of land use listed above. For purposes of these estimates, the cost uncertainty associated with different levels of public use after remediation is being accounted for by varying the removal area in the low and high estimates.

3.1.8 Extent of Remediation

The extent of remediation at a site is closely linked to the level of public use after remediation. Table 3-6 shows how the extent of remediation is related to the level of public use after remediation. For purposes of these estimates, the cost uncertainty associated with different levels of public use after remediation is being accounted for by varying the removal area in the low and high estimates.

Table 3-6. MMRP Sites – Extent of Remediation

Issue	Public Use After Remediation	Remediation
Extent of Remediation	No Public Access	No Physical Removal
	Limited Public Access	Surface Clearance
	Restricted Public Access	OE removal to depth
	Unrestricted Public Access	OE removal to depth

Table 3-7. MMRP Sites – Site Access Control

Variable	Assumptions	Assumptions for Low and High Cases	
		Low	High
Engineering Controls (security fence)	If site specific access decisions have not been made	0% of area is fenced	Perimeter of removal area ¹²
	If site-specific site access decisions have been made	Use baseline cost (if any) for this cost element	

3.2 Site-Level Assumptions for Munitions Constituents at MMRP Sites

Historical site-level cost and phase data were used to build a cost model for developing low and high estimates for the cleanup of munitions constituents. This Section describes the cost model and provides guidance on using the model to develop aggregate low and high estimates for munitions constituents.

The model assumes work will be performed at a site-level, and requires the Components to subdivide each range or range complex into “site-level” parcels. Examples of “site-level” parcels include firing points, target areas, OB/OD areas, demolition areas, burial sites, small arms ranges, etc. Each small arms range will be considered a separate parcel.

Components should estimate the number of parcels for a range based on a range map and site specific information where possible. If information on a former range or other area is not available, Components may use the assumptions in Table 2-2.

For developing the low and high cost estimates, Components are required to further subdivide their sites into three categories—sites where the PA/SI is not complete; sites where the PA/SI is complete, but the RI/FS is not complete; and sites where the RI/FS is complete.

Once the number of “site-level” parcels in each of the three categories is determined, the number of parcels in each category is entered into the model to calculate the low and high aggregate estimates for munitions constituents. The model is shown in Figure 3-1. The boxes highlighted in yellow show where the data are to be entered. The spreadsheet model will be provided to the Components electronically.

¹² Perimeter (in feet) is assumed to be $\sqrt{(Acres) \times (43,560)} * 4$.

The model uses data on the historical costs for sites with groundwater and soil contamination. Low cost estimates use phase costs at the 15th percentile of all sites, and the high estimates use costs at the 85th percentile. These phase costs were determined by examining historical RMIS data from FY97–FY01 and deriving the mean cost by phase for existing sites in the inventory.

The estimated percentages of sites requiring activities in a given phase were assumed. The percentages for the low estimates are based on information on a small number of sites addressing munitions in the

current inventory. The percentages for the high estimates are based on assumptions derived from the current inventory of DERP sites.

The assumptions provided herein should be used for low and high cost estimates unless the Component has site-specific information indicating that either different assumptions would yield a more accurate estimate for a given site or that different program-level assumptions should be used. In these cases, the specific assumptions used and the rationale for using them will be documented and provided with the Component's submittal.

Figure 3-1: Munitions Constituent Cost Model

Programmatic Cost Model for Munitions Constituents									June 3, 2002
									(\$000)
									Additional RA cost for GWater
	# of Sites	PA/SI	RI/F5 (Soil)	RA (Soil)	RA (GWater & Soil)	RA-0 (GWater & Soil)	LTM (GWater & Soil)	Totals	
For sites where the PA/SI is incomplete									
Low % of sites requiring work in phase		100%	50%	40%	0.50%	0.50%	0.25%		
Low Cost (15th percentile of phase cost)		\$9	\$35	\$45	\$28	\$60	\$29		
Low Estimate	100	\$900	\$1,750	\$1,800	\$14	\$30	\$7	\$4,501	
High % of sites requiring work in phase		100%	90%	80%	50%	50%	25%		
High Cost (85th percentile of phase cost)		\$340	\$500	\$1,250	\$1,050	\$2,300	\$690		
High Estimate	100	\$34,000	\$45,000	\$100,000	\$52,500	\$115,000	\$17,250	\$363,750	
For sites where the PA/SI is complete, but RI/F5 is incomplete									
Low % of sites requiring work in phase		N/A	90%	80%	1.00%	1.00%	0.50%		
Low Cost (15th percentile of phase cost)		N/A	\$35	\$45	\$28	\$60	\$29		
Low Estimate	50	\$0	\$1,575	\$1,800	\$14	\$30	\$7	\$3,426	
High % of sites requiring work in phase		N/A	100%	90%	56.25%	56.25%	28.13%		
High Cost (85th percentile of phase cost)		N/A	\$500	\$1,250	\$1,050	\$2,300	\$690		
High Estimate	50	\$0	\$25,000	\$56,250	\$29,531	\$64,688	\$9,703	\$185,172	
For sites where the RI/F5 is complete									
Low % of sites requiring work in phase		N/A	N/A	100%	1.25%	1.25%	0.63%		
Low Cost (15th percentile of phase cost)		N/A	N/A	\$45	\$28	\$60	\$29		
Low Estimate	25	\$0	\$0	\$1,125	\$9	\$19	\$5	\$1,157	
High % of sites requiring work in phase		N/A	N/A	100%	62.50%	62.50%	31.25%		
High Cost (85th percentile of phase cost)		N/A	N/A	\$1,250	\$1,050	\$2,300	\$690		
High Estimate	25	\$0	\$0	\$31,250	\$16,406	\$35,938	\$5,391	\$88,984	
Aggregate Low Estimate								\$9,085	
Aggregate High Estimate								\$637,906	

Explanation of Component Variance from the Guidance

The estimates submitted by the Army are based on 105 MMRP sites at 20 installations. These sites represent the portion of the MMRP inventory Army completed by the end of FY02—approximately 14 percent of all closed sites at Army’s active installations. The estimates also include costs for several transferred ranges (approximately 80 percent of the total acreage used) that are Formerly Used Defense Sites (FUDS) program-eligible but are not included in the FUDS list at this time.

The Army also deviated from the guidance by calculating munitions constituents (MC) costs through RACER, rather than using the OSD spreadsheet. Specifically, MC response costs for small arms ranges include the assumption that the volume of soil possibly containing lead, that is excavated and disposed of off-site, is based on actual range size and the size of a typical small arms range. Also, for ranges with UXO or discarded military munitions, the cost estimates assume the soil contains metals and the groundwater contains both metals and organics. The soil volume is based on anticipated parcels and range size. Army’s groundwater response costs assume the use of a pump-and-treat system, operating for 30 years.

To develop the cost estimates for UXO and discarded military military munitions, the Navy first derived RACER baseline estimates for sites not containing current estimates of cost in the Navy’s NORMS database. Navy then applied the assumptions provided to these RACER-derived baseline costs, as well as to those sites that did have current data in the NORMS database. The two totals were added for both the low and high estimates to create the overall estimates provided by Navy.

In completing the low and high cost estimates for UXO, discarded military munitions, and MC at FUDS properties, the U.S. Army Corps of Engineers used the guidance provided except where more detailed site-level data were available.



UNEXPLODED ORDNANCE TECHNOLOGY OBJECTIVES

This appendix provides illustrations of the six unexploded ordnance technology objectives developed by DoD's research, development, testing, and evaluation community. These objectives do not represent single endpoints in the technology development process, but rather describe classes of technologies required to meet specific operational needs. Additional information on UXO technology programs is available in the Department's annual *Environmental Technology Report to Congress*.

Investment in Wide Area Assessment

Objective	<ul style="list-style-type: none"> ▪ Develop capabilities to perform rapid assessment of large areas 																											
Need	<ul style="list-style-type: none"> ▪ Systems to locate concentrations of UXO to focus subsequent production ground surveys 																											
Benefit	<ul style="list-style-type: none"> ▪ Identification of lands where UXO is and is not present will reduce the area which requires detailed site characterization ▪ Reduced survey costs for large areas. 																											
Required System Capabilities	<ul style="list-style-type: none"> ▪ Ability to detect wide variety of UXO types, sizes, and shapes ▪ Operation in varying terrain, vegetative cover, and geology ▪ Area coverage rates exceeding hundreds of acres per day ▪ Detection of both surface and sub-surface UXO ▪ Low resolution capability to determine contamination boundaries ▪ High resolution capability to locate individual UXO ▪ Moderate to high probability of detection ▪ Moderate discrimination capability to minimize false alarm rate 																											
Future Plan	<ul style="list-style-type: none"> ▪ Develop magnetic and electromagnetic capabilities to survey large tracts of open and flat terrain ▪ Improve signal processing and optimize platform designs ▪ Extend capability to rough and vegetative terrain <ul style="list-style-type: none"> ▪ multi-axis magnetometry ▪ advanced electromagnetic ▪ synthetic aperture radar 																											
Investment Roadmap	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;"></th> <th style="width: 10%;">FY00</th> <th style="width: 10%;">FY01</th> <th style="width: 10%;">FY02</th> <th style="width: 10%;">FY03</th> <th style="width: 10%;">FY04</th> <th style="width: 10%;">FY05</th> <th style="width: 10%;">FY06</th> <th style="width: 10%;">FY07</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: middle;">S&T</td> <td colspan="8"> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="width: 100%; border-bottom: 1px solid black; margin-bottom: 5px;">SAR Phenomenology</div> <div style="display: flex; justify-content: space-between; width: 100%;"> <div style="width: 15%; border: 1px solid black; padding: 2px;">Mag Phenomena</div> <div style="width: 60%; border: 1px solid black; padding: 2px;">Platform/Sensor Development</div> </div> <div style="width: 100%; border-bottom: 1px solid black; margin-bottom: 5px;">EMI Phenomenology</div> <div style="width: 100%; border-bottom: 1px solid black; margin-bottom: 5px;">MAG/EMI Signal Process</div> </div> </td> </tr> <tr> <td style="text-align: center; vertical-align: middle;">DEM/VAL</td> <td colspan="8"> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="width: 100%; border-bottom: 1px dashed black; margin-bottom: 5px;"> <div style="width: 15%; border: 1px solid black; padding: 2px;">Mag systems</div> <div style="width: 60%; border: 1px solid black; padding: 2px;">EMI systems</div> </div> <div style="width: 100%; border-bottom: 1px solid black; margin-bottom: 5px;"> <div style="width: 15%; border: 1px solid black; padding: 2px;">SAR Assessment</div> <div style="width: 60%; border: 1px solid black; padding: 2px;">Advanced sensors</div> </div> </div> </td> </tr> </tbody> </table> <p style="font-size: small; margin-top: 10px;"> Arrows indicate dependencies: SAR Assessment (FY02) feeds into Platform/Sensor Development (FY03-04) and MAG/EMI Signal Process (FY02-04). Platform/Sensor Development (FY03-04) feeds into Advanced sensors (FY05-07). MAG/EMI Signal Process (FY02-04) feeds into Advanced sensors (FY05-07). </p>		FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	S&T	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="width: 100%; border-bottom: 1px solid black; margin-bottom: 5px;">SAR Phenomenology</div> <div style="display: flex; justify-content: space-between; width: 100%;"> <div style="width: 15%; border: 1px solid black; padding: 2px;">Mag Phenomena</div> <div style="width: 60%; border: 1px solid black; padding: 2px;">Platform/Sensor Development</div> </div> <div style="width: 100%; border-bottom: 1px solid black; margin-bottom: 5px;">EMI Phenomenology</div> <div style="width: 100%; border-bottom: 1px solid black; margin-bottom: 5px;">MAG/EMI Signal Process</div> </div>								DEM/VAL	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="width: 100%; border-bottom: 1px dashed black; margin-bottom: 5px;"> <div style="width: 15%; border: 1px solid black; padding: 2px;">Mag systems</div> <div style="width: 60%; border: 1px solid black; padding: 2px;">EMI systems</div> </div> <div style="width: 100%; border-bottom: 1px solid black; margin-bottom: 5px;"> <div style="width: 15%; border: 1px solid black; padding: 2px;">SAR Assessment</div> <div style="width: 60%; border: 1px solid black; padding: 2px;">Advanced sensors</div> </div> </div>							
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Investment in Production Ground Survey

Objective	<ul style="list-style-type: none"> ▪ Improve existing and/or develop new capabilities for detailed site characterization 																											
Need	<ul style="list-style-type: none"> ▪ Systems to accurately detect individual UXO and discriminate UXO from non-hazardous items 																											
Benefit	<ul style="list-style-type: none"> ▪ Increasing system capabilities with respect to probability of detection and discrimination, coverage rates, and applicability to varying terrain, geology, ordnance types and clutter environments ▪ Reduced residual risk due to higher detection rates ▪ Significant cost reduction due to reduced false alarms 																											
Required System Capabilities	<ul style="list-style-type: none"> ▪ Ability to detect wide variety of UXO types, sizes, and shapes ▪ Operation in varying terrain, vegetative cover, and geology ▪ Areal coverage rates exceeding tens of acres per day (vehicle mounted) or acres per day (man portable) ▪ Detection of both surface and sub-surface UXO ▪ High resolution capability to locate individual UXO and discriminate from non-UXO items ▪ High probability of detection ▪ High discrimination capability to minimize false alarm rate 																											
Future Plan	<ul style="list-style-type: none"> ▪ Improve understanding of the phenomenology of sensor responses to UXO and clutter ▪ Advance modeling and signal processing ▪ Gather UXO and non-UXO signature data ▪ Develop advanced magnetic and electromagnetic UXO sensors and optimized platforms ▪ Vehicle towed, man-portable, hand-held 																											
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Investment in Production Cued Identification

Objective	<ul style="list-style-type: none"> ▪ Develop capabilities for non-intrusive, cost-effective cued object identification
Need	<ul style="list-style-type: none"> ▪ Systems to determine whether ordnance objects pose explosive hazards ▪ Additional capability to characterize detected anomalies
Benefit	<ul style="list-style-type: none"> ▪ Improves ability to assess explosive hazards ▪ Allows for refined analysis of alternatives to address UXO ▪ Offers opportunity to reducing unneeded excavation
Required System Capabilities	<ul style="list-style-type: none"> ▪ No search capability is required as sensor is cued ▪ Throughput of tens to hundreds of objects per day ▪ Ability to interrogate sub-surface or partially exposed items ▪ Very high confidence in determinations of “not ordnance” ▪ Ability to identify ordnance functional type (e.g., high explosive, pyrotechnic, inert)
Future Plan	<ul style="list-style-type: none"> ▪ Develop cued electromagnetic sensors for buried UXO ▪ Develop cued filler-type identification techniques for exposed UXO (e.g., neutron activation, acoustics) ▪ Develop of next generation systems for partially exposed or sub-surface UXO
Investment Roadmap	<p>The diagram illustrates the investment roadmap from FY00 to FY07, divided into S&T (Science and Technology) and DEM/VAL (Development, Engineering, Manufacturing, and Validation) phases by a dashed horizontal line. S&T activities include Chemical Signatures (FY00), Radar Phenomenology (FY00), EMI Identification (FY01-FY04), and Advanced Identification (FY04-FY07). DEM/VAL activities include Cued GPR (FY01-FY03), Neutron Based Filler Identification (FY02-FY04), and Advanced Identification (FY06-FY07). Arrows show the transition of technology from S&T to DEM/VAL. Labels 'Open Terrain and Large Ordnance' and 'Exposed Objects' are placed near the DEM/VAL activities.</p>

Investment in Standards and Protocols

Objective	<ul style="list-style-type: none"> Develop methods for collection and management of standardized, high quality archival geophysical data and analysis products 																																																																								
Need	<ul style="list-style-type: none"> Advances in supporting technologies and the development of technical standards and protocols to support subsequent analysis, actions, QA/QC, and review by stakeholders 																																																																								
Benefit	<ul style="list-style-type: none"> Standardized data collection and management improves quality of and confidence in response activities, improves legal defensibility, allows for reevaluation, and improves ability to evaluate data over time 																																																																								
Required System Capabilities	<ul style="list-style-type: none"> Must accommodate systems that operate in a variety of terrain and vegetation, using different navigation/geo-location systems Ensure collected data meets performance requirements Advanced cost-effective geo-location technologies that can operate in varying terrain and vegetation and provide for highly accurate registration of sensor data Standard software and visualization tools to assist stakeholder understanding of analyses and decisions Standards for data archiving Standardized technology test sites and protocols 																																																																								
Future Plan	<ul style="list-style-type: none"> Improve geo-location technology for terrain where differential global positioning satellite (DGPS) access is unavailable Transition data management standards and protocols to the “user” communities Develop and transition standards, protocols, and software for data management 																																																																								
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Investment in Recovery and Treatment

Objective	<ul style="list-style-type: none"> ▪ Develop capabilities to reduce the cost and environmental impact associated with UXO recovery and treatment 																																													
Need	<ul style="list-style-type: none"> ▪ Improved removal and treatment systems are required to efficiently, safely, and effectively recover and treat individual UXO as well as for mass recovery in areas densely populated with UXO 																																													
Benefit	<ul style="list-style-type: none"> ▪ Greater safety and efficiency of UXO recovery operations ▪ Reduced environmental impact ▪ Increased regulatory and stakeholder acceptance 																																													
Required System Capabilities	<p>Recovery</p> <ul style="list-style-type: none"> ▪ Ability to recover individual UXO ▪ Ability to conduct mass UXO recovery ▪ Standoff capability (e.g., remote operation) or robust design to protect operators <p>Treatment</p> <ul style="list-style-type: none"> ▪ Ability to handle full range of potential UXO items ▪ Transportability ▪ Regulatory compliance and regulatory agency and stakeholder acceptance 																																													
Future Plan	<ul style="list-style-type: none"> ▪ Develop technologies for UXO recovery and treatment ▪ Develop area clearance technologies 																																													
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Investment in Decision Tools

Objective	<ul style="list-style-type: none"> Develop tools to guide and evaluate actions throughout the UXO clean-up process 																											
Need	<ul style="list-style-type: none"> Systems to support decision making that is statistically defensible and acceptable to the regulatory and stakeholder communities prior to, during, and after a response 																											
Benefit	<ul style="list-style-type: none"> The ability to quantify the impacts of actions taken during the UXO response process is a required component in making informed, defensible decisions 																											
Required System Capabilities	<ul style="list-style-type: none"> The ability to assess the hazard presented by UXO, its potential to migrate, and the effectiveness of potential management actions Statistically defensible procedures to assess sites through sub-sampling techniques that reflect the unique aspects of UXO and account for such factors as lateral and vertical distribution The ability to assess the potential for future exposure and effectiveness of potential response actions 																											
Future Plan	<ul style="list-style-type: none"> Develop of tools to support the appropriate statistical sampling of sites suspected to contain UXO Develop tools to aid in risk assessment 																											
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	WEB SITE	DESCRIPTION	INTERNET LOCATION
DoD	Base Realignment and Closure (BRAC) Home Page	BRAC information, policy, and guidance documents, points of contact, fact sheets, tools, and other BRAC-related publications	http://www.dtic.mil/envirodod/brac/index.html
	Defense Environmental Restoration Task Force (DERTF) Home Page	Provides reports and activities of the DERTF	http://www.dtic.mil/envirodod/brac/dertf.html
	Defense Environmental Restoration Program (DERP) Report to Congress	Online copy of the 1994 through 2000 DERP Reports to Congress	http://www.dtic.mil/envirodod/envdocs.html
	Devolvement of the Defense Environmental Restoration Account	Description of the benefits of disbursing funds to each Service and providing answers to questions and congressional concerns	http://www.dtic.mil/envirodod/derreport96/vol1/fact1.html
	DoD Environmental Cleanup Home Page	Web resource for up-to-date information on DoD's billion dollar cleanup program	http://www.dtic.mil/envirodod/index.html
	DoD Relative-Risk Site Evaluation Primer	Provides information on the relative-risk site evaluation framework used by DoD and detailed instructions on conducting relative-risk evaluations	http://www.dtic.mil/envirodod/relrisk/relrisk.html
	Office of the Deputy Under Secretary of Defense (Installations and Environment) (ODUSD(I&E))	Home page for ODUSD(I&E), providing general information about the office as well as links to other sites	http://www.acq.osd.mil/ens/

	WEB SITE	DESCRIPTION	INTERNET LOCATION
DoD	Proposed Restoration Advisory Board (RAB) Rule	DoD's 1996 proposed rule, which is awaiting finalization	http://www.dtic.mil/envirodod/rab/rab_fedr.html
	Final Technical Assistance for Public Participation Rule	DoD's final rule on facilitating public participation in the DERP	http://www.dtic.mil/envirodod/rab/63fr_tapp.html
	RAB Information Home Page	Provides a list of publications and information about RABs	http://www.dtic.mil/envirodod/rab/
	RAB Resource Book	Provides a summary of DoD policy on various aspects of establishing and operating RABs and lists several other sources of information	http://www.dtic.mil/envirodod/rab/rabresource/
	Directory of RABs	Lists all active and inactive RABs and points of contact for each RAB	http://www.dtic.mil/envirodod/rab/rabdir/index.html
Army	U.S. Army Corps of Engineers (USACE) Environmental Division	Provides general information on all aspects of the USACE	http://hq.environmental.usace.army.mil/
	Office of Director of Environmental Programs--Army	Includes the Army's environmental mission and policy statement as well as recent Army news and links	http://www.hqda.army.mil/acsimweb/env/
	U.S. Army Environmental Center (USAEC)	Provides general information on all aspects of the USAEC	http://aec.army.mil
	U.S. Army BRAC Office	Provides general information on all aspects of the BRAC program as well as recent news and data	http://www.hqda.army.mil/acsimweb/brac/braco.htm
Navy	Department of the Navy Environmental Program	Includes the Navy's environmental mission and policy statement, recent news, and links to other Navy and environmental sites	http://enviro.navy.mil/
	Department of Navy 5-Year Environmental Restoration Plan	A look at the Navy's plan for identifying and assessing potential areas of environmental contamination from FY99 through FY03	http://5yrplan.nfesc.navy.mil/

	WEB SITE	DESCRIPTION	INTERNET LOCATION
Navy	Navy Environmental Leadership Program	Provides information on the program and lists other resources, including recent publications	http://nelp.navy.mil
	Naval Facilities Engineering Service Center Environmental Services	Provides general information about the center, assistance with environmental compliance, and links to relevant documents	http://enviro.nfesc.navy.mil/
Air Force	Air Force Center for Environmental Excellence (AFCEE)	Provides general information about AFCEE and its products and services	http://www.afcee.brooks.af.mil/
	Air Force Environmental Home Page	Includes the Air Force's environmental mission and policy statement, as well as recent news	http://www.af.mil/environment/
	Air Force Base Conversion Agency	Provides general information about the Air Force BRAC program and BRAC bases	http://www.afbca.hq.af.mil/
	PRO-ACT	Air Force's environmental information clearinghouse and research service	http://www.afcee.brooks.af.mil/pro-act
DLA	DLA Environmental and Safety Directorate (DSS-E)	Provides information about the DSS-E and links to DLA and other resources	http://www.dla.mil/dss/dss-e/
	Hazardous Technical Information Services (HTIS)	HTIS is a support function, operated by DLA, that provides consultation services to DoD personnel worldwide	http://www.dscr.dla.mil/htis/htis.htm
FUDS	FUDS	A USACE-sponsored site that describes FUDS projects	http://hq.environmental.usace.army.mil/programs/fuds/fuds.html
U.S. EPA	U.S. EPA	U.S. EPA home page containing links to all Regions and resources	http://www.epa.gov
	EPA Office of Solid Waste and Emergency Response	Provides information about RCRA and solid waste definitions and programs	http://www.epa.gov/swerrims/
	U.S. EPA Pollution Prevention Home Page	Pollution prevention guidance and documents	http://www.epa.gov/opptintr/p2home

	WEB SITE	DESCRIPTION	INTERNET LOCATION
	RCRA, Superfund, and EPCRA Hotline	Information on RCRA, Superfund, UST, SPCC, EPCRA, Oil Pollution Act, RMP, and pollution prevention	http://www.epa.gov/epaoswer/hotline
	Ground Water and Drinking Water, U.S. EPA, Office of Water	Safe Drinking Water Act and amendments and information on policy and regulations regarding public water supply programs	http://www.epa.gov/ogwdw
	Watershed Information Resource System Database	Information on lake restoration, management, and protection	http://www.terrene.org/wirsdata.htm
	Wetlands Protection, U.S. EPA, Office of Water	Information on the value and function of wetlands, guidance documents, and information on constructed wetlands	http://www.epa.gov/owow/wetlands/
	Superfund	Information about the Superfund program and sites	http://www.epa.gov/superfund/
Other	Air RISC Hotline	Information on health, exposure, and risk assessment of toxic air pollutants	http://www.epa.gov/earth100/records/a00119.html
	Asbestos Abatement Management Ombudsman	Information on asbestos abatement	http://www.epa.gov/earth100/records/a00193.html
	Defense Environmental Network and Information Exchange (DENIX)	Provides DoD personnel in the environmental security arena and the public with up-to-date information on environmental issues, legislation, and DoD guidance	http://www.denix.osd.mil/
	Develop On-site Innovative Technologies Committee Report	Report containing committee findings on cooperative approaches to technical solutions	http://www.westgov.org/wga/publicat/doiweb.htm
	Defense and State Memorandum of Agreement (DSMOA)	A guide to the DSMOA program and process	http://hq.environmental.usace.army.mil/programs/dsmoa/dsmoa.html
Other	Clearinghouse for Inventories and Emissions Factors	Air pollution emission data for criteria and toxic pollutants from stationary, area, and mobile sources	http://www.epa.gov/ttn/chief/

WEB SITE	DESCRIPTION	INTERNET LOCATION
Environmental Security Technology Certification Program	Provides general information on projects and documents that describe the program	http://www.estcp.org
National Response Center Hazardous Materials and Oil Spills Hotline	National Response Center in the event of hazardous material spills, and provides reporting information	http://www.nrc.uscg.mil/index.html
Partnering Guide for Environmental Missions of the Air Force, Army, and Navy (1996)	Publication on the partnering process, its benefits, and its application	http://www.hq.usace.army.mil/cemp/c/partner.htm
Institute for Defense Analysis BRAC Report (2000)	Findings on Issues and Alternatives for Cleanup and Property Transfer of BRAC Sites	http://www.denix.osd.mil/IDA-BRAC



CONTACTS

For additional general information about the Defense Environmental Restoration Program and information about specific initiatives, write to:

Office of the Assistant Deputy Under Secretary of Defense (Installations & Environment)/Cleanup

**3400 Defense Pentagon
Washington, DC 20301-3400**

For additional information about the activities of specific DoD Components, write to:

Department of the Army*

**Office of the Deputy Assistant Secretary of the Army
(Environment, Safety, and Occupational Health)
110 Army Pentagon
Washington, DC 20310-0110**

Department of the Navy**

**Office of the Deputy Assistant Secretary of the Navy
(Environment and Safety)
1000 Navy Pentagon
Washington, DC 20350-1000**

Defense Threat Reduction Agency
**45045 Aviation Drive
Dulles, VA 20166-7517**

Department of the Air Force

**Office of the Deputy Assistant Secretary of the Air Force
(Environment, Safety, and Occupational Health)
1660 Air Force Pentagon
Washington, DC 20330-1660**

Defense Logistics Agency

**Environmental and Safety Directorate
8725 John J. Kingman Road
Suite 2533
Fort Belvoir, VA 22060-6221**

*Includes FUDS

**Includes Marine Corps

For information on small business, write to:

OSD Small and Disadvantaged Business Utilization Office
**3061 Defense Pentagon
Washington, DC 20301-3061**

Army Small Business Office

**Attn: SADB
106 Army Pentagon
Room 2A712
Washington, DC 20301-0106**

Navy Small and Disadvantaged Business Utilization Office

**2211 Jefferson Davis Highway
Arlington, VA 22244-5102**

Army Corps of Engineers Small Business Office

**20 Massachusetts Avenue, NW
#4117
Washington, DC 20014-1000**

Air Force Small Business Office

**SAF/CB
1060 Air Force Pentagon
Washington, DC 20330-1060**

