SUBCHAPTER J—SUPERFUND, EMERGENCY PLANNING, AND COMMUNITY RIGHT-TO-KNOW PROGRAMS

PART 300—NATIONAL OIL AND HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY PLAN

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AUTHORITY: 33 U.S.C. 1251 *et seq.;* 42 U.S.C. 9601–9657; E.O. 13626, 77 FR 56749, 3 CFR, 2013 Comp., p. 306; E.O. 12777, 56 FR 54757, 3 CFR, 1991 Comp., p. 351; E.O. 12580, 52 FR 2923, 3 CFR, 1987 Comp., p. 193.

Subpart A—Introduction

SOURCE: 59 FR 47416, Sept. 15, 1994, unless otherwise noted.

§ 300.1 Purpose and objectives.

The purpose of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) is to provide the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants.

§ 300.2 Authority and applicability.

The NCP is required by section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. 9605, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), Pub. L. 99–499, (hereinafter CERCLA), and by section 311(d) of the Clean Water Act (CWA), 33 U.S.C. 1321(d), as amended by the Oil Pollution Act of 1990 (OPA), Pub. L. 101–380. In Executive Order (E.O.) 12777 (56 FR 54757, October 22, 1991), the President delegated to the Environmental Protection Agency (EPA) the responsibility for the amendment of the NCP. Amendments to the NCP are coordinated with members of the National Response Team (NRT) prior to publication for notice and comment. This includes coordination with the Federal Emergency Management Agency (FEMA) and the Nuclear Regulatory Commission in order to avoid inconsistent or duplicative requirements in the emergency planning responsibilities of those agencies. The NCP is applicable to response actions taken pursuant to the authorities under CERCLA and section 311 of the CWA, as amended.

§ 300.3 Scope.

(a) The NCP applies to and is in effect for:

(1) Discharges of oil into or on the navigable waters of the United States, on the adjoining shorelines, the waters of the contiguous zone, into waters of the exclusive economic zone, or that may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the

United States (See sections 311(c)(1) and 502(7) of the CWA).

(2) Releases into the environment of hazardous substances, and pollutants or contaminants which may present an imminent and substantial danger to public health or welfare of the United States.

(b) The NCP provides for efficient, coordinated, and effective response to discharges of oil and releases of hazardous substances, pollutants, and contaminants in accordance with the authorities of CERCLA and the CWA. It provides for:

(1) The national response organization that may be activated in response actions. It specifies responsibilities among the federal, state, and local governments and describes resources that are available for response.

(2) The establishment of requirements for federal, regional, and area contingency plans. It also summarizes state and local emergency planning requirements under SARA Title III.

(3) Procedures for undertaking removal actions pursuant to section 311 of the CWA.

(4) Procedures for undertaking response actions pursuant to CERCLA.

(5) Procedures for involving state governments in the initiation, development, selection, and implementation of response actions, pursuant to CERCLA.

(6) Listing of federal trustees for natural resources for purposes of CERCLA and the CWA.

(7) Procedures for the participation of other persons in response actions.

(8) Procedures for compiling and making available an administrative record for response actions.

(9) National procedures for the use of dispersants and other chemicals in removals under the CWA and response actions under CERCLA.

(c) In implementing the NCP, consideration shall be given to international assistance plans and agreements, security regulations and responsibilities based on international agreements, federal statutes, and executive orders. Actions taken pursuant to the provisions of any applicable international joint contingency plans shall be consistent with the NCP, to the greatest extent possible. The Department of State shall be consulted, as appropriate, prior to taking any action which may affect its activities.

(d) Additionally, the NCP applies to and is in effect when the Federal Response Plan and some or all its Emergency Support Functions (ESFs) are activated.

§ 300.4 Abbreviations.

(a) *Department and Agency Title Abbreviations:*

ATSDR—Agency for Toxic Substances and Disease Registry
CDC—Centers for Disease Control
DOC—Department of Commerce
DOD—Department of Defense
DOE—Department of Energy
DOI—Department of the Interior
DOJ—Department of Justice
DOL—Department of Labor
DOS—Department of State
DOT—Department of Transportation
EPA—Environmental Protection Agency
FEMA—Federal Emergency Management Agency
GSA—General Services Administration
HHS—Department of Health and Human Services
NIOSH—National Institute for Occupational Safety and Health
NOAA—National Oceanic and Atmospheric Administration
OSHA—Occupational Health and Safety Administration
RSPA—Research and Special Programs Administration
USCG—United States Coast Guard
USDA—United States Department of Agriculture

NOTE: Reference is made in the NCP to both the Nuclear Regulatory Commission and the National Response Center. In order to avoid confusion, the NCP will spell out Nuclear Regulatory Commission and use the abbreviation ''NRC'' only with respect to the National Response Center.

(b) *Operational Abbreviations:*

ACP—Area Contingency Plan
ARARs—Applicable or Relevant and Appropriate Requirements
CERCLIS—CERCLA Information System
CRC—Community Relations Coordinator
CRP—Community Relations Plan
DRAT—District Response Advisory Team
DRG—District Response Group
ERT—Environmental Response Team
ESF—Emergency Support Function
FCO—Federal Coordinating Officer
FRERP—Federal Radiological Emergency Response Plan
FRP—Federal Response Plan
FS—Feasibility Study
HRS—Hazard Ranking System

LEPC—Local Emergency Planning Committee
NCP—National Contingency Plan
NPFC—National Pollution Funds Center
NPL—National Priorities List
NRC—National Response Center
NRS—National Response System
NRT—National Response Team
NSF—National Strike Force
NSFCC—National Strike Force Coordination Center
O&M—Operation and Maintenance
OSC—On-Scene Coordinator
OSLTF—Oil Spill Liability Trust Fund
PA—Preliminary Assessment
PIAT—Public Information Assist Team
RA—Remedial Action
RCP—Regional Contingency Plan
RD—Remedial Design
RERT—Radiological Emergency Response Team
RI—Remedial Investigation
ROD—Record of Decision
RPM—Remedial Project Manager
RRC—Regional Response Center
RRT—Regional Response Team
SAC—Support Agency Coordinator
SEMS—Superfund Enterprise Management System
SERC—State Emergency Response Commission
SI—Site Inspection
SMOA—Superfund Memorandum of Agreement
SONS—Spill of National Significance
SSC—Scientific Support Coordinator
SUPSALV—United States Navy Supervisor of Salvage
USFWS—United States Fish and Wildlife Service

[59 FR 47416, Sept. 15, 1994, as amended at 79 FR 65592, Nov. 5, 2014]

§ 300.5 Definitions.

Terms not defined in this section have the meaning given by CERCLA, the OPA, or the CWA.

Activation means notification by telephone or other expeditious manner or, when required, the assembly of some or all appropriate members of the RRT or NRT.

Alternative water supplies as defined by section 101(34) of CERCLA, includes, but is not limited to, drinking water and household water supplies.

Applicable requirements means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable.

Area Committee (AC) as provided for by CWA sections 311(a)(18) and (j)(4), means the entity appointed by the President consisting of members from qualified personnel of federal, state, and local agencies with responsibilities that include preparing an area contingency plan for an area designated by the President.

Area contingency plan (ACP) as provided for by CWA sections 311(a)(19) and (j)(4), means the plan prepared by an Area Committee that is developed to be implemented in conjunction with the NCP and RCP, in part to address removal of a worst case discharge and to mitigate or prevent a substantial threat of such a discharge from a vessel, offshore facility, or onshore facility operating in or near an area designated by the President.

Bioremediation agents means microbiological cultures, enzyme additives, or nutrient additives that are deliberately introduced into an oil discharge and that will significantly increase the rate of biodegradation to mitigate the effects of the discharge.

Burning agents means those additives that, through physical or chemical means, improve the combustibility of the materials to which they are applied.

CERCLA is the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986.

CERCLIS was the abbreviation for the CERCLA Information System. This system has been retired and has been replaced with SEMS, the Superfund Enterprise Management System.

Chemical agents means those elements, compounds, or mixtures that coagulate, disperse, dissolve, emulsify, foam, neutralize, precipitate, reduce, solubilize, oxidize, concentrate, congeal, entrap, fix, make the pollutant mass more rigid or viscous, or otherwise facilitate the mitigation of deleterious effects or the removal of the pollutant from the water. Chemical agents include biological additives, dispersants, sinking agents, miscellaneous oil spill control agents, and burning agents, but do not include sorbents.

Claim for purposes of a release under CERCLA, means a demand in writing for a sum certain; for purposes of a discharge under CWA, it means a request, made in writing for a sum certain, for compensation for damages or removal costs resulting from an incident.

Claimant as defined by section 1001 of the OPA means any person or government who presents a claim for compensation under Title I of the OPA.

Coastal waters for the purposes of classifying the size of discharges, means the waters of the coastal zone except for the Great Lakes and specified ports and harbors on inland rivers.

Coastal zone as defined for the purpose of the NCP, means all United States waters subject to the tide, United States waters of the Great Lakes, specified ports and harbors on inland rivers, waters of the contiguous zone, other waters of the high seas subject to the NCP, and the land surface or land substrata, ground waters, and ambient air proximal to those waters. The term coastal zone delineates an area of federal responsibility for response action. Precise boundaries are determined by EPA/USCG agreements and identified in federal regional contingency plans.

Coast Guard District Response Group (DRG) as provided for by CWA sections 311(a)(20) and (j)(3), means the entity established by the Secretary of the department in which the USCG is operating, within each USCG district, and shall consist of: the combined USCG personnel and equipment, including marine firefighting equipment, of each port in the district; additional prepositioned response equipment; and a district response advisory team.

Community relations means EPA's program to inform and encourage public participation in the Superfund process and to respond to community concerns. The term ''public'' includes citizens directly affected by the site, other interested citizens or parties, organized groups, elected officials, and potentially responsible parties (PRPs).

Community relations coordinator means lead agency staff who work with the OSC/RPM to involve and inform the public about the Superfund process and response actions in accordance with the interactive community relations requirements set forth in the NCP.

Contiguous zone means the zone of the high seas, established by the United States under Article 24 of the Convention on the Territorial Sea and Contiguous Zone, which is contiguous to the territorial sea and which extends nine miles seaward from the outer limit of the territorial sea.

Cooperative agreement is a legal instrument EPA uses to transfer money, property, services, or anything of value to a recipient to accomplish a public purpose in which substantial EPA involvement is anticipated during the performance of the project.

Damages as defined by section 1001 of the OPA means damages specified in section 1002(b) of the Act, and includes the cost of assessing these damages.

Discharge as defined by section 311(a)(2) of the CWA, includes, but is not limited to, any spilling, leaking, pumping, pouring, emitting, emptying, or dumping of oil, but excludes discharges in compliance with a permit under section 402 of the CWA, discharges resulting from circumstances identified and reviewed and made a part of the public record with respect to a permit issued or modified under section 402 of the CWA, and subject to a condition in such permit, or continuous or anticipated intermittent discharges from a point source, identified in a permit or permit application under section 402 of the CWA, that are caused by events occurring within the scope of relevant operating or treatment systems. For purposes of the NCP, discharge also means substantial threat of discharge.

Dispersants means those chemical agents that emulsify, disperse, or solubilize oil into the water column or promote the surface spreading of oil slicks to facilitate dispersal of the oil into the water column.

Drinking water supply as defined by section 101(7) of CERCLA, means any raw or finished water source that is or may be used by a public water system (as defined in the Safe Drinking Water Act (42 U.S.C. 300 *et seq.*) or as drinking water by one or more individuals.

Environment as defined by section 101(8) of CERCLA, means the navigable waters, the waters of the contiguous zone, and the ocean waters of which the natural resources are under the exclusive management authority of the United States under the Magnuson Fishery Conservation and Management Act (16 U.S.C. 1801 *et seq.*); and any other surface water, ground water, drinking water supply, land surface or subsurface strata, or ambient air within the United States or under the jurisdiction of the United States.

Exclusive economic zone, as defined by OPA section 1001, means the zone established by Presidential Proclamation Numbered 5030, dated March 10, 1983, including the ocean waters of the areas referred to as ''eastern special areas'' in Article 3(1) of the Agreement between the United States of America and the Union of Soviet Socialist Republics on the Maritime Boundary, signed June 1, 1990.

Facility as defined by section 101(9) of CERCLA, means any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft, or any site or area, where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located; but does not include any consumer product in consumer use or any vessel. As defined by section 1001 of the OPA, it means any structure, group of structures, equipment, or device (other than a vessel) which is used for one or more of the following purposes: Exploring for, drilling for, producing, storing, handling, transferring, processing, or transporting oil. This term includes any motor vehicle, rolling stock, or pipeline used for one or more of these purposes.

Feasibility study (FS) means a study undertaken by the lead agency to develop and evaluate options for remedial action. The FS emphasizes data analysis and is generally performed concurrently and in an interactive fashion with the remedial investigation (RI), using data gathered during the RI. The RI data are used to define the objectives of the response action, to develop remedial action alternatives, and to undertake an initial screening and detailed analysis of the alternatives. The term also refers to a report that describes the results of the study.

Federal Radiological Emergency Response Plan (FRERP) means the interagency agreement for coordinating the response of various agencies, under a variety of statutes, to a large radiological accident. The Lead Federal Agency (LFA), defined by the FRERP, activates the FRERP for any peacetime radiological emergency which, based upon its professional judgment, is expected to have a significant radiological effect within the United States, its territories, possessions, or territorial waters and that could require a response by several federal agencies.

Federal Response Plan (FRP) means the agreement signed by 27 federal departments and agencies in April 1987 and developed under the authorities of the Earthquake Hazards Reduction Act of 1977 (42 U.S.C. 7701 *et seq.*) and the Disaster Relief Act of 1974 (42 U.S.C. 3231 *et seq.*), as amended by the Stafford Disaster Relief Act of 1988.

First federal official means the first federal representative of a participating agency of the National Response Team to arrive at the scene of a discharge or a release. This official coordinates activities under the NCP and may initiate, in consultation with the OSC, any necessary actions until the arrival of the predesignated OSC. A state with primary jurisdiction over a site covered by a cooperative agreement will act in the stead of the first federal official for any incident at the site.

Fund or *Trust Fund* means the Hazardous Substance Superfund established by section 9507 of the Internal Revenue Code of 1986.

Ground water as defined by section 101(12) of CERCLA, means water in a saturated zone or stratum beneath the surface of land or water.

Hazard Ranking System (HRS) means the method used by EPA to evaluate the relative potential of hazardous substance releases to cause health or safety problems, or ecological or environmental damage.

Hazardous substance as defined by section 101(14) of CERCLA, means: Any substance designated pursuant to section 311(b)(2)(A) of the CWA; any element, compound, mixture, solution, or substance designated pursuant to section 102 of CERCLA; any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act (42 U.S.C. 6901 *et seq.*) has been suspended by Act of Congress); any toxic pollutant listed under section 307(a) of the CWA; any hazardous air pollutant listed under section 112 of the Clean Air Act (42 U.S.C. 7521 *et seq.*); and any imminently hazardous chemical substance or mixture with respect to which the EPA Administrator has taken action pursuant to section 7 of the Toxic Substances Control Act (15 U.S.C. 2601 *et seq.*). The term does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance in the first sentence of this paragraph, and the term does not include natural gas, natural gas liquids, liquified natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

Indian tribe as defined by section 101(36) of CERCLA, means any Indian tribe, band, nation, or other organized group or community, including any Alaska Native village but not including any Alaska Native regional or village corporation, which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians. ‘‘Indian tribe,’’ as defined by OPA section 1001, means any Indian tribe, band, nation, or other organized group or community, but not including any Alaska Native regional or village corporation, which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians and has governmental authority over lands belonging to or controlled by the tribe.

Inland waters, for the purposes of classifying the size of discharges, means those waters of the United States in the inland zone, waters of the Great Lakes, and specified ports and harbors on inland rivers.

Inland zone means the environment inland of the coastal zone excluding the Great Lakes and specified ports and harbors on inland rivers. The term inland zone delineates an area of federal responsibility for response action. Precise boundaries are determined by EPA/USCG agreements and identified in federal regional contingency plans.

Lead administrative trustee means a natural resource trustee who is designated on an incident-by-incident basis for the purpose of preassessment and damage assessment and chosen by the other trustees whose natural resources are affected by the incident. The lead administrative trustee facilitates effective and efficient communication during response operations between the OSC and the other natural resource trustees conducting activities associated with damage assessment, and is responsible for applying to the OSC for access to response operations resources on behalf of all trustees for initiation of a damage assessment.

Lead agency means the agency that provides the OSC/RPM to plan and implement response actions under the NCP. EPA, the USCG, another federal agency, or a state (or political subdivision of a state) operating pursuant to a contract or cooperative agreement executed pursuant to section 104(d)(1) of CERCLA, or designated pursuant to a Superfund Memorandum of Agreement (SMOA) entered into pursuant to subpart F of the NCP or other agreements may be the lead agency for a response action. In the case of a release of a hazardous substance, pollutant, or contaminant, where the release is on, or the sole source of the release is from, any facility or vessel under the jurisdiction, custody, or control of Department of Defense (DOD) or Department of Energy (DOE), then DOD or DOE will be the lead agency. Where the release is on, or the sole source of the release is from, any facility or vessel under the jurisdiction, custody, or control of a federal agency other than EPA, the USCG, DOD, or DOE, then that agency will be the lead agency for remedial actions and removal actions other than emergencies. The federal agency maintains its lead agency responsibilities whether the remedy is selected by the federal agency for non-NPL sites or by EPA and the federal agency or by EPA alone under CERCLA section 120. The lead agency will consult with the support agency, if one exists, throughout the response process.

Management of migration means actions that are taken to minimize and mitigate the migration of hazardous substances or pollutants or contaminants and the effects of such migration. Measures may include, but are not limited to, management of a plume of contamination, restoration of a drinking water aquifer, or surface water restoration.

Miscellaneous oil spill control agent is any product, other than a dispersant, sinking agent, surface washing agent, surface collecting agent, bioremediation agent, burning agent, or sorbent that can be used to enhance oil spill cleanup, removal, treatment, or mitigation.

National Pollution Funds Center (NPFC) means the entity established by the Secretary of Transportation whose function is the administration of the Oil Spill Liability Trust Fund (OSLTF). Among the NPFC's duties are: providing appropriate access to the OSLTF for federal agencies and states for removal actions and for federal trustees to initiate the assessment of natural resource damages; providing appropriate access to the OSLTF for claims; and coordinating cost recovery efforts.

National Priorities List (NPL) means the list, compiled by EPA pursuant to CERCLA section 105, of uncontrolled hazardous substance releases in the United States that are priorities for long-term remedial evaluation and response.

National response system (NRS) is the mechanism for coordinating response actions by all levels of government in support of the OSC/RPM. The NRS is composed of the NRT, RRTs, OSC/RPM, Area Committees, and Special Teams and related support entities. The NRS is capable of expanding or contracting to accommodate the response effort required by the size or complexity of the discharge or release.

National Strike Force (NSF) is a special team established by the USCG, including the three USCG Strike Teams, the Public Information Assist Team (PIAT), and the National Strike Force Coordination Center. The NSF is available to assist OSCs/RPMs in their preparedness and response duties.

National Strike Force Coordination Center (NSFCC), authorized as the National Response Unit by CWA sections 311(a)(23) and (j)(2), means the entity established by the Secretary of the department in which the USCG is operating at Elizabeth City, North Carolina with responsibilities that include administration of the USCG Strike Teams, maintenance of response equipment inventories and logistic networks, and conducting a national exercise program.

Natural resources means land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States (including the resources of the exclusive economic zone defined by the Magnuson Fishery Conservation and Management Act of 1976), any state or local government, any foreign government, any Indian tribe, or, if such resources are subject to a trust restriction on alienation, any member of an Indian tribe.

Navigable waters means the waters of the United States, including the territorial seas, as defined in §120.2 of this chapter.

Offshore facility as defined by section 101(17) of CERCLA and section 311(a)(11) of the CWA, means any facility of any kind located in, on, or under any of the navigable waters of the United States, and any facility of any kind which is subject to the jurisdiction of the United States and is located in, on, or under any other waters, other than a vessel or a public vessel.

Oil as defined by section 311(a)(1) of the CWA, means oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil. Oil, as defined by section 1001 of the OPA means oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil, but does not include petroleum, including crude oil or any fraction thereof, which is specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. 9601) and which is subject to the provisions of that Act.

Oil Spill Liability Trust Fund (OSLTF) means the fund established under section 9509 of the Internal Revenue Code of 1986 (26 U.S.C. 9509).

On-scene coordinator (OSC) means the federal official predesignated by EPA or the USCG to coordinate and direct responses under subpart D, or the government official designated by the lead agency to coordinate and direct removal actions under subpart E of the NCP.

Onshore facility as defined by section 101(18) of CERCLA, means any facility (including, but not limited to, motor vehicles and rolling stock) of any kind located in, on, or under any land or non-navigable waters within the United States; and, as defined by section 311(a)(10) of the CWA, means any facility (including, but not limited to, motor vehicles and rolling stock) of any kind located in, on, or under any land within the United States other than submerged land.

On-site means the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action.

Operable unit means a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure. 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. Operable units may address geographical portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site.

Operation and maintenance (O&M) means measures required to maintain the effectiveness of response actions.

Person as defined by section 101(21) of CERCLA, means an individual, firm, corporation, association, partnership, consortium, joint venture, commercial entity, United States government, state, municipality, commission, political subdivision of a state, or any interstate body. As defined by section 1001 of the OPA, ''person'' means an individual, corporation, partnership, association, state, municipality, commission, or political subdivision of a state, or any interstate body.

Pollutant or contaminant as defined by section 101(33) of CERCLA, shall include, but 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. The term does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under section 101(14) (A) through (F) of CERCLA, nor does it include natural gas, liquified natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas). For purposes of the NCP, the term pollutant or contaminant means any pollutant or contaminant that may present an imminent and substantial danger to public health or welfare of the United States.

Post-removal site control means those activities that are necessary to sustain the integrity of a Fund-financed removal action following its conclusion.

Post-removal site control may be a removal or remedial action under CERCLA. The term includes, without being limited to, activities such as relighting gas flares, replacing filters, and collecting leachate.

Preliminary assessment (PA) under CERCLA means review of existing information and an off-site reconnaissance, if appropriate, to determine if a release may require additional investigation or action. A PA may include an on-site reconnaissance, if appropriate.

Public participation, see the definition for community relations.

Public vessel as defined by section 311(a)(4) of the CWA, means a vessel owned or bareboat-chartered and operated by the United States, or by a state or political subdivision thereof, or by a foreign nation, except when such vessel is engaged in commerce.

Quality assurance project plan (QAPP) is a written document, associated with all remedial site sampling activities, which presents in specific terms the organization (where applicable), objectives, functional activities, and specific quality assurance (QA) and quality control (QC) activities designed to achieve the data quality objectives of a specific project(s) or continuing operation(s). The QAPP is prepared for each specific project or continuing operation (or group of similar projects or continuing operations). The QAPP will be prepared by the responsible program office, regional office, laboratory, contractor, recipient of an assistance agreement, or other organization. For an enforcement action, potentially responsible parties may prepare a QAPP subject to lead agency approval.

Release as defined by section 101(22) of CERCLA, means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant), but excludes: Any release which results in exposure to persons solely within a workplace, with respect to a claim which such persons may assert against the employer of such persons; emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine; release of source, byproduct, or special nuclear material from a nuclear incident, as those terms are defined in the Atomic Energy Act of 1954, if such release is subject to requirements with respect to financial protection established by the Nuclear Regulatory Commission under section 170 of such Act, or, for the purposes of section 104 of CERCLA or any other response action, any release of source, byproduct, or special nuclear material from any processing site designated under section 102(a)(1) or 302(a) of the Uranium Mill Tailings Radiation Control Act of 1978 (42 U.S.C. 7901 *et seq.*); and the normal application of fertilizer. For purposes of the NCP, release also means threat of release.

Relevant and appropriate requirements means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not ‘‘applicable’’ to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

Remedial design (RD) means the technical analysis and procedures which follow the selection of remedy for a site and result in a detailed set of plans and specifications for implementation of the remedial action.

Remedial investigation (RI) is a process undertaken by the lead agency to determine the nature and extent of the problem presented by the release. The RI emphasizes data collection and site characterization, and is generally performed concurrently and in an interactive fashion with the feasibility study. The RI includes sampling and monitoring, as necessary, and includes the gathering of sufficient information to determine the necessity for remedial action and to support the evaluation of remedial alternatives.

Remedial project manager (RPM) means the official designated by the lead agency to coordinate, monitor, or direct remedial or other response actions under subpart E of the NCP.

Remedy or remedial action (RA) means those actions consistent with permanent remedy taken instead of, or in addition to, removal action 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 or 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, on-site treatment or incineration, provision of alternative water supplies, any monitoring reasonably required to assure that such actions protect the public health and welfare and the environment and, where appropriate, post-removal site control activities. The term includes the costs of permanent relocation of residents and businesses and community facilities (including the cost of providing ‘‘alternative land of equivalent value’’ to an Indian tribe pursuant to CERCLA section 126(b)) where EPA determines that, alone or in combination with other measures, such relocation is more cost-effective than, and environmentally preferable to, the transportation, storage, treatment, destruction, or secure disposition off-site of such hazardous substances, or may otherwise be necessary to protect the public health or welfare; the term includes off-site transport and off-site storage, treatment, destruction, or secure disposition of hazardous substances and associated contaminated materials. For the purpose of the NCP, the term also includes enforcement activities related thereto.

Remove or removal as defined by section 311(a)(8) of the CWA, refers to containment and removal of oil or hazardous substances from the water and shorelines or the taking of such other actions as may be necessary to minimize or mitigate damage to the public health or welfare of the United States (including, but not limited to, fish, shellfish, wildlife, public and private property, and shorelines and beaches) or to the environment. For the purpose of the NCP, the term also includes monitoring of action to remove a discharge. As defined by section 101(23) of CERCLA, remove or removal means the cleanup or removal of released hazardous substances from the environment; such actions as may be necessary taken in the event of the threat of release of hazardous substances into the environment; such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances; the disposal of removed material; or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare of the United States or to the environment, which may otherwise result from a release or threat of release. The term includes, in addition, without being limited to, security fencing or other measures to limit access, provision of alternative water supplies, temporary evacuation and housing of threatened individuals not otherwise provided for, action taken under section 104(b) of CERCLA, post-removal site control, where appropriate, and any emergency assistance which may be provided under the Disaster Relief Act of 1974. For the purpose of the NCP, the term also includes enforcement activities related thereto.

Removal costs as defined by section 1001 of the OPA means the costs of removal that are incurred after a discharge of oil has occurred, or in any case in which there is a substantial threat of a discharge of oil, the costs to prevent, minimize, or mitigate oil pollution from such an incident.

Respond or response as defined by section 101(25) of CERCLA, means remove, removal, remedy, or remedial action, including enforcement activities related thereto.

Responsible party as defined by section 1001 of the OPA, means the following:

(1) Vessels—In the case of a vessel, any person owning, operating, or demise chartering the vessel.

(2) Onshore Facilities—In the case of an onshore facility (other than a pipeline), any person owning or operating the facility, except a federal agency, state, municipality, commission, or political subdivision of a state, or any interstate body, that as the owner transfers possession and right to use the property to another person by lease, assignment, or permit.

(3) Offshore Facilities—In the case of an offshore facility (other than a pipeline or a deepwater port licensed under the Deepwater Port Act of 1974 (33 U.S.C. 1501 *et seq.*)), the lessee or permittee of the area in which the facility is located or the holder of a right of use and easement granted under applicable state law or the Outer Continental Shelf Lands Act (43 U.S.C. 1301–1356) for the area in which the facility is located (if the holder is a different person than the lessee or permittee), except a federal agency, state, municipality, commission, or political subdivision of a state, or any interstate body, that as owner transfers possession and right to use the property to another person by lease, assignment, or permit.

(4) Deepwater Ports—In the case of a deepwater port licensed under the Deepwater Port Act of 1974 (33 U.S.C. 1501–1524), the licensee.

(5) Pipelines—In the case of a pipeline, any person owning or operating the pipeline.

(6) Abandonment—In the case of an abandoned vessel, onshore facility, deepwater port, pipeline, or offshore facility, the person who would have been responsible parties immediately prior to the abandonment of the vessel or facility.

SARA is the Superfund Amendments and Reauthorization Act of 1986. In addition to certain free-standing provisions of law, it includes amendments to CERCLA, the Solid Waste Disposal Act, and the Internal Revenue Code. Among the free-standing provisions of law is Title III of SARA, also known as the ''Emergency Planning and Community Right-to-Know Act of 1986'' and Title IV of SARA, also known as the ''Radon Gas and Indoor Air Quality Research Act of 1986.'' Title V of SARA amending the Internal Revenue Code is also known as the ''Superfund Revenue Act of 1986.''

SEMS is the abbreviation for the Superfund Enterprise Management System. SEMS is EPA's comprehensive data management system that inventories and tracks information about releases addressed or needing to be addressed by the CERCLA Superfund program. SEMS consolidates legacy systems including CERCLIS into a single integrated platform. SEMS contains information for potential and confirmed hazardous waste sites addressed under the Superfund remedial and removal programs. SEMS includes sites in the active site inventory and archived sites. The active site inventory includes sites on the NPL, and sites not on the NPL where site assessment, removal, remedial, enforcement, cost recovery, or oversight activities are being planned or conducted. Archived sites include non-NPL sites that were formerly in the active site inventory which have no further site assessment, removal, remedial, enforcement, cost recovery or oversight needed under the Federal Superfund program based on available information. New information may warrant return of an archive site to the active inventory. Inclusion of a specific site or area in SEMS does not represent a determination of any party's liability, nor does it represent a finding that any response action is necessary.''

Sinking agents means those additives applied to oil discharges to sink floating pollutants below the water surface.

Site inspection (SI) means an on-site investigation to determine whether there is a release or potential release and the nature of the associated threats. The purpose is to augment the data collected in the preliminary assessment and to generate, if necessary, sampling and other field data to determine if further action or investigation is appropriate.

Size classes of discharges refers to the following size classes of oil discharges which are provided as guidance to the OSC and serve as the criteria for the actions delineated in subpart D. They are not meant to imply associated degrees of hazard to public health or welfare of the United States, nor are they a measure of environmental injury. Any oil discharge that poses a substantial threat to public health or welfare of the United States or the environment or results in significant public concern shall be classified as a major discharge regardless of the following quantitative measures:

(1) Minor discharge means a discharge to the inland waters of less than 1,000 gallons of oil or a discharge to the coastal waters of less than 10,000 gallons of oil.

(2) Medium discharge means a discharge of 1,000 to 10,000 gallons of oil to the inland waters or a discharge of 10,000 to 100,000 gallons of oil to the coastal waters.

(3) Major discharge means a discharge of more than 10,000 gallons of oil to the inland waters or more than 100,000 gallons of oil to the coastal waters.

Size classes of releases refers to the following size classifications which are provided as guidance to the OSC for meeting pollution reporting requirements in subpart B. The final determination of the appropriate classification of a release will be made by the OSC based on consideration of the particular release (e.g., size, location, impact, etc.):

(1) Minor release means a release of a quantity of hazardous substance(s), pollutant(s), or contaminant(s) that poses minimal threat to public health or welfare of the United States or the environment.

(2) Medium release means a release not meeting the criteria for classification as a minor or major release.

(3) Major release means a release of any quantity of hazardous substance(s), pollutant(s), or contaminant(s) that poses a substantial threat to public health or welfare of the United States or the environment or results in significant public concern.

Sorbents means essentially inert and insoluble materials that are used to remove oil and hazardous substances from water through adsorption, in which the oil or hazardous substance is attracted to the sorbent surface and then adheres to it; absorption, in which the oil or hazardous substance penetrates the pores of the sorbent material; or a combination of the two. Sorbents are generally manufactured in particulate form for spreading over an oil slick or as sheets, rolls, pillows, or booms. The sorbent material may consist of, but is not limited to, the following materials:

(1) Organic products—

(i) Peat moss or straw;

(ii) Cellulose fibers or cork;

(iii) Corn cobs;

(iv) Chicken, duck, or other bird feathers.

(2) Mineral compounds—

(i) Volcanic ash or perlite;

(ii) Vermiculite or zeolite.

(3) Synthetic products—

(i) Polypropylene;

(ii) Polyethylene;

(iii) Polyurethane;

(iv) Polyester.

Source control action is the construction or installation and start-up of those actions necessary to prevent the continued release of hazardous substances or pollutants or contaminants (primarily from a source on top of or within the ground, or in buildings or other structures) into the environment.

Source control maintenance measures are those measures intended to maintain the effectiveness of source control actions once such actions are operating and functioning properly, such as the maintenance of landfill caps and leachate collection systems.

Specified ports and harbors means those ports and harbor areas on inland rivers, and land areas immediately adjacent to those waters, where the USCG acts as predesignated on-scene coordinator. Precise locations are determined by EPA/USCG regional agreements and identified in federal Regional Contingency Plans and Area Contingency Plans.

Spill of national significance (SONS) means a spill that due to its severity, size, location, actual or potential impact on the public health and welfare or the environment, or the necessary response effort, is so complex that it requires extraordinary coordination of federal, state, local, and responsible party resources to contain and clean up the discharge.

State means the several states of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the U.S. Virgin Islands, the Commonwealth of the Northern Marianas, and any other territory or possession over which the United States has jurisdiction. For purposes of the NCP, the term includes Indian tribes as defined in the NCP except where specifically noted. Section 126 of CERCLA provides that the governing body of an Indian tribe shall be afforded substantially the same treatment as a state with respect to certain provisions of CERCLA. Section 300.515(b) of the NCP describes the requirements pertaining to Indian tribes that wish to be treated as states under CERCLA.

Superfund Memorandum of Agreement (SMOA) means a nonbinding, written document executed by an EPA Regional Administrator and the head of a state agency that may establish the nature and extent of EPA and state interaction during the removal, pre-remedial, remedial, and/or enforcement response process. The SMOA is not a site-specific document although attachments may address specific sites. The SMOA generally defines the role and responsibilities of both the lead and the support agencies.

Superfund state contract is a joint, legally binding agreement between EPA and a state to obtain the necessary assurances before a federal-lead remedial action can begin at a site. In the case of a political subdivision-lead remedial response, a three-party Superfund state contract among EPA, the state, and political subdivision thereof, is required before a political subdivision takes the lead for any phase of remedial response to ensure state involvement pursuant to section 121(f)(1) of CERCLA. The Superfund state contract may be amended to provide the state's CERCLA section 104 assurances before a political subdivision can take the lead for remedial action.

Support agency means the agency or agencies that provide the support agency coordinator to furnish necessary data to the lead agency, review response data and documents, and provide other assistance as requested by the OSC or RPM. EPA, the USCG, another federal agency, or a state may be support agencies for a response action if operating pursuant to a contract executed under section 104(d)(1) of CERCLA or designated pursuant to a Superfund Memorandum of Agreement entered into pursuant to subpart F of the NCP or other agreement. The support agency may also concur on decision documents.

Support agency coordinator (SAC) means the official designated by the support agency, as appropriate, to interact and coordinate with the lead agency in response actions under subpart E of this part.

Surface collecting agents means those chemical agents that form a surface film to control the layer thickness of oil.

Surface washing agent is any product that removes oil from solid surfaces, such as beaches and rocks, through a detergency mechanism and does not involve dispersing or solubilizing the oil into the water column.

Tank vessel as defined by section 1001 of the OPA means a vessel that is constructed or adapted to carry, or that carries oil or hazardous material in bulk as cargo or cargo residue, and that:

(1) is a vessel of the United States;

(2) operates on the navigable waters; or

(3) transfers oil or hazardous material in a place subject to the jurisdiction of the United States.

Threat of discharge or release, see definitions for discharge and release.

Threat of release, see definition for release.

Treatment technology means any unit operation or series of unit operations that alters the composition of a hazardous substance or pollutant or contaminant through chemical, biological, or physical means so as to reduce toxicity, mobility, or volume of the contaminated materials being treated. Treatment technologies are an alternative to land disposal of hazardous wastes without treatment.

Trustee means an official of a federal natural resources management agency designated in subpart G of the NCP or a designated state official or Indian tribe or, in the case of discharges covered by the OPA, a foreign government official, who may pursue claims for damages under section 107(f) of CERCLA or section 1006 of the OPA.

United States when used in relation to section 311(a)(5) of the CWA, means the states, the District of Columbia, the Commonwealth of Puerto Rico, the Northern Mariana Islands, Guam, American Samoa, the United States Virgin Islands, and the Pacific Island Governments. United States, when used in relation to section 101(27) of CERCLA and section 1001(36) of the OPA, includes the several states of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Commonwealth of the Northern Marianas, and any other territory or possession over which the United States has jurisdiction.

Vessel as defined by section 101(28) of CERCLA, means every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water; and, as defined by section 311(a)(3) of the CWA, means every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water other than a public vessel.

Volunteer means any individual accepted to perform services by the lead agency which has authority to accept volunteer services (examples: See 16 U.S.C. 742f(c)). A volunteer is subject to the provisions of the authorizing statute and the NCP.

Worst case discharge as defined by section 311(a)(24) of the CWA, means, in the case of a vessel, a discharge in adverse weather conditions of its entire cargo, and, in the case of an offshore facility or onshore facility, the largest foreseeable discharge in adverse weather conditions.

59 FR 47416, Sept. 15, 1994, as amended at 60 FR 16054, Mar. 29, 1995;79 FR 65592, Nov. 5, 2014; 80 FR 37119, June 29, 2015; 83 FR 5209, Feb. 6, 2018]

EFFECTIVE DATE NOTE: At 88 FR 38332, June 12, 2023, §300.5 was amended by adding in alphabetical order definitions of ‘‘Bioaccumulation’’, ‘‘Bioconcentration’’, ‘‘Biodegradation’’, ‘‘Biological agents’’, and ‘‘Bioremediation’’ and revising the definitions of ‘‘Bioremediation agents’’, ‘‘Burning agents’’, ‘‘Chemical agents’’, ‘‘Dispersants’’; adding in alphabetical order the definition of ‘‘Herding agents’’, removing the definition of ‘‘Miscellaneous Oil Spill Control Agents (MOSCA)’’, adding in alphabetical order the definition of ‘‘Products’’ ,revising the definition of ‘‘Sinking agents’’, adding in alphabetical order the definition of ‘‘Solidifiers’’, revising the definition of ‘‘Sorbents’’, removing the definitions for ‘‘Surface collecting agents’’ and ‘‘Surface washing agent’’; andadding in alphabetical order the definition of ‘‘Surface washing agents’’, effective Dec. 11, 2023. For the convenience of the user, the added and revised text is set forth as follows:

§ 300.5 Definitions.

* * * * *

Bioaccumulation is the process of accumulation of chemicals in the tissue of organisms through any route, including respiration, ingestion, or direct contact with the ambient or contaminated medium.

Bioconcentration is the accumulation of chemicals in the tissues of organisms from water alone.

Biodegradation is a process by which microorganisms metabolically decompose contaminants into biomass and smaller molecular compounds such as carbon dioxide, water, and end products.

Biological agents are microorganisms (typically bacteria, fungi, or algae) or biological catalysts, such as enzymes, that can enhance the biodegradation of a contaminated environment.

Bioremediation is the process of enhancing the ability of microorganisms to convert contaminants into biomass and smaller molecular end products by the addition of materials into a contaminated environment to accelerate the natural biodegradation process.

Bioremediation agents are biological agents and/or nutrient additives deliberately introduced into a contaminated environment to increase the rate of biodegradation and mitigate any deleterious effects caused by the contaminant constituents. Bioremediation agents include microorganisms, enzymes, and nutrient additives such as fertilizers containing bioavailable forms of nitrogen, phosphorus, and potassium.

Burning agents are additives that, through physical or chemical means, improve the combustibility of the materials to which they are applied.

* * * * *

Chemical agents are elements, compounds, or mixtures designed to facilitate the removal of oil from a contaminated environment and to mitigate any deleterious effects. Chemical agent categories include burning agents, dispersants, herding agents, solidifiers, surface washing agents, and bioremediation agents that consist of nutrient additives.

* * * * *

Dispersants are substances that emulsify, disperse, or solubilize oil by promoting the formation of small droplets or particles of oil in the water column.

* * * * *

Herding agents are substances that form a film on the water surface to control the spreading of the oil to allow for oil removal.

* * * * *

Products are chemical or biological agents or other substances manufactured using a unique composition or formulation.

* * * * *

Sinking agents are substances introduced into an oil discharge for the purpose of submerging the oil to the bottom of a water body.

* * * * *

Solidifiers are substances that through a chemical reaction cause oil to become a cohesive mass, preventing oil from dissolving or dispersing into the water column. Solidifiers are generally collected and recovered from the environment.

Sorbents are inert and insoluble substances that readily absorb and/or adsorb oil or hazardous substances, and that are not combined with or act as a chemical agent, biological agent, or sinking agent. Sorbents may be used in their natural bulk form or as manufactured products in particulate form, sheets, rolls, pillows, or booms. Sorbents are generally collected and recovered from the environment. Sorbents consist of:

(1) Natural organic substances (*e.g.*, feathers, cork, peat moss, and cellulose fibers such as bagasse, corncobs, and straw);

(2) Inorganic/mineral compounds (*e.g.*, volcanic ash, perlite, vermiculite, zeolite, clay); and

(3) Synthetic compounds (*e.g.*, polypropylene, polyethylene, polyurethane, polyester).

* * * * *

Surface washing agents are substances that separate oil from solid surfaces, such as beaches, rocks, metals, or concrete, through a detergency mechanism that lifts and floats oil. Product and oil are generally to be collected and recovered from the environment with minimal dissolution, dispersion, or transfer into the water column.

§ 300.6 Use of number and gender.

As used in this regulation, words in the singular also include the plural and words in the masculine gender also include the feminine and vice versa, as the case may require.

§ 300.7 Computation of time.

In computing any period of time prescribed or allowed in these rules of practice, except as otherwise provided, the day of the event from which the designated period begins to run shall not be included. Saturdays, Sundays, and federal legal holidays shall be included. When a stated time expires on a Saturday, Sunday, or legal holiday, the stated time period shall be extended to include the next business day.

Subpart B—Responsibility and Organization for Response

SOURCE: 59 FR 47424, Sept. 15, 1994, unless otherwise noted.

§ 300.100 Duties of President delegated to federal agencies.

In Executive Orders 12580 and 12777, the President delegated certain functions and responsibilities vested in him by the CWA, CERCLA, and the OPA.

§ 300.105 General organization concepts.

(a) Federal agencies should:

(1) Plan for emergencies and develop procedures for addressing oil discharges and releases of hazardous substances, pollutants, or contaminants;

(2) Coordinate their planning, preparedness, and response activities with one another;

(3) Coordinate their planning, preparedness, and response activities with affected states, local governments, and private entities; and

(4) Make available those facilities or resources that may be useful in a response situation, consistent with agency authorities and capabilities.

(b) Three fundamental kinds of activities are performed pursuant to the NCP:

(1) Preparedness planning and coordination for response to a discharge of oil or release of a hazardous substance, pollutant, or contaminant;

(2) Notification and communications; and

(3) Response operations at the scene of a discharge or release.

(c) The organizational elements created to perform these activities are:

(1) The NRT, responsible for national response and preparedness planning, for coordinating regional planning, and for providing policy guidance and support to the Regional Response Teams (RRTs). NRT membership consists of representatives from the agencies specified in § 300.175(b).

(2) RRTs, responsible for regional planning and preparedness activities before response actions, and for providing advice and support to the OSC or RPM when activated during a response. RRT membership consists of designated representatives from each federal agency participating in the NRT together with state and (as agreed upon by the states) local government representatives.

(3) The OSC and the RPM, primarily responsible for directing response efforts and coordinating all other efforts at the scene of a discharge or release. The other responsibilities of OSCs and RPMs are described in § 300.135.

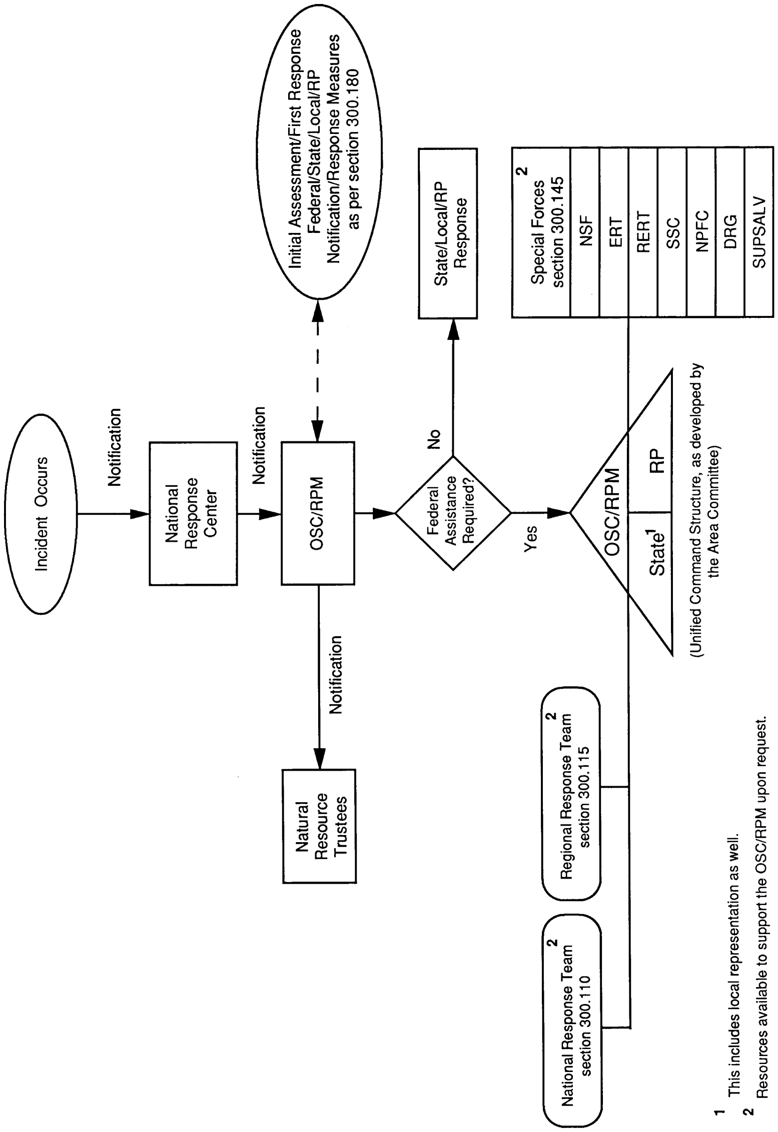
(4) Area Committees, responsible for developing, under direction of the OSC, ACPs for each area designated by the President. Responsibilities of Area Committees are described in § 300.205(c).

(d) The basic framework for the response management structure is a system (e.g., a unified command system) that brings together the functions of the Federal Government, the state government, and the responsible party to achieve an effective and efficient response, where the OSC maintains authority.

(e)(1) The organizational concepts of the national response system are depicted in the following Figures 1a and 1b:

Figure 1a

National Response System Concepts: Response

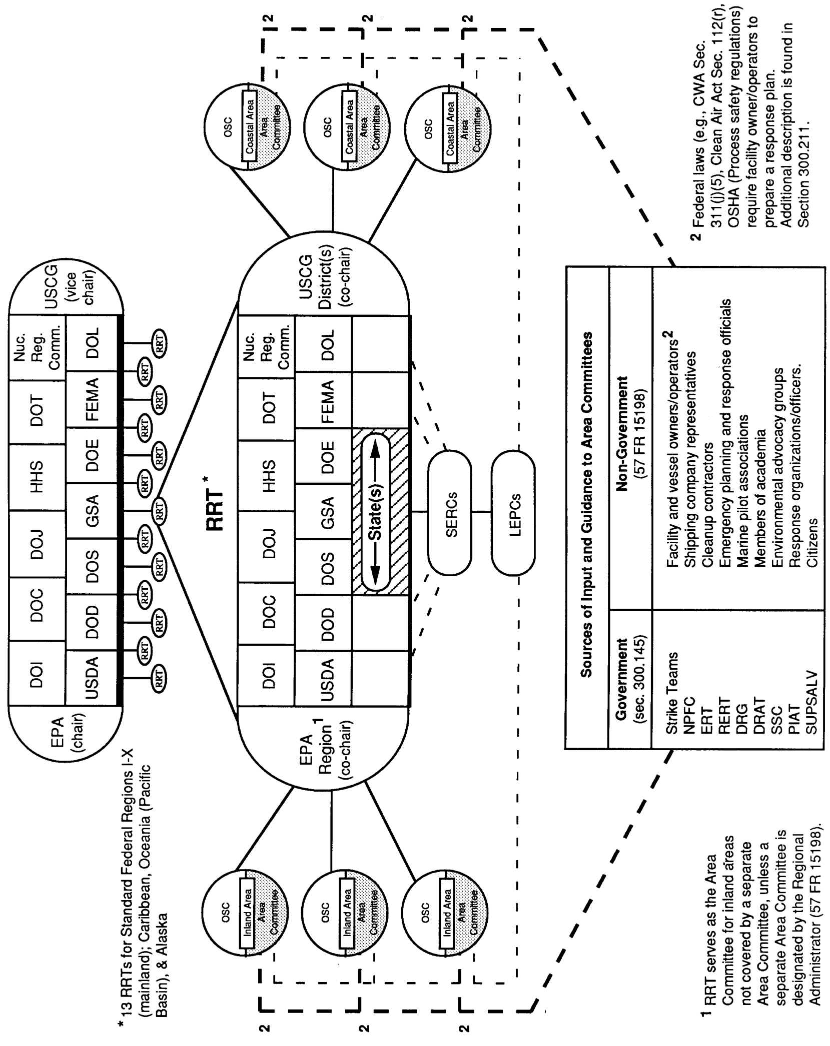


[1] This includes local representation as well.

[2] Resources available to support the OSC/RPM upon request.

Figure 1b

National Response System Concepts: Planning



Sources of Input and Guidance to Area Committees

Government (sec. 300.145)	Non-Government (57 FR 15198)
Strike Teams NPFC ERT RERT DRG DRAT SSC PIAT SUPSALV	Facility and vessel owners/operators[2] Shipping company representatives Cleanup contractors Emergency planning and response officials Marine pilot associations Members of academia Environmental advocacy groups Response organizations/officers. Citizens

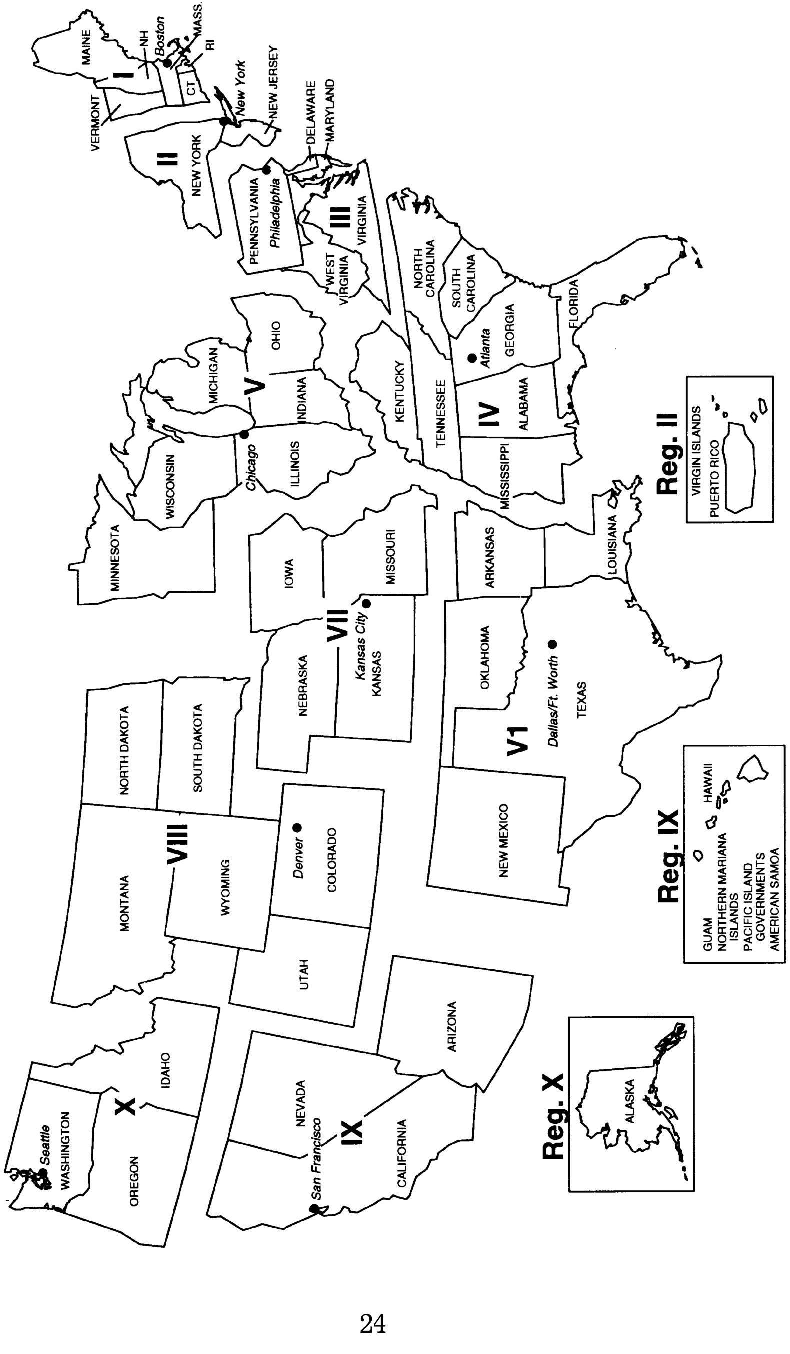
* 13 RRTs for Standard Federal Regions I-X (mainland); Caribbean, Oceania (Pacific Basin), & Alaska

[1] RRT serves as the Area Committee for inland areas not covered by a separate Area Committee, unless a separate Area Committee is designated by the Regional Administrator (57 FR 15198).

[2] Federal laws (e.g., CWA Sec. 311(j)(5), Clean Air Act Sec. 112(r), OSHA (Process safety regulations) require facility owner/operators to prepare a response plan. Additional description is found in Section 300.211.

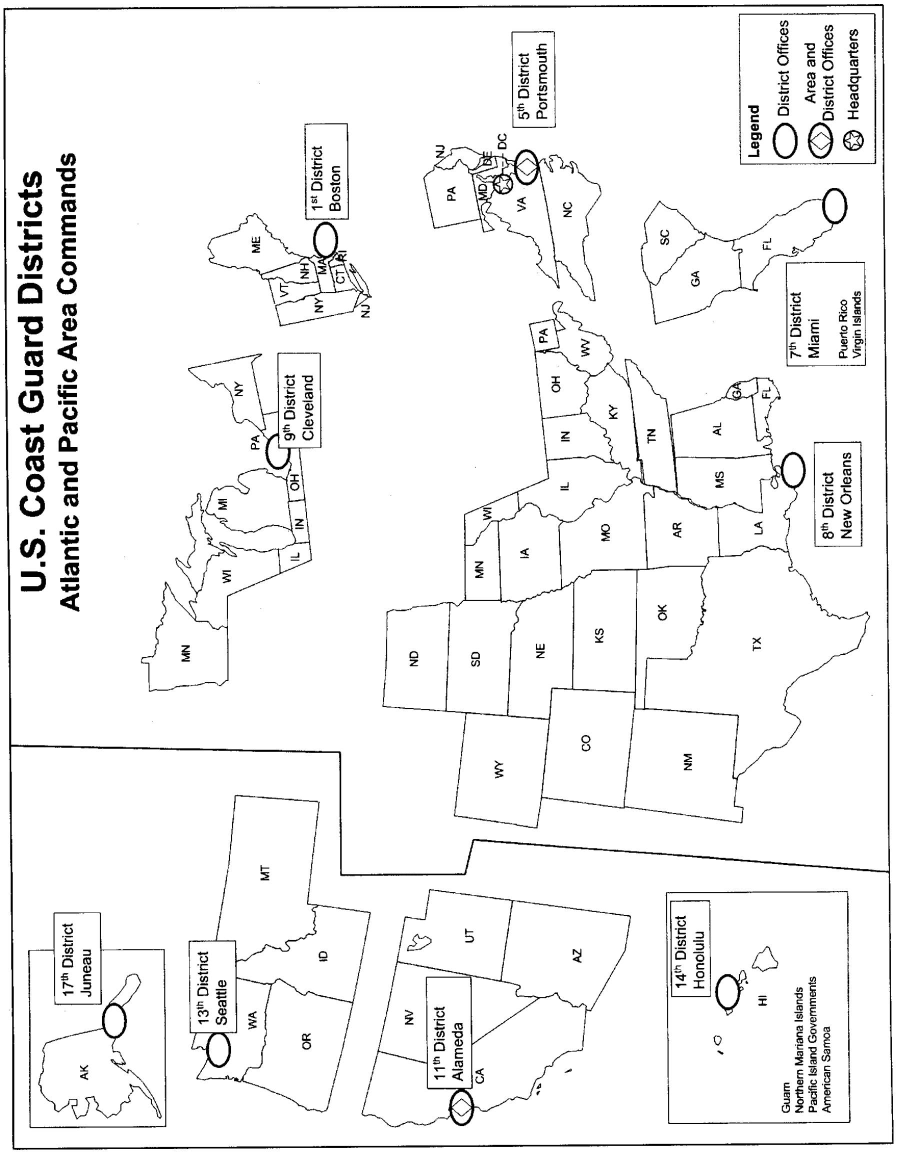
(2) The standard federal regional boundaries (which are also the geographic areas of responsibility for the RRTs) are shown in the following Figure 2:

Figure 2 -- Standard Regional Boundaries for Ten Regions



(3) The USCG District boundaries are shown in the following Figure 3:

Figure 3



[59 FR 47424, Sept. 15, 1994, as amended at 72 FR 31753, June 8, 2007; 84 FR 56670, Oct. 22, 2019]

§ 300.110 National Response Team.

National planning and coordination is accomplished through the NRT.

(a) The NRT consists of representatives from the agencies named in § 300.175(b). Each agency shall designate a member to the team and sufficient alternates to ensure representation, as agency resources permit. The NRT will consider requests for membership on the NRT from other agencies. Other agencies may request membership by forwarding such requests to the chair of the NRT.

(b) The chair of the NRT shall be the representative of EPA and the vice chair shall be the representative of the USCG, with the exception of periods of activation because of response action. During activation, the chair shall be the member agency providing the OSC/RPM. The vice chair shall maintain records of NRT activities along with national, regional, and area plans for response actions.

(c) While the NRT desires to achieve a consensus on all matters brought before it, certain matters may prove unresolvable by this means. In such cases, each agency serving as a participating agency on the NRT may be accorded one vote in NRT proceedings.

(d) The NRT may establish such bylaws and committees as it deems appropriate to further the purposes for which it is established.

(e) The NRT shall evaluate methods of responding to discharges or releases; shall recommend any changes needed in the response organization; and shall recommend to the Administrator of EPA changes to the NCP designed to improve the effectiveness of the national response system, including drafting of regulatory language.

(f) The NRT shall provide policy and program direction to the RRTs.

(g) The NRT may consider and make recommendations to appropriate agencies on the training, equipping, and protection of response teams and necessary research, development, demonstration, and evaluation to improve response capabilities.

(h) Direct planning and preparedness responsibilities of the NRT include:

(1) Maintaining national preparedness to respond to a major discharge of oil or release of a hazardous substance, pollutant, or contaminant that is beyond regional capabilities;

(2) Publishing guidance documents for preparation and implementation of SARA Title III local emergency response plans;

(3) Monitoring incoming reports from all RRTs and activating for a response action, when necessary;

(4) Coordinating a national program to assist member agencies in preparedness planning and response, and enhancing coordination of member agency preparedness programs;

(5) Developing procedures, in coordination with the NSFCC, as appropriate, to ensure the coordination of federal, state, and local governments, and private response to oil discharges and releases of hazardous substances, pollutants, or contaminants;

(6) Monitoring response-related research and development, testing, and evaluation activities of NRT agencies to enhance coordination, avoid duplication of effort, and facilitate research in support of response activities;

(7) Developing recommendations for response training and for enhancing the coordination of available resources among agencies with training responsibilities under the NCP;

(8) Reviewing regional responses to oil discharges and hazardous substance, pollutant, or contaminant releases, including an evaluation of equipment readiness and coordination among responsible public agencies and private organizations; and

(9) Assisting in developing a national exercise program, in coordination with the NSFCC, to ensure preparedness and coordination nationwide.

(i) The NRT will consider matters referred to it for advice or resolution by an RRT.

(j) The NRT should be activated as an emergency response team:

(1) When an oil discharge or hazardous substance release:

(i) Exceeds the response capability of the region in which it occurs;

(ii) Transects regional boundaries; or

(iii) Involves a substantial threat to the public health or welfare of the United States or the environment, substantial amounts of property, or substantial threats to natural resources;

(2) If requested by any NRT member.

(k) When activated for a response action, the NRT shall meet at the call of the chair and may:

(1) Monitor and evaluate reports from the OSC/RPM and recommend to the OSC/RPM, through the RRT, actions to combat the discharge or release;

(2) Request other federal, state, and local governments, or private agencies, to provide resources under their existing authorities to combat a discharge or release, or to monitor response operations; and

(3) Coordinate the supply of equipment, personnel, or technical advice to the affected region from other regions or districts.

§300.115 Regional Response Teams.

(a) Regional planning and coordination of preparedness and response actions is accomplished through the RRT. In the case of a discharge of oil, preparedness activities will be carried out in conjunction with Area Committees, as appropriate. The RRT agency membership parallels that of the NRT, as described in §300.110, but also includes state and local representation. The RRT provides:

(1) The appropriate regional mechanism for development and coordination of preparedness activities before a response action is taken and for coordination of assistance and advice to the OSC/RPM during such response actions; and

(2) Guidance to Area Committees, as appropriate, to ensure inter-area consistency and consistency of individual ACPs with the RCP and NCP.

(b) The two principal components of the RRT mechanism are a standing team, which consists of designated representatives from each participating federal agency, state governments, and local governments (as agreed upon by the states); and incident-specific teams formed from the standing team when the RRT is activated for a response. On incident-specific teams, participation by the RRT member agencies will relate to the technical nature of the incident and its geographic location.

(1) The standing team's jurisdiction corresponds to the standard federal regions, except for Alaska, Oceania in the Pacific, and the Caribbean area, each of which has a separate standing RRT. The role of the standing RRT includes communications systems and procedures, planning, coordination, training, evaluation, preparedness, and related matters on a regionwide basis. It also includes coordination of Area Committees for these functions in areas within their respective regions, as appropriate.

(2) The role of the incident-specific team is determined by the operational requirements of the response to a specific discharge or release. Appropriate levels of activation and/or notification of the incident-specific RRT, including participation by state and local governments, shall be determined by the designated RRT chair for the incident, based on the RCP. The incident-specific RRT supports the designated OSC/RPM. The designated OSC/RPM directs response efforts and coordinates all other efforts at the scene of a discharge or release.

(c) The representatives of EPA and the USCG shall act as co-chairs of RRTs except when the RRT is activated. When the RRT is activated for response actions, the chair shall be the member agency providing the OSC/RPM.

(d) Each participating agency should designate one member and at least one alternate member to the RRT. Agencies whose regional subdivisions do not correspond to the standard federal regions may designate additional representatives to the standing RRT to ensure appropriate coverage of the standard federal region. Participating states may also designate one member and at least one alternate member to the RRT. Indian tribal governments may arrange for representation with the RRT appropriate to their geographical location. All agencies and states may also provide additional representatives as observers to meetings of the RRT.

(e) RRT members should designate representatives and alternates from their agencies as resource personnel for RRT activities, including RRT work planning, and membership on incident-specific teams in support of the OSCs/RPMs.

(f) Federal RRT members or their representatives should provide OSCs/

RPMs with assistance from their respective federal agencies commensurate with agency responsibilities, resources, and capabilities within the region. During a response action, the members of the RRT should seek to make available the resources of their agencies to the OSC/RPM as specified in the RCP and ACP.

(g) RRT members should nominate appropriately qualified representatives from their agencies to work with OSCs in developing and maintaining ACPs.

(h) Affected states are encouraged to participate actively in all RRT activities. Each state governor is requested to assign an office or agency to represent the state on the appropriate RRT; to designate representatives to work with the RRT in developing RCPs; to plan for, make available, and coordinate state resources; and to serve as the contact point for coordination of response with local government agencies, whether or not represented on the RRT. The state's RRT representative should keep the State Emergency Response Commission (SERC), described in §300.205(d), apprised of RRT activities and coordinate RRT activities with the SERC. Local governments are invited to participate in activities on the appropriate RRT as provided by state law or as arranged by the state's representative. Indian tribes are also invited to participate in such activities.

(i) The standing RRT shall recommend changes in the regional response organization as needed, revise the RCP as needed, evaluate the preparedness of the participating agencies and the effectiveness of ACPs for the federal response to discharges and releases, and provide technical assistance for preparedness to the response community. The RRT should:

(1) Review and comment, to the extent practicable, on local emergency response plans or other issues related to the preparation, implementation, or exercise of such plans upon request of a local emergency planning committee;

(2) Evaluate regional and local responses to discharges or releases on a continuing basis, considering available legal remedies, equipment readiness, and coordination among responsible public agencies and private organizations, and recommend improvements;

(3) Recommend revisions of the NCP to the NRT, based on observations of response operations;

(4) Review OSC actions to ensure that RCPs and ACPs are effective;

(5) Encourage the state and local response community to improve its preparedness for response;

(6) In coordination with Area Committees and in accordance with any applicable laws, regulations, or requirements, conduct advance planning for use of dispersants, surface washing agents, surface collecting agents, burning agents, bioremediation agents, or other chemical agents in accordance with subpart J of this part;

(7) Be prepared to provide response resources to major discharges or releases outside the region;

(8) Conduct or participate in training and exercises as necessary to encourage preparedness activities of the response community within the region;

(9) Meet at least semiannually to review response actions carried out during the preceding period, consider changes in RCPs, and recommend changes in ACPs;

(10) Provide letter reports on RRT activities to the NRT twice a year, no later than January 31 and July 31. At a minimum, reports should summarize recent activities, organizational changes, operational concerns, and efforts to improve state and local coordination; and

(11) Ensure maximum participation in the national exercise program for announced and unannounced exercises.

(j)(1) The RRT may be activated by the chair as an incident-specific response team when a discharge or release:

(i) Exceeds the response capability available to the OSC/RPM in the place where it occurs;

(ii) Transects state boundaries;

(iii) May pose a substantial threat to the public health or welfare of the United States or the environment, or to regionally significant amounts of property; or

(iv) Is a worst case discharge, as described in §300.324. RCPs shall specify detailed criteria for activation of RRTs.

(2) The RRT will be activated during any discharge or release upon a request from the OSC/RPM, or from any RRT representative, to the chair of the RRT. Requests for RRT activation shall later be confirmed in writing. Each representative, or an appropriate alternate, should be notified immediately when the RRT is activated.

(3) During prolonged removal or remedial action, the RRT may not need to be activated or may need to be activated only in a limited sense, or may need to have available only those member agencies of the RRT who are directly affected or who can provide direct response assistance.

(4) When the RRT is activated for a discharge or release, agency representatives shall meet at the call of the chair and may:

(i) Monitor and evaluate reports from the OSC/RPM, advise the OSC/RPM on the duration and extent of response, and recommend to the OSC/RPM specific actions to respond to the discharge or release;

(ii) Request other federal, state, or local governments, or private agencies, to provide resources under their existing authorities to respond to a discharge or release or to monitor response operations;

(iii) Help the OSC/RPM prepare information releases for the public and for communication with the NRT;

(iv) If the circumstances warrant, make recommendations to the regional or district head of the agency providing the OSC/RPM that a different OSC/RPM should be designated; and

(v) Submit pollution reports to the NRC as significant developments occur.

(5) At the regional level, a Regional Response Center (RRC) may provide facilities and personnel for communications, information storage, and other requirements for coordinating response. The location of each RRC should be provided in the RCP.

(6) When the RRT is activated, affected states may participate in all RRT deliberations. State government representatives participating in the RRT have the same status as any federal member of the RRT.

(7) The RRT can be deactivated when the incident-specific RRT chair determines that the OSC/RPM no longer requires RRT assistance.

(8) Notification of the RRT may be appropriate when full activation is not necessary, with systematic communication of pollution reports or other means to keep RRT members informed as to actions of potential concern to a particular agency, or to assist in later RRT evaluation of regionwide response effectiveness.

(k) Whenever there is insufficient national policy guidance on a matter before the RRT, a technical matter requiring solution, a question concerning interpretation of the NCP, or a disagreement on discretionary actions among RRT members that cannot be resolved at the regional level, it may be referred to the NRT, described in § 300.110, for advice.

§ 300.120 On-scene coordinators and remedial project managers: general responsibilities.

(a) The OSC/RPM directs response efforts and coordinates all other efforts at the scene of a discharge or release. As part of the planning and preparedness for response, OSCs shall be predesignated by the regional or district head of the lead agency. EPA and the USCG shall predesignate OSCs for all areas in each region, except as provided in paragraphs (c) and (d) of this section. RPMs shall be assigned by the lead agency to manage remedial or other response actions at NPL sites, except as provided in paragraphs (c) and (d) of this section.

(1) The USCG shall provide OSCs for oil discharges, including discharges from facilities and vessels under the jurisdiction of another federal agency, within or threatening the coastal zone. The USCG shall also provide OSCs for the removal of releases of hazardous substances, pollutants, or contaminants into or threatening the coastal zone, except as provided in paragraph (b) of this section. The USCG shall not provide predesignated OSCs for discharges or releases from hazardous waste management facilities or in similarly chronic incidents. The USCG shall provide an initial response to discharges or releases from hazardous waste management facilities within

the coastal zone in accordance with Department of Transportation (DOT)/EPA Instrument of Redelegation (May 27, 1988) except as provided by paragraph (b) of this section. The USCG OSC shall contact the cognizant RPM as soon as it is evident that a removal may require a follow-up remedial action, to ensure that the required planning can be initiated and an orderly transition to an EPA or state lead can occur.

(2) EPA shall provide OSCs for discharges or releases into or threatening the inland zone and shall provide RPMs for federally funded remedial actions, except in the case of state-lead federally funded response and as provided in paragraph (b) of this section. EPA will also assume all remedial actions at NPL sites in the coastal zone, even where removals are initiated by the USCG, except as provided in paragraph (b) of this section.

(b) In general, USCG Captains of the Port (COTP) shall serve as the designated OSCs for areas in the coastal zone for which an ACP is required under CWA section 311(j) and EPA Regional Administrators shall designate OSCs for areas in the inland zone for which an ACP is required under CWA section 311(j).

(c) For releases of hazardous substances, pollutants, or contaminants, when the release is on, or the sole source of the release is from, any facility or vessel, including vessels bareboat-chartered and operated, under the jurisdiction, custody, or control of DOD, DOE, or other federal agency:

(1) In the case of DOD or DOE, DOD or DOE shall provide OSCs/RPMs responsible for taking all response actions; and

(2) In the case of a federal agency other than EPA, DOD, or DOE, such agency shall provide OSCs for all removal actions that are not emergencies and shall provide RPMs for all remedial actions.

(d) DOD will be the removal response authority with respect to incidents involving DOD military weapons and munitions or weapons and munitions under the jurisdiction, custody, or control of DOD.

(e) The OSC is responsible for overseeing development of the ACP in the area of the OSC's responsibility. ACPs shall, as appropriate, be accomplished in cooperation with the RRT, and designated state and local representatives. In contingency planning and removal, the OSC coordinates, directs, and reviews the work of other agencies, Area Committees, responsible parties, and contractors to assure compliance with the NCP, decision document, consent decree, administrative order, and lead agency-approved plans applicable to the response.

(f) The RPM is the prime contact for remedial or other response actions being taken (or needed) at sites on the proposed or promulgated NPL, and for sites not on the NPL but under the jurisdiction, custody, or control of a federal agency. The RPM's responsibilities include:

(1) Fund-financed response: The RPM coordinates, directs, and reviews the work of EPA, states and local governments, the U.S. Army Corps of Engineers, and all other agencies and contractors to assure compliance with the NCP. Based upon the reports of these parties, the RPM recommends action for decisions by lead agency officials. The RPM's period of responsibility begins prior to initiation of the remedial investigation/feasibility study (RI/FS), described in § 300.430, and continues through design, remedial action, deletion of the site from the NPL, and the CERCLA cost recovery activity. When a removal and remedial action occur at the same site, the OSC and RPM should coordinate to ensure an orderly transition of responsibility.

(2) Federal-lead non-Fund-financed response: The RPM coordinates, directs, and reviews the work of other agencies, responsible parties, and contractors to assure compliance with the NCP, Record of Decision (ROD), consent decree, administrative order, and lead agency-approved plans applicable to the response. Based upon the reports of these parties, the RPM shall recommend action for decisions by lead agency officials. The RPM's period of responsibility begins prior to initiation of the RI/FS, described in § 300.430, and continues through design and remedial action and the CERCLA cost recovery activity. The OSC and RPM shall ensure orderly transition of responsibilities from one to the other.

(3) The RPM shall participate in all decision-making processes necessary to ensure compliance with the NCP, including, as appropriate, agreements between EPA or other federal agencies and the state. The RPM may also review responses where EPA has preauthorized a person to file a claim for reimbursement to determine that the response was consistent with the terms of such preauthorization in cases where claims are filed for reimbursement.

(g)(1) Where a support agency has been identified through a cooperative agreement, Superfund Memorandum of Agreement (SMOA), or other agreement, that agency may designate a support agency coordinator (SAC) to provide assistance, as requested, by the OSC/RPM. The SAC is the prime representative of the support agency for response actions.

(2) The SAC's responsibilities may include:

(i) Providing and reviewing data and documents as requested by the OSC/RPM during the planning, design, and cleanup activities of the response action; and

(ii) Providing other assistance as requested.

(h)(1) The lead agency should provide appropriate training for its OSCs, RPMs, and other response personnel to carry out their responsibilities under the NCP.

(2) OSCs/RPMs should ensure that persons designated to act as their on-scene representatives are adequately trained and prepared to carry out actions under the NCP, to the extent practicable.

§ 300.125 Notification and communications.

(a) The National Response Center (NRC), located at USCG Headquarters, is the national communications center, continuously manned for handling activities related to response actions. The NRC acts as the single point of contact for all pollution incident reporting, and as the NRT communications center. Notice of discharges and releases must be made telephonically through a toll free number or a special local number (Telecommunication Device for the Deaf (TDD) and collect calls accepted). (Notification details appear in §§ 300.300 and 300.405.) The NRC receives and immediately relays telephone notices of discharges or releases to the appropriate predesignated federal OSC. The telephone report is distributed to any interested NRT member agency or federal entity that has established a written agreement or understanding with the NRC. The NRC evaluates incoming information and immediately advises FEMA of a potential major disaster situation.

(b) The Commandant, USCG, in conjunction with other NRT agencies, shall provide the necessary personnel, communications, plotting facilities, and equipment for the NRC.

(c) Notice of an oil discharge or release of a hazardous substance in an amount equal to or greater than the reportable quantity must be made immediately in accordance with 33 CFR part 153, subpart B, and 40 CFR part 302, respectively. Notification shall be made to the NRC Duty Officer, HQ USCG, Washington, DC, telephone (800) 424–8802 or (202) 267–2675. All notices of discharges or releases received at the NRC will be relayed immediately by telephone to the OSC.

§ 300.130 Determinations to initiate response and special conditions.

(a) In accordance with CWA and CERCLA, the Administrator of EPA or the Secretary of the department in which the USCG is operating, as appropriate, is authorized to act for the United States to take response measures deemed necessary to protect the public health or welfare or environment from discharges of oil or releases of hazardous substances, pollutants, or contaminants except with respect to such releases on or from vessels or facilities under the jurisdiction, custody, or control of other federal agencies.

(b) The Administrator of EPA or the Secretary of the department in which the USCG is operating, as appropriate, is authorized to initiate and, in the case of a discharge posing a substantial threat to public health or welfare of the United States is required to initiate and direct, appropriate response activities when the Administrator or Secretary determines that any oil or CWA hazardous substance is discharged or there is a substantial threat of such discharge from any vessel or offshore or onshore facility into or on the navigable waters of the United States, on the adjoining shorelines to the navigable waters, into or on the waters of the exclusive economic zone, or that may affect natural resources belonging to, appertaining to, or under exclusive management authority of the United States; or

(c) The Administrator of EPA or the Secretary of the department in which the USCG is operating, as appropriate, is authorized to initiate appropriate response activities when the Administrator or Secretary determines that any hazardous substance is released or there is a threat of such a release into the environment, or there is a release or threat of release into the environment of any pollutant or contaminant which may present an imminent and substantial danger to the public health or welfare of the United States.

(d) In addition to any actions taken by a state or local government, the Administrator of EPA or the Secretary of the department in which the USCG is operating may request the U.S. Attorney General to secure the relief from any person, including the owner or operator of the vessel or facility necessary to abate a threat or, after notice to the affected state, take any other action authorized by section 311 of the CWA or section 106 of CERCLA as appropriate, including issuing administrative orders, that may be necessary to protect the public health or welfare, if the Administrator or Secretary determines:

(1) That there may be an imminent and substantial threat to the public health or welfare of the United States or the environment of the United States, including fish, shellfish, and wildlife, public and private property, shorelines, beaches, habitats, and other living and nonliving natural resources under the jurisdiction or control of the United States, because of an actual or threatened discharge of oil or a CWA hazardous substance from any vessel or offshore or onshore facility into or upon the navigable waters of the United States; or

(2) That there may be an imminent and substantial endangerment to the public health or welfare of the United States or the environment because of a release of a CERCLA hazardous substance from a facility.

(e) Response actions to remove discharges originating from operations conducted subject to the Outer Continental Shelf Lands Act shall be in accordance with the NCP.

(f) Where appropriate, when a discharge or release involves radioactive materials, the lead or support federal agency shall act consistent with the notification and assistance procedures described in the appropriate Federal Radiological Plan. For the purpose of the NCP, the FRERP (24 CFR part 2401) is the appropriate plan. Most radiological discharges and releases do not result in FRERP activation and should be handled in accordance with the NCP. However, releases from nuclear incidents subject to requirements for financial protection established by the Nuclear Regulatory Commission under the Price-Anderson amendments (section 170) of the Atomic Energy Act are specifically excluded from CERCLA and NCP requirements.

(g) Removal actions involving nuclear weapons should be conducted in accordance with the joint Department of Defense, Department of Energy, and FEMA Agreement for Response to Nuclear Incidents and Nuclear Weapons Significant Incidents (January 8, 1981).

(h) If the situation is beyond the capability of state and local governments and the statutory authority of federal agencies, the President may, under the Disaster Relief Act of 1974, act upon a request by the governor and declare a major disaster or emergency and appoint a Federal Coordinating Officer (FCO) to coordinate all federal disaster assistance activities. In such cases, the OSC/RPM would continue to carry out OSC/RPM responsibilities under the NCP, but would coordinate those activities with the FCO to ensure consistency with other federal disaster assistance activities.

(i) In the event of a declaration of a major disaster by the President, the FEMA may activate the Federal Response Plan (FRP). A FCO, designated by the President, may implement the FRP and coordinate and direct emergency assistance and disaster relief of impacted individuals, business, and public services under the Robert T. Stafford Disaster Relief Act. Delivery of federal assistance is facilitated through twelve functional annexes to the FRP known as Emergency Support Functions (ESFs). EPA coordinates activities under ESF #10—Hazardous Materials, which addresses preparedness and response to hazardous materials and oil incidents caused by a natural disaster or other catastrophic event. In such cases, the OSC/RPM should coordinate response activities with the FCO, through the incident-specific ESF #10 Chair, to ensure consistency with federal disaster assistance activities.

§ 300.135 Response operations.

(a) The OSC/RPM, consistent with §§ 300.120 and 300.125, shall direct response efforts and coordinate all other efforts at the scene of a discharge or release. As part of the planning and preparation for response, the OSCs/RPMs shall be predesignated by the regional or district head of the lead agency.

(b) The first federal official affiliated with an NRT member agency to arrive at the scene of a discharge or release should coordinate activities under the NCP and is authorized to initiate, in consultation with the OSC, any necessary actions normally carried out by the OSC until the arrival of the predesignated OSC. This official may initiate federal fund-financed actions only as authorized by the OSC or, if the OSC is unavailable, the authorized representative of the lead agency.

(c) The OSC/RPM shall, to the extent practicable, collect pertinent facts about the discharge or release, such as its source and cause; the identification of potentially responsible parties; the nature, amount, and location of discharged or released materials; the probable direction and time of travel of discharged or released materials; whether the discharge is a worst case discharge as discussed in § 300.324; the pathways to human and environmental exposure; the potential impact on human health, welfare, and safety and the environment; whether the discharge or release poses a substantial threat to the public health or welfare of the United States as discussed in § 300.322; the potential impact on natural resources and property which may be affected; priorities for protecting human health and welfare and the environment; and appropriate cost documentation.

(d) The OSC's/RPM's efforts shall be coordinated with other appropriate federal, state, local, and private response agencies. OSCs/RPMs may designate capable persons from federal, state, or local agencies to act as their on-scene representatives. State and local governments, however, are not authorized to take actions under subparts D and E of the NCP that involve expenditures of the Oil Spill Liability Trust Fund or CERCLA funds unless an appropriate contract or cooperative agreement has been established. The basic framework for the response management structure is a system (e.g., a unified command system), that brings together the functions of the federal government, the state government, and the responsible party to achieve an effective and efficient response, where the OSC maintains authority.

(e) The OSC/RPM should consult regularly with the RRT and NSFCC, as appropriate, in carrying out the NCP and keep the RRT and NSFCC, as appropriate, informed of activities under the NCP.

(f) The OSC/RPM shall advise the support agency as promptly as possible of reported releases.

(g) The OSC/RPM should evaluate incoming information and immediately advise FEMA of potential major disaster situations.

(h) In those instances where a possible public health emergency exists, the OSC/RPM should notify the Department of Health and Human Services (HHS) representative to the RRT. Throughout response actions, the OSC/RPM may call upon the HHS representative for assistance in determining public health threats and call upon the Occupational Safety and Health Administration (OSHA) and HHS for assistance on worker health and safety issues.

(i) All federal agencies should plan for emergencies and develop procedures for dealing with oil discharges and releases of hazardous substances, pollutants, or contaminants from vessels and facilities under their jurisdiction. All federal agencies, therefore, are responsible for designating the office that coordinates response to such incidents in accordance with the NCP and applicable federal regulations and guidelines.

(j)(1) The OSC/RPM shall ensure that the trustees for natural resources are promptly notified of discharges or releases.

(2) The OSC or RPM shall coordinate all response activities with the affected natural resource trustees and, for discharges of oil, the OSC shall consult with the affected trustees on the appropriate removal action to be taken.

(k) Where the OSC/RPM becomes aware that a discharge or release may affect any endangered or threatened species or their habitat, the OSC/RPM shall consult with the Department of Interior (DOI), or the Department of Commerce (DOC) (NOAA) and, if appropriate, the cognizant federal land managing agency.

(l) The OSC/RPM is responsible for addressing worker health and safety concerns at a response scene, in accordance with § 300.150.

(m) The OSC shall submit pollution reports to the RRT and other appropriate agencies as significant developments occur during response actions, through communications networks or procedures agreed to by the RRT and covered in the RCP.

(n) OSCs/RPMs should ensure that all appropriate public and private interests are kept informed and that their concerns are considered throughout a response, to the extent practicable, consistent with the requirements of § 300.155 of this part.

§ 300.140 Multi-regional responses.

(a) If a discharge or release moves from the area covered by one ACP or RCP into another area, the authority for response actions should likewise shift. If a discharge or release affects areas covered by two or more ACPs or RCPs, the response mechanisms of each applicable plan may be activated. In this case, response actions of all regions concerned shall be fully coordinated as detailed in the RCPs and ACPs.

(b) There shall be only one OSC and/or RPM at any time during the course of a response operation. Should a discharge or release affect two or more areas, EPA, the USCG, DOD, DOE, or other lead agency, as appropriate, shall give prime consideration to the area vulnerable to the greatest threat, in determining which agency should provide the OSC and/or RPM. The RRT shall designate the OSC and/or RPM if the RRT member agencies who have response authority within the affected areas are unable to agree on the designation. The NRT shall designate the OSC and/or RPM if members of one RRT or two adjacent RRTs are unable to agree on the designation.

(c) Where the USCG has initially provided the OSC for response to a release from hazardous waste management facilities located in the coastal zone, responsibility for response action shall shift to EPA or another federal agency, as appropriate.

§ 300.145 Special teams and other assistance available to OSCs/RPMs.

(a) The NSF is a special team established by the USCG, including the three USCG Strike Teams, the Public Information Assist Team (PIAT), and the NSFCC. The NSF is available to assist OSCs/RPMs in their preparedness and response duties.

(1) The three Strike Teams (Atlantic, Gulf, and Pacific) provide trained personnel and specialized equipment to assist the OSC in training for spill response, stabilizing and containing the spill, and in monitoring or directing the response actions of the responsible parties and/or contractors. The OSC has a specific team designated for initial contact and may contact that team directly for any assistance.

(2) The NSFCC can provide the following support to the OSC:

(i) Technical assistance, equipment and other resources to augment the OSC staff during spill response.

(ii) Assistance in coordinating the use of private and public resources in support of the OSC during a response to or a threat of a worst case discharge of oil.

(iii) Review of the area contingency plan, including an evaluation of equipment readiness and coordination among responsible public agencies and private organizations.

(iv) Assistance in locating spill response resources for both response and planning, using the NSFCC's national and international computerized inventory of spill response resources.

(v) Coordination and evaluation of pollution response exercises.

(vi) Inspection of district prepositioned pollution response equipment.

(3) PIAT is an element of the NSFCC staff which is available to assist OSCs to meet the demands for public information during a response or exercise. Its use is encouraged any time the OSC requires outside public affairs support. Requests for PIAT assistance may be made through the NSFCC or NRC.

(b)(1) The Environmental Response Team (ERT) is established by EPA in accordance with its disaster and emergency responsibilities. The ERT has expertise in treatment technology, biology, chemistry, hydrology, geology, and engineering.

(2) The ERT can provide access to special decontamination equipment for chemical releases and advice to the OSC/RPM in hazard evaluation; risk assessment; multimedia sampling and analysis program; on-site safety, including development and implementation plans; cleanup techniques and priorities; water supply decontamination and protection; application of dispersants; environmental assessment; degree of cleanup required; and disposal of contaminated material.

(3) The ERT also provides both introductory and intermediate level training courses to prepare response personnel.

(4) OSC/RPM or RRT requests for ERT support should be made to the EPA representative on the RRT; EPA Headquarters, Director, Emergency Response Division; or the appropriate EPA regional emergency coordinator.

(c) Scientific Support Coordinators (SSCs) may be designated by the OSC (and RPM in the case of EPA SSCs) as the principal advisors for scientific issues, communication with the scientific community, and coordination of requests for assistance from state and federal agencies regarding scientific studies. The SSC strives for a consensus on scientific issues affecting the response, but ensures that differing opinions within the community are communicated to the OSC/RPM.

(1) Generally, SSCs are provided by NOAA in the coastal zones, and by EPA in the inland zone. OSC/RPM requests for SSC support can be made directly to the SSC assigned to the area or to the agency member of the RRT. NOAA SSCs can also be requested through NOAA's SSC program office in Seattle, WA. NOAA SSCs are assigned to USCG Districts and are supported by a scientific support team that includes expertise in environmental chemistry, oil slick tracking, pollutant transport modeling, natural resources at risk, environmental tradeoffs of countermeasures and cleanup, and information management.

(2) During a response, the SSC serves on the federal OSC's/RPM's staff and may, at the request of the OSC/RPM, lead the scientific team and be responsible for providing scientific support for operational decisions and for coordinating on-scene scientific activity. Depending on the nature and location of the incident, the SSC integrates expertise from governmental agencies, universities, community representatives, and industry to assist the OSC/RPM in evaluating the hazards and potential effects of releases and in developing response strategies.

(3) At the request of the OSC, the SSC may facilitate the OSC's work with the lead administrative trustee for natural resources to ensure coordination between damage assessment data collection efforts and data collected in support of response operations.

(4) SSCs support the Regional Response Teams and the Area Committees in preparing regional and area contingency plans and in conducting spill training and exercises. For area plans, the SSC provides leadership for the synthesis and integration of environmental information required for spill response decisions in support of the OSC.

(d)(1) SUPSALV has an extensive salvage/search and recovery equipment inventory with the requisite knowledge and expertise to support these operations, including specialized salvage, firefighting, and petroleum, oil and lubricants offloading capability.

(2) When possible, SUPSALV will provide equipment for training exercises in support of national and regional contingency planning objectives.

(3) The OSC/RPM may request assistance directly from SUPSALV. Formal requests are routed through the Chief of Naval Operations (N312).

(e) For marine salvage operations, OSCs/RPMs with responsibility for monitoring, evaluating, or supervising these activities should request technical assistance from DOD, the Strike Teams, or commercial salvors as necessary to ensure that proper actions are taken. Marine salvage operations generally fall into five categories: afloat salvage; offshore salvage; river and harbor clearance; cargo salvage; and rescue towing. Each category requires different knowledge and specialized types of equipment. The complexity of such operations may be further compounded by local environmental and geographic conditions. The nature of marine salvage and the conditions under which it occurs combine to make such operations imprecise, difficult, hazardous, and expensive. Thus, responsible parties or other persons attempting to perform such operations without adequate knowledge, equipment, and experience could aggravate, rather than relieve, the situation.

(f) Radiological Emergency Response Teams (RERTs) have been established by EPA's Office of Radiation Programs (ORP) to provide response and support for incidents or sites containing radiological hazards. Expertise is available in radiation monitoring, radionuclide analysis, radiation health physics, and risk assessment. RERTs can provide on-site support including mobile monitoring laboratories for field analyses of samples and fixed laboratories for radiochemical sampling and analyses. Requests for support may be made 24 hours a day via the NRC or directly to the EPA Radiological Response Coordinator in the Office of Radiation Programs. Assistance is also available from DOE and other federal agencies.

(g)(1) DRGs assist the OSC by providing technical assistance, personnel, and equipment, including pre-positioned equipment. Each DRG consists of all Coast Guard personnel and equipment, including marine firefighting equipment, in its district, additional pre-positioned equipment, and a District Response Advisory Team (DRAT) that is available to provide support to the OSC in the event that a spill exceeds local response capabilities. Each DRG:

(i) Shall provide technical assistance, equipment, and other resources, as available, when requested by an OSC through the USCG representative to the RRT;

(ii) Shall ensure maintenance of all USCG response equipment within its district;

(iii) May provide technical assistance in the preparation of the ACP; and

(iv) Shall review each of those plans that affect its area of geographic responsibility.

(2) In deciding where to locate personnel and pre-positioned equipment, the USCG shall give priority emphasis to:

(i) The availability of facilities for loading and unloading heavy or bulky equipment by barge;

(ii) The proximity to an airport capable of supporting large military transport aircraft;

(iii) The flight time to provide response to oil spills in all areas of the Coast Guard district with the potential for marine casualties;

(iv) The availability of trained local personnel capable of responding in an oil spill emergency; and

(v) Areas where large quantities of petroleum products are transported.

(h) The NPFC is responsible for implementing those portions of Title I of the OPA that have been delegated to the Secretary of the department in which the Coast Guard is operating. The NPFC is responsible for addressing funding issues arising from discharges and threats of discharges of oil. The NPFC:

(1) Issues Certificates of Financial Responsibility to owners and operators of vessels to pay for costs and damages that are incurred by their vessels as a result of oil discharges;

(2) Provides funding for various response organizations for timely abatement and removal actions related to oil discharges;

(3) Provides equitable compensation to claimants who sustain costs and damages from oil discharges when the responsible party fails to do so;

(4) Recovers monies from persons liable for costs and damages resulting from oil discharges to the full extent of liability under the law; and

(5) Provides funds to initiate natural resource damage assessments.

§ 300.150 Worker health and safety.

(a) Response actions under the NCP will comply with the provisions for response action worker safety and health in 29 CFR 1910.120. The NRS meets the requirements of 29 CFR 1910.120 concerning use of an incident command system.

(b) In a response action taken by a responsible party, the responsible party must assure that an occupational safety and health program consistent with 29 CFR 1910.120 is made available for the protection of workers at the response site.

(c) In a response taken under the NCP by a lead agency, an occupational safety and health program should be made available for the protection of workers at the response site, consistent with, and to the extent required by, 29 CFR 1910.120. Contracts relating to a response action under the NCP should contain assurances that the contractor at the response site will comply with this program and with any applicable provisions of the Occupational Safety and Health Act of 1970 (29 U.S.C. 651 *et seq.*) (OSH Act) and state laws with plans approved under section 18 of the OSH Act.

(d) When a state, or political subdivision of a state, without an OSHA-approved state plan is the lead agency for response, the state or political subdivision must comply with standards in 40 CFR part 311, promulgated by EPA pursuant to section 126(f) of SARA.

(e) Requirements, standards, and regulations of the OSH Act and of state OSH laws not directly referenced in paragraphs (a) through (d) of this section, must be complied with where applicable. Federal OSH Act requirements include, among other things, Construction Standards (29 CFR part 1926), General Industry Standards (29 CFR part 1910), and the general duty requirement of section 5(a)(1) of the OSH Act (29 U.S.C. 654(a)(1)). No action by the lead agency with respect to response activities under the NCP constitutes an exercise of statutory authority within the meaning of section 4(b)(1) of the OSH Act. All governmental agencies and private employers are directly responsible for the health and safety of their own employees.

§ 300.155 Public information and community relations.

(a) When an incident occurs, it is imperative to give the public prompt, accurate information on the nature of the incident and the actions underway to mitigate the damage. OSCs/RPMs and community relations personnel should ensure that all appropriate public and private interests are kept informed and that their concerns are considered throughout a response. They should coordinate with available public affairs/community relations resources to carry out this responsibility by establishing, as appropriate, a Joint Information Center bringing together resources from federal and state agencies and the responsible party.

(b) An on-scene news office may be established to coordinate media relations and to issue official federal information on an incident. Whenever possible, it will be headed by a representative of the lead agency. The OSC/RPM determines the location of the on-scene news office, but every effort should be made to locate it near the scene of the incident. If a participating agency believes public interest warrants the issuance of statements and an on-scene news office has not been established, the affected agency should recommend its establishment. All federal news releases or statements by participating agencies should be cleared through the OSC/RPM. Information dissemination relating to natural resource damage assessment activities shall be coordinated through the lead administrative trustee. The designated lead administrative trustee may assist the OSC/RPM by disseminating information on issues relating to damage assessment activities. Following termination of removal activity, information dissemination on damage assessment activities shall be through the lead administrative trustee.

(c) The community relations requirements specified in §§ 300.415, 300.430, and 300.435 apply to removal, remedial, and enforcement actions and are intended to promote active communication between communities affected by discharges or releases and the lead agency responsible for response actions. Community Relations Plans (CRPs) are required by EPA for certain response actions. The OSC/RPM should ensure coordination with such plans which may be in effect at the scene of a discharge or release or which may need to be developed during follow-up activities.

§ 300.160 Documentation and cost recovery.

(a) For releases of a hazardous substance, pollutant, or contaminant, the following provisions apply:

(1) During all phases of response, the lead agency shall complete and maintain documentation to support all actions taken under the NCP and to form the basis for cost recovery. In general, documentation shall be sufficient to provide the source and circumstances of the release, the identity of responsible parties, the response action taken, accurate accounting of federal, state, or private party costs incurred for response actions, and impacts and potential impacts to the public health and welfare and the environment. Where applicable, documentation shall state when the NRC received notification of a release of a reportable quantity.

(2) The information and reports obtained by the lead agency for Fund-financed response actions shall, as appropriate, be transmitted to the chair of the RRT. Copies can then be forwarded to the NRT, members of the RRT, and others as appropriate.

(3) The lead agency shall make available to the trustees of affected natural resources information and documentation that can assist the trustees in the determination of actual or potential natural resource injuries.

(b) For discharges of oil, documentation and cost recovery provisions are described in § 300.315.

(c) Response actions undertaken by the participating agencies shall be carried out under existing programs and authorities when available. Federal agencies are to make resources available, expend funds, or participate in response to discharges and releases under their existing authority. Interagency agreements may be signed when necessary to ensure that the federal resources will be available for a timely response to a discharge or release. The ultimate decision as to the appropriateness of expending funds rests with the agency that is held accountable for such expenditures. Further funding provisions for discharges of oil are described in § 300.335.

(d) The Administrator of EPA and the Administrator of the Agency for Toxic Substances and Disease Registry (ATSDR) shall assure that the costs of health assessment or health effect studies conducted under the authority of CERCLA section 104(i) are documented in accordance with standard EPA procedures for cost recovery. Documentation shall include information on the nature of the hazardous substances addressed by the research, information concerning the locations where these substances have been found, and any available information on response actions taken concerning these substances at the location.

§ 300.165 OSC reports.

(a) As requested by the NRT or RRT, the OSC/RPM shall submit to the NRT or RRT a complete report on the removal operation and the actions taken. The RRT shall review the OSC report and send to the NRT a copy of the OSC report with its comments or recommendations within 30 days after the RRT has received the OSC report.

(b) The OSC report shall record the situation as it developed, the actions taken, the resources committed, and the problems encountered.

§ 300.170 Federal agency participation.

Federal agencies listed in § 300.175 have duties established by statute, executive order, or Presidential directive which may apply to federal response actions following, or in prevention of, the discharge of oil or release of a hazardous substance, pollutant, or contaminant. Some of these agencies also have duties relating to the restoration, rehabilitation, replacement, or acquisition of equivalent natural resources injured or lost as a result of such discharge or release as described in subpart G of this part. The NRT, RRT, and Area Committee organizational structure, and the NCP, RCPs and ACPs, described in §300.210, provide for agencies to coordinate with each other in carrying out these duties.

(a) Federal agencies may be called upon by an OSC/RPM during response planning and implementation to provide assistance in their respective areas of expertise, as described in §300.175, consistent with the agencies' capabilities and authorities.

(b) In addition to their general responsibilities, federal agencies should:

(1) Make necessary information available to the Secretary of the NRT, RRTs, Area Committees, and OSCs/RPMs.

(2) Provide representatives to the NRT and RRTs and otherwise assist RRTs and OSCs, as necessary, in formulating RCPs and ACPs.

(3) Inform the NRT, RRTs, and Area Committees, consistent with national security considerations, of changes in the availability of resources that would affect the operations implemented under the NCP.

(c) All federal agencies are responsible for reporting releases of hazardous substances from facilities or vessels under their jurisdiction or control in accordance with section 103 of CERCLA.

(d) All federal agencies are encouraged to report releases of pollutants or contaminants and must report discharges of oil, as required in 40 CFR part 110, from facilities or vessels under their jurisdiction or control to the NRC.

§300.175 Federal agencies: additional responsibilities and assistance.

(a) During preparedness planning or in an actual response, various federal agencies may be called upon to provide assistance in their respective areas of expertise, as indicated in paragraph (b) of this section, consistent with agency legal authorities and capabilities.

(b) The federal agencies include:

(1) USCG, as provided in 14 U.S.C. 1–3, is an agency in DOT, except when operating as an agency in the United States Navy (USN) in time of war. The USCG provides the NRT vice chair, cochairs for the standing RRTs, and predesignated OSCs for the coastal zone, as described in §300.120(a)(1). The USCG maintains continuously manned facilities which can be used for command, control, and surveillance of oil discharges and hazardous substance releases occurring in the coastal zone. The USCG also offers expertise in domestic and international fields of port safety and security, maritime law enforcement, ship navigation and construction, and the manning, operation, and safety of vessels and marine facilities. The USCG may enter into a contract or cooperative agreement with the appropriate state in order to implement a response action.

(2) EPA chairs the NRT and cochairs, with the USCG, the standing RRTs; provides predesignated OSCs for all inland areas for which an ACP is required under CWA section 311(j) and for discharges and releases occurring in the inland zone and RPMs for remedial actions except as otherwise provided; and generally provides the SSC for responses in the inland zone. EPA provides expertise on human health and ecological effects of oil discharges or releases of hazardous substances, pollutants, or contaminants; ecological and human health risk assessment methods; and environmental pollution control techniques. Access to EPA's scientific expertise can be facilitated through the EPA representative to the Research and Development Committee of the National Response Team; the EPA Office of Research and Development's Superfund Technical Liaisons or Regional Scientists located in EPA Regional offices; or through EPA's Office of Science Planning and Regulatory Evaluation. EPA also provides legal expertise on the interpretation of CERCLA and other environmental statutes. EPA may enter into a contract or cooperative agreement with the appropriate state in order to implement a response action.

(3) FEMA provides guidance, policy and program advice, and technical assistance in hazardous materials, chemical, and radiological emergency preparedness activities (including planning, training, and exercising). FEMA's primary point of contact for administering financial and technical assistance to state and local governments to support their efforts to develop and maintain an effective emergency management and response capability is the Preparedness, Training, and Exercises Directorate.

(4) DOD has responsibility to take all action necessary with respect to releases where either the release is on, or the sole source of the release is from, any facility or vessel under the jurisdiction, custody, or control of DOD. In addition to those capabilities provided by SUPSALV, DOD may also, consistent with its operational requirements and upon request of the OSC, provide locally deployed USN oil spill equipment and provide assistance to other federal agencies on request. The following two branches of DOD have particularly relevant expertise:

(i) The United States Army Corps of Engineers has specialized equipment and personnel for maintaining navigation channels, for removing navigation obstructions, for accomplishing structural repairs, and for performing maintenance to hydropower electric generating equipment. The Corps can also provide design services, perform construction, and provide contract writing and contract administrative services for other federal agencies.

(ii) The U.S. Navy Supervisor of Salvage (SUPSALV) is the branch of service within DOD most knowledgeable and experienced in ship salvage, shipboard damage control, and diving. The USN has an extensive array of specialized equipment and personnel available for use in these areas as well as specialized containment, collection, and removal equipment specifically designed for salvage-related and open-sea pollution incidents.

(5) DOE generally provides designated OSCs/RPMs that are responsible for taking all response actions with respect to releases where either the release is on, or the sole source of the release is from, any facility or vessel under its jurisdiction, custody, or control, including vessels bareboat-chartered and operated. In addition, under the FRERP, DOE provides advice and assistance to other OSCs/RPMs for emergency actions essential for the control of immediate radiological hazards. Incidents that qualify for DOE radiological advice and assistance are those believed to involve source, by-product, or special nuclear material or other ionizing radiation sources, including radium, and other naturally occurring radionuclides, as well as particle accelerators. Assistance is available through direct contact with the appropriate DOE Radiological Assistance Program Regional Office.

(6) The Department of Agriculture (USDA) has scientific and technical capability to measure, evaluate, and monitor, either on the ground or by use of aircraft, situations where natural resources including soil, water, wildlife, and vegetation have been impacted by fire, insects and diseases, floods, hazardous substances, and other natural or man-caused emergencies. The USDA may be contacted through Forest Service emergency staff officers who are the designated members of the RRT. Agencies within USDA have relevant capabilities and expertise as follows:

(i) The Forest Service has responsibility for protection and management of national forests and national grasslands. The Forest Service has personnel, laboratory, and field capability to measure, evaluate, monitor, and control as needed, releases of pesticides and other hazardous substances on lands under its jurisdiction.

(ii) The Agriculture Research Service (ARS) administers an applied and developmental research program in animal and plant protection and production; the use and improvement of soil, water, and air; the processing, storage, and distribution of farm products; and human nutrition. The ARS has the capabilities to provide regulation of, and evaluation and training for, employees exposed to biological, chemical, radiological, and industrial hazards. In emergency situations, the ARS can identify, control, and abate pollution in the areas of air, soil, wastes, pesticides, radiation, and toxic substances for ARS facilities.

(iii) The Soil Conservation Service (SCS) has personnel in nearly every county in the nation who are knowledgeable in soil, agronomy, engineering, and biology. These personnel can help to predict the effects of pollutants on soil and their movements over and through soils. Technical specialists can assist in identifying potential hazardous waste sites and provide review and advice on plans for remedial measures.

(iv) The Animal and Plant Health Inspection Service (APHIS) can respond in an emergency to regulate movement of diseased or infected organisms to prevent the spread and contamination of nonaffected areas.

(v) The Food Safety and Inspection Service (FSIS) has responsibility to prevent meat and poultry products contaminated with harmful substances from entering human food channels. In emergencies, the FSIS works with other federal and state agencies to establish acceptability for slaughter of exposed or potentially exposed animals and their products. In addition they are charged with managing the Federal Radiological Emergency Response Program for the USDA.

(7) DOC, through NOAA, provides scientific support for response and contingency planning in coastal and marine areas, including assessments of the hazards that may be involved, predictions of movement and dispersion of oil and hazardous substances through trajectory modeling, and information on the sensitivity of coastal environments to oil and hazardous substances and associated clean-up and mitigation methods; provides expertise on living marine resources and their habitats, including endangered species, marine mammals and National Marine Sanctuary ecosystems; provides information on actual and predicted meteorological, hydrological, ice, and oceanographic conditions for marine, coastal, and inland waters, and tide and circulation data for coastal and territorial waters and for the Great Lakes.

(8) HHS assists with the assessment, preservation, and protection of human health and helps ensure the availability of essential human services. HHS provides technical and nontechnical assistance in the form of advice, guidance, and resources to other federal agencies as well as state and local governments.

(i) The principal HHS response comes from the U.S. Public Health Service and is coordinated from the Office of the Assistant Secretary for Health, and various Public Health Service regional offices. Within the Public Health Service, the primary response to a hazardous materials emergency comes from Agency for Toxic Substances and Disease Registry (ATSDR) and the Centers for Disease Control (CDC). Both ATSDR and CDC have a 24-hour emergency response capability wherein scientific and technical personnel are available to provide technical assistance to the lead federal agency and state and local response agencies on human health threat assessment and analysis, and exposure prevention and mitigation. Such assistance is used for situations requiring evacuation of affected areas, human exposure to hazardous materials, and technical advice on mitigation and prevention. CDC takes the lead during petroleum releases regulated under the CWA and OPA while ATSDR takes the lead during chemical releases under CERCLA. Both agencies are mutually supportive.

(ii) Other Public Health Service agencies involved in support during hazardous materials incidents either directly or through ATSDR/CDC include the Food and Drug Administration, the Health Resources and Services Administration, the Indian Health Service, and the National Institutes of Health.

(iii) Statutory authority for HHS/National Institutes for Environmental Health Sciences (NIEHS) involvement in hazardous materials accident prevention is non-regulatory in nature and focused on two primary areas for preventing community and worker exposure to hazardous materials releases: Worker safety training and basic research activities. Under section 126 of SARA, NIEHS is given statutory authority for supporting development of curricula and model training programs for waste workers and chemical emergency responders.

Under section 118(b) of the Hazardous Materials Transportation and Uniform Safety Act (HMTUSA) (49 U.S.C. 1802 *et* *seq.*), NIEHS also administers the Hazmat Employee Training Program to prepare curricula and training for hazardous materials transportation workers. In the basic research arena, NIEHS is authorized under section 311 of SARA to conduct a hazardous substance basic research and training program to evaluate toxic effects and assess human health risks from accidental releases of hazardous materials. Under Title IX, section 901(h) of the Clean Air Act Amendments, NIEHS also is authorized to conduct basic research on air pollutants, as well as train physicians in environmental health. Federal research and training in hazardous materials release prevention represents an important non-regulatory activity and supplements ongoing private sector programs.

(9) DOI may be contacted through Regional Environmental Officers (REOs), who are the designated members of RRTs. Department land managers have jurisdiction over the national park system, national wildlife refuges and fish hatcheries, the public lands, and certain water projects in western states. In addition, bureaus and offices have relevant expertise as follows:

(i) United States Fish and Wildlife Service (USFWS) and other Bureaus: Anadromous and certain other fishes and wildlife, including endangered and threatened species, migratory birds, and certain marine mammals; waters and wetlands; and effects on natural resources.

(ii) The National Biological Survey performs research in support of biological resource management; inventories, monitors, and reports on the status and trends in the Nation's biotic resources; and transfers the information gained in research and monitoring to resource managers and others concerned with the care, use, and conservation of the Nation's natural resources. The National Biological Survey has laboratory/research facilities.

(iii) Geological Survey: Geology, hydrology (ground water and surface water), and natural hazards.

(iv) Bureau of Land Management: Minerals, soils, vegetation, wildlife, habitat, archaeology, and wilderness; and hazardous materials.

(v) Minerals Management Service: Oversight of offshore oil and gas exploration and production facilities and associated pipelines and pipeline facilities under the Outer Continental Shelf Lands Act and the CWA; oil spill response technology research; and establishing oil discharge contingency planning requirements for offshore facilities.

(vi) Bureau of Mines: Analysis and identification of inorganic hazardous substances and technical expertise in metals and metallurgy relevant to site cleanup.

(vii) Office of Surface Mining: Coal mine wastes and land reclamation.

(viii) National Park Service: General biological, natural, and cultural resource managers to evaluate, measure, monitor, and contain threats to park system lands and resources; archaeological and historical expertise in protection, preservation, evaluation, impact mitigation, and restoration of cultural resources; emergency personnel.

(ix) Bureau of Reclamation: Operation and maintenance of water projects in the West; engineering and hydrology; and reservoirs.

(x) Bureau of Indian Affairs: Coordination of activities affecting Indian lands; assistance in identifying Indian tribal government officials.

(xi) Office of Territorial Affairs: Assistance in implementing the NCP in American Samoa, Guam, the Pacific Island Governments, the Northern Mariana Islands, and the Virgin Islands.

(10) The Department of Justice (DOJ) can provide expert advice on complicated legal questions arising from discharges or releases, and federal agency responses. In addition, the DOJ represents the federal government, including its agencies, in litigation relating to such discharges or releases. Other legal issues or questions shall be directed to the federal agency counsel for the agency providing the OSC/RPM for the response.

(11) The Department of Labor (DOL), through OSHA and the states operating plans approved under section 18 of the OSH Act, has authority to conduct

safety and health inspections of hazardous waste sites to assure that employees are being protected and to determine if the site is in compliance with:

(i) Safety and health standards and regulations promulgated by OSHA (or the states) in accordance with section 126 of SARA and all other applicable standards; and

(ii) Regulations promulgated under the OSH Act and its general duty clause. OSHA inspections may be self-generated, consistent with its program operations and objectives, or may be conducted in response to requests from EPA or another lead agency, or in response to accidents or employee complaints. OSHA may also conduct inspections at hazardous waste sites in those states with approved plans that choose not to exercise their jurisdiction to inspect such sites. On request, OSHA will provide advice and consultation to EPA and other NRT/RRT agencies as well as to the OSC/RPM regarding hazards to persons engaged in response activities. OSHA may also take any other action necessary to assure that employees are properly protected at such response activities. Any questions about occupational safety and health at these sites may be referred to the OSHA Regional Office.

(12) DOT provides response expertise pertaining to transportation of oil or hazardous substances by all modes of transportation. Through the Research and Special Programs Administration (RSPA), DOT offers expertise in the requirements for packaging, handling, and transporting regulated hazardous materials. DOT, through RSPA, establishes oil discharge contingency planning requirements for pipelines, transport by rail and containers or bulk transport of oil.

(13) The Department of State (DOS) will lead in the development of international joint contingency plans. It will also help to coordinate an international response when discharges or releases cross international boundaries or involve foreign flag vessels. Additionally, DOS will coordinate requests for assistance from foreign governments and U.S. proposals for conducting research at incidents that occur in waters of other countries.

(14) The Nuclear Regulatory Commission will respond, as appropriate, to releases of radioactive materials by its licensees, in accordance with the NRC Incident Response Plan (NUREG–0728) to monitor the actions of those licensees and assure that the public health and environment are protected and adequate recovery operations are instituted. The Nuclear Regulatory Commission will keep EPA informed of any significant actual or potential releases in accordance with procedural agreements. In addition, the Nuclear Regulatory Commission will provide advice to the OSC/RPM when assistance is required in identifying the source and character of other hazardous substance releases where the Nuclear Regulatory Commission has licensing authority for activities utilizing radioactive materials.

(15) The General Services Administration (GSA) provides logistic and telecommunications support to federal agencies. During an emergency situation, GSA quickly responds to aid state and local governments as directed by other federal agencies. The type of support provided might include leasing and furnishing office space, setting up telecommunications and transportation services, and advisory assistance.

§300.180 State and local participation in response.

(a) Each state governor is requested to designate one state office/representative to represent the state on the appropriate RRT. The state's office/representative may participate fully in all activities of the appropriate RRT. Each state governor is also requested to designate a lead state agency that will direct state-lead response operations. This agency is responsible for designating the lead state response official for federal and/or state-lead response actions, and coordinating/communicating with any other state agencies, as appropriate. Local governments are invited to participate in activities on the appropriate RRT as may be provided by state law or arranged by the state's representative. Indian tribes wishing to participate should assign one person or office to represent the tribal government on the appropriate RRT.

(b) Appropriate local and state officials (including Indian tribes) will participate as part of the response structure as provided in the ACP.

(c) In addition to meeting the requirements for local emergency plans under SARA section 303, state and local government agencies are encouraged to include contingency planning for responses, consistent with the NCP, RCP, and ACP in all emergency and disaster planning.

(d) For facilities not addressed under CERCLA or the CWA, states are encouraged to undertake response actions themselves or to use their authorities to compel potentially responsible parties to undertake response actions.

(e) States are encouraged to enter into cooperative agreements pursuant to sections 104 (c)(3) and (d) of CERCLA to enable them to undertake actions authorized under subpart E of the NCP. Requirements for entering into these agreements are included in subpart F of the NCP. A state agency that acts pursuant to such agreements is referred to as the lead agency. In the event there is no cooperative agreement, the lead agency can be designated in a SMOA or other agreement.

(f) Because state and local public safety organizations would normally be the first government representatives at the scene of a discharge or release, they are expected to initiate public safety measures that are necessary to protect public health and welfare and that are consistent with containment and cleanup requirements in the NCP, and are responsible for directing evacuations pursuant to existing state or local procedures.

§ 300.185 Nongovernmental participation.

(a) Industry groups, academic organizations, and others are encouraged to commit resources for response operations. Specific commitments should be listed in the RCP and ACP. Those entities required to develop tank vessel and facility response plans under CWA section 311(j) must be able to respond to a worst case discharge to the maximum extent practicable, and shall commit sufficient resources to implement other aspects of those plans in accordance with the requirements of 30 CFR part 254, 33 CFR parts 150, 154, and 155; 40 CFR part 112; and 49 CFR parts 171 and 194.

(b) The technical and scientific information generated by the local community, along with information from federal, state, and local governments, should be used to assist the OSC/RPM in devising response strategies where effective standard techniques are unavailable. Such information and strategies will be incorporated into the ACP, as appropriate. The SSC may act as liaison between the OSC/RPM and such interested organizations.

(c) ACPs shall establish procedures to allow for well organized, worthwhile, and safe use of volunteers, including compliance with § 300.150 regarding worker health and safety. ACPs should provide for the direction of volunteers by the OSC/RPM or by other federal, state, or local officials knowledgeable in contingency operations and capable of providing leadership. ACPs also should identify specific areas in which volunteers can be used, such as beach surveillance, logistical support, and bird and wildlife treatment. Unless specifically requested by the OSC/RPM, volunteers generally should not be used for physical removal or remedial activities. If, in the judgment of the OSC/RPM, dangerous conditions exist, volunteers shall be restricted from on-scene operations.

(d) Nongovernmental participation must be in compliance with the requirements of subpart H of this part if any recovery of costs will be sought.

Subpart C—Planning and Preparedness

SOURCE: 59 FR 47440, Sept. 15, 1994, unless otherwise noted.

§ 300.200 General.

This subpart summarizes emergency preparedness activities relating to discharges of oil and releases of hazardous substances, pollutants, or contaminants; describes the three levels of contingency planning under the national response system; and cross-references state and local emergency preparedness activities under SARA Title III, also known as the ''Emergency Planning and Community Right-to-Know Act of 1986'' but referred to herein as ''Title III.'' Regulations implementing Title III are codified at 40 CFR subchapter J.

§ 300.205 Planning and coordination structure.

(a) *National.* As described in § 300.110, the NRT is responsible for national planning and coordination.

(b) *Regional.* As described in § 300.115, the RRTs are responsible for regional planning and coordination.

(c) *Area.* As required by section 311(j) of the CWA, under the direction of the federal OSC for its area, Area Committees comprising qualified personnel of federal, state, and local agencies shall be responsible for:

(1) Preparing an ACP for their areas (as described in § 300.210(c));

(2) Working with appropriate federal, state, and local officials to enhance the contingency planning of those officials and to assure pre-planning of joint response efforts, including appropriate procedures for mechanical recovery, dispersal, shoreline cleanup, protection of sensitive environmental areas, and protection, rescue, and rehabilitation of fisheries and wildlife; and

(3) Working with appropriate federal, state, and local officials to expedite decisions for the use of dispersants and other mitigating substances and devices.

(d) *State.* As provided by sections 301 and 303 of Title III, the SERC of each state, appointed by the Governor, is to designate emergency planning districts, appoint Local Emergency Planning Committees (LEPCs), supervise and coordinate their activities, and review local emergency response plans, which are described in § 300.215. The SERC also is to establish procedures for receiving and processing requests from the public for information generated by Title III reporting requirements and to designate an official to serve as coordinator for information.

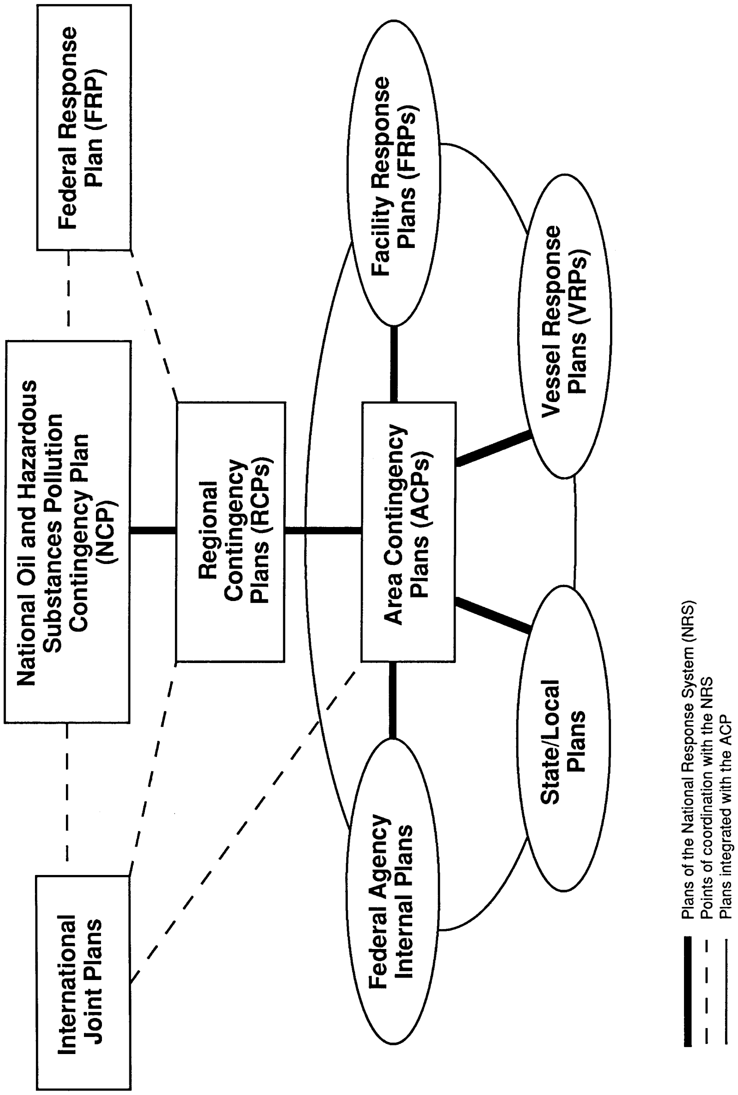
(e) *Local.* As provided by sections 301 and 303 of Title III, emergency planning districts are designated by the SERC in order to facilitate the preparation and implementation of emergency plans. Each LEPC is to prepare a local emergency response plan for the emergency planning district and establish procedures for receiving and processing requests from the public for information generated by Title III reporting requirements. The LEPC is to appoint a chair and establish rules for the LEPC. The LEPC is to designate an official to serve as coordinator for information and designate in its plan a community emergency coordinator.

(f) As required by section 311(j)(5) of the CWA, a tank vessel, as defined under section 2101 of title 46, U.S. Code, an offshore facility, and an onshore facility that, because of its location, could reasonably be expected to cause substantial harm to the environment by discharging into or on the navigable waters, adjoining shorelines, or exclusive economic zone must prepare and submit a plan for responding, to the maximum extent practicable, to a worst case discharge, and to a substantial threat of such a discharge, of oil or a hazardous substance.

(g) The relationship of these plans is described in Figure 4.

Figure 4

Relationship of Plans



§ 300.210 Federal contingency plans.

There are three levels of contingency plans under the national response system: The National Contingency Plan, RCPs, and ACPs. These plans are available for inspection at EPA regional offices or USCG district offices. Addresses and telephone numbers for these offices may be found in the United States Government Manual, issued annually, or in local telephone directories.

(a) *The National Contingency Plan*. The purpose and objectives, authority, and scope of the NCP are described in §§ 300.1 through 300.3.

(b) *Regional Contingency Plans*. The RRTs, working with the states, shall develop federal RCPs for each standard federal region, Alaska, Oceania in the

Pacific, and the Caribbean to coordinate timely, effective response by various federal agencies and other organizations to discharges of oil or releases of hazardous substances, pollutants, or contaminants. RCPs shall, as appropriate, include information on all useful facilities and resources in the region, from government, commercial, academic, and other sources. To the greatest extent possible, RCPs shall follow the format of the NCP and be coordinated with state emergency response plans, ACPs, which are described in § 300.210(c), and Title III local emergency response plans, which are described in § 300.215. Such coordination should be accomplished by working with the SERCs in the region covered by the RCP. RCPs shall contain lines of demarcation between the inland and coastal zones, as mutually agreed upon by USCG and EPA.

(c) *Area Contingency Plans.* (1) Under the direction of an OSC and subject to approval by the lead agency, each Area Committee, in consultation with the appropriate RRTs, Coast Guard DRGs, the NSFCC, SSCs, LEPCs, and SERCs, shall develop an ACP for its designated area. This plan, when implemented in conjunction with other provisions of the NCP, shall be adequate to remove a worst case discharge under § 300.324, and to mitigate or prevent a substantial threat of such a discharge, from a vessel, offshore facility, or onshore facility operating in or near the area.

(2) The areas of responsibility may include several Title III local planning districts, or parts of such districts. In developing the ACP, the OSC shall coordinate with affected SERCs and LEPCs. The ACP shall provide for a well coordinated response that is integrated and compatible, to the greatest extent possible, with all appropriate response plans of state, local, and non-federal entities, and especially with Title III local emergency response plans.

(3) The ACP shall include the following:

(i) A description of the area covered by the plan, including the areas of special economic or environmental importance that might be damaged by a discharge;

(ii) A description in detail of the responsibilities of an owner or operator and of federal, state, and local agencies in removing a discharge, and in mitigating or preventing a substantial threat of a discharge;

(iii) A list of equipment (including firefighting equipment), dispersants, or other mitigating substances and devices, and personnel available to an owner or operator and federal, state, and local agencies, to ensure an effective and immediate removal of a discharge, and to ensure mitigation or prevention of a substantial threat of a discharge (this may be provided in an appendix or by reference to other relevant emergency plans (e.g., state or LEPC plans), which may include such equipment lists);

(iv) A description of procedures to be followed for obtaining an expedited decision regarding the use of dispersants; and

(v) A detailed description of how the plan is integrated into other ACPs and tank vessel, offshore facility, and onshore facility response plans approved by the President, and into operating procedures of the NSFCC.

(4)(i) In order to provide for coordinated, immediate and effective protection, rescue, and rehabilitation of, and minimization of risk of injury to, fish and wildlife resources and habitat, Area Committees shall incorporate into each ACP a detailed annex containing a Fish and Wildlife and Sensitive Environments Plan that is consistent with the RCP and NCP. The annex shall be prepared in consultation with the USFWS and NOAA and other interested natural resource management agencies and parties. It shall address fish and wildlife resources and their habitat, and shall include other areas considered sensitive environments in a separate section of the annex, based upon Area Committee recommendations. The annex will provide the necessary information and procedures to immediately and effectively respond to discharges that may adversely affect fish and wildlife and their habitat and sensitive environments, including provisions for a response to a worst case discharge. Such information shall include the identification of appropriate agencies and their responsibilities, procedures to notify these agencies following a discharge or threat of a discharge, protocols for obtaining required fish and wildlife permits and other necessary permits, and provisions to ensure compatibility of annex-related activities with removal operations.

(ii) The annex shall:

(A) Identify and establish priorities for fish and wildlife resources and their habitats and other important sensitive areas requiring protection from any direct or indirect effects from discharges that may occur. These effects include, but are not limited to, any seasonal or historical use, as well as all critical, special, significant, or otherwise designated protected areas.

(B) Provide a mechanism to be used during a spill response for timely identification of protection priorities of those fish and wildlife resources and habitats and sensitive environmental areas that may be threatened or injured by a discharge. These include as appropriate, not only marine and freshwater species, habitats, and their food sources, but also terrestrial wildlife and their habitats that may be affected directly by onshore oil or indirectly by oil-related factors, such as loss or contamination of forage. The mechanism shall also provide for expeditious evaluation and appropriate consultations on the effects to fish and wildlife, their habitat, and other sensitive environments from the application of chemical countermeasures or other countermeasures not addressed under paragraph (e)(4)(iii).

(C) Identify potential environmental effects on fish and wildlife, their habitat, and other sensitive environments resulting from removal actions or countermeasures, including the option of no removal. Based on this evaluation of potential environmental effects, the annex should establish priorities for application of countermeasure and removal actions to habitats within the geographic region of the ACP. The annex should establish methods to minimize the identified effects on fish and wildlife because of response activities, including, but not limited to: Disturbance of sensitive areas and habitats; illegal or inadvertent taking or disturbance of fish and wildlife or specimens by response personnel; and fish and wildlife, their habitat, and environmentally sensitive areas coming in contact with various cleaning or bioremediation agents. Furthermore, the annex should identify the areas where the movement of oiled debris may pose a risk to resident, transient, or migratory fish and wildlife, and other sensitive environments and should discuss measures to be considered for removing such oiled debris in a timely fashion to reduce such risk.

(D) Provide for pre-approval of application of specific countermeasures or removal actions that, if expeditiously applied, will minimize adverse spill-induced impacts to fish and wildlife resources, their habitat, and other sensitive environments. Such pre-approval plans must be consistent with paragraphs (c)(4)(ii)(B) and (C) of this section and subpart J requirements, and must have the concurrence of the natural resource trustees.

(E) Provide monitoring plan(s) to evaluate the effectiveness of different countermeasures or removal actions in protecting the environment. Monitoring should include ‘‘set-aside’’ or ‘‘control’’ areas, where no mitigative actions are taken.

(F) Identify and plan for the acquisition and utilization of necessary response capabilities for protection, rescue, and rehabilitation of fish and wildlife resources and habitat. This may include appropriately permitted private organizations and individuals with appropriate expertise and experience. The suitable organizations should be identified in cooperation with natural resource law enforcement agencies. Such capabilities shall include, but not be limited to, identification of facilities and equipment necessary for deterring sensitive fish and wildlife from entering oiled areas, and for capturing, holding, cleaning, and releasing injured wildlife. Plans for the provision of such capabilities shall ensure that there is no interference with other OSC removal operations.

(G) Identify appropriate federal and state agency contacts and alternates responsible for coordination of fish and wildlife rescue and rehabilitation and protection of sensitive environments; identify and provide for required fish and wildlife handling and rehabilitation permits necessary under federal and state laws; and provide guidance on the implementation of law enforcement requirements included under current federal and state laws and corresponding regulations. Requirements include, but are not limited to procedures regarding the capture, transport, rehabilitation, and release of wildlife exposed to or threatened by oil, and disposal of contaminated carcasses of wildlife.

(H) Identify and secure the means for providing, if needed, the minimum required OSHA and EPA training for volunteers, including those who assist with injured wildlife.

(I) Define the requirements for evaluating the compatibility between this annex and non-federal response plans (including those of vessels, facilities, and pipelines) on issues affecting fish and wildlife, their habitat, and sensitive environments.

§ 300.211 OPA facility and vessel response plans.

This section describes and cross-references the regulations that implement section 311(j)(5) of the CWA. A tank vessel, as defined under section 2101 of title 46, U.S. Code, an offshore facility, and an onshore facility that, because of its location, could reasonably expect to cause substantial harm to the environment by discharging into or on the navigable waters, adjoining shorelines, or exclusive economic zone must prepare and submit a plan for responding, to the maximum extent practicable, to a worst case discharge, and to a substantial threat of such a discharge, of oil or a hazardous substance. These response plans are required to be consistent with applicable Area Contingency Plans. These regulations are codified as follows:

(a) For tank vessels, these regulations are codified in 33 CFR part 155;

(b) For offshore facilities, these regulations are codified in 30 CFR part 254;

(c) For non-transportation related onshore facilities, these regulations are codified in 40 CFR 112.20;

(d) For transportation-related onshore facilities, these regulations are codified in 33 CFR part 154;

(e) For pipeline facilities, these regulations are codified in 49 CFR part 194; and

(f) For rolling stock, these regulations are codified in 49 CFR part 106 et al.

§ 300.212 Area response drills.

The OSC periodically shall conduct drills of removal capability (including fish and wildlife response capability), without prior notice, in areas for which ACPs are required by § 300.210(c) and under relevant tank vessel and facility response plans.

§ 300.215 Title III local emergency response plans.

This section describes and cross-references the regulations that implement Title III. These regulations are codified at 40 CFR part 355.

(a) Each LEPC is to prepare an emergency response plan in accordance with section 303 of Title III and review the plan once a year, or more frequently as changed circumstances in the community or at any facility may require. Such Title III local emergency response plans should be closely coordinated with applicable federal ACPs and state emergency response plans.

(b) [Reserved]

§ 300.220 Related Title III issues.

Other related Title III requirements are found in 40 CFR part 355.

Subpart D—Operational Response Phases for Oil Removal

SOURCE: 59 FR 47444, Sept. 15, 1994, unless otherwise noted.

§ 300.300 Phase I—Discovery or notification.

(a) A discharge of oil may be discovered through:

(1) A report submitted by the person in charge of a vessel or facility, in accordance with statutory requirements;

(2) Deliberate search by patrols;

(3) Random or incidental observation by government agencies or the public; or

(4) Other sources.

(b) Any person in charge of a vessel or a facility shall, as soon as he or she has knowledge of any discharge from such vessel or facility in violation of section 311(b)(3) of the CWA, immediately notify the NRC. If direct reporting to the NRC is not practicable, reports may be made to the USCG or EPA predesignated OSC for the geographic area where the discharge occurs. The EPA predesignated OSC may also be contacted through the regional 24-hour emergency response telephone number. All such reports shall be promptly relayed to the NRC. If it is not possible to notify the NRC or predesignated OSC immediately, reports may be made immediately to the nearest Coast Guard unit. In any event such person in charge of the vessel or facility shall notify the NRC as soon as possible.

(c) Any other person shall, as appropriate, notify the NRC of a discharge of oil.

(d) Upon receipt of a notification of discharge, the NRC shall promptly notify the OSC. The OSC shall ensure notification of the appropriate state agency of any state which is, or may reasonably be expected to be, affected by the discharge. The OSC shall then proceed with the following phases as outlined in the RCP and ACP.

§ 300.305 Phase II—Preliminary assessment and initiation of action.

(a) The OSC is responsible for promptly initiating a preliminary assessment.

(b) The preliminary assessment shall be conducted using available information, supplemented where necessary and possible by an on-scene inspection. The OSC shall undertake actions to:

(1) Evaluate the magnitude and severity of the discharge or threat to public health or welfare of the United States or the environment;

(2) Assess the feasibility of removal; and

(3) To the extent practicable, identify potentially responsible parties.

(c) Where practicable, the framework for the response management structure is a system (e.g., a unified command system), that brings together the functions of the federal government, the state government, and the responsible party to achieve an effective and efficient response, where the OSC maintains authority.

(d) Except in a case when the OSC is required to direct the response to a discharge that may pose a substantial threat to the public health or welfare of the United States (including but not limited to fish, shellfish, wildlife, other natural resources, and the public and private beaches and shorelines of the United States), the OSC may allow the responsible party to voluntarily and promptly perform removal actions, provided the OSC determines such actions will ensure an effective and immediate removal of the discharge or mitigation or prevention of a substantial threat of a discharge. If the responsible party does conduct the removal, the OSC shall ensure adequate surveillance over whatever actions are initiated. If effective actions are not being taken to eliminate the threat, or if removal is not being properly done, the OSC should, to the extent practicable under the circumstances, so advise the responsible party. If the responsible party does not respond properly the OSC shall take appropriate response actions and should notify the responsible party of the potential liability for federal response costs incurred by the OSC pursuant to the OPA and CWA. Where practicable, continuing efforts should be made to encourage response by responsible parties.

(1) In carrying out a response under this section, the OSC may:

(i) Remove or arrange for the removal of a discharge, and mitigate or prevent a substantial threat of a discharge, at any time;

(ii) Direct or monitor all federal, state, and private actions to remove a discharge; and

(iii) Remove and, if necessary, destroy a vessel discharging, or threatening to discharge, by whatever means are available.

(2) If the discharge results in a substantial threat to the public health or welfare of the United States (including, but not limited to fish, shellfish, wildlife, other natural resources, and the public and private beaches and shorelines of the United States), the OSC must direct all response efforts, as provided in § 300.322(b) of this part. The OSC should declare as expeditiously as practicable to spill response participants that the federal government will

direct the response. The OSC may act without regard to any other provision of the law governing contracting procedures or employment of personnel by the federal government in removing or arranging for the removal of such a discharge.

(e) The OSC shall ensure that the natural resource trustees are promptly notified in the event of any discharge of oil, to the maximum extent practicable as provided in the Fish and Wildlife and Sensitive Environments Plan annex to the ACP for the area in which the discharge occurs. The OSC and the trustees shall coordinate assessments, evaluations, investigations, and planning with respect to appropriate removal actions. The OSC shall consult with the affected trustees on the appropriate removal action to be taken. The trustees will provide timely advice concerning recommended actions with regard to trustee resources potentially affected. The trustees also will assure that the OSC is informed of their activities in natural resource damage assessment that may affect response operations. The trustees shall assure, through the lead administrative trustee, that all data from the natural resource damage assessment activities that may support more effective operational decisions are provided in a timely manner to the OSC. When circumstances permit, the OSC shall share the use of non-monetary response resources (*i.e.*, personnel and equipment) with the trustees, provided trustee activities do not interfere with response actions. The lead administrative trustee facilitates effective and efficient communication between the OSC and the other trustees during response operations and is responsible for applying to the OSC for non-monetary federal response resources on behalf of all trustees. The lead administrative trustee is also responsible for applying to the NPFC for funding for initiation of damage assessment for injuries to natural resources.

§300.310 Phase III—Containment, countermeasures, cleanup, and disposal.

(a) Defensive actions shall begin as soon as possible to prevent, minimize, or mitigate threat(s) to the public health or welfare of the United States or the environment. Actions may include but are not limited to: Analyzing water samples to determine the source and spread of the oil; controlling the source of discharge; measuring and sampling; source and spread control or salvage operations; placement of physical barriers to deter the spread of the oil and to protect natural resources and sensitive ecosystems; control of the water discharged from upstream impoundment; and the use of chemicals and other materials in accordance with subpart J of this part to restrain the spread of the oil and mitigate its effects. The ACP prepared under §300.210(c) should be consulted for procedures to be followed for obtaining an expedited decision regarding the use of dispersants and other products listed on the NCP Product Schedule.

(b) As appropriate, actions shall be taken to recover the oil or mitigate its effects. Of the numerous chemical or physical methods that may be used, the chosen methods shall be the most consistent with protecting public health and welfare and the environment. Sinking agents shall not be used.

(c) Oil and contaminated materials recovered in cleanup operations shall be disposed of in accordance with the RCP, ACP, and any applicable laws, regulations, or requirements. RRT and Area Committee guidelines may identify the disposal options available during an oil spill response and may describe what disposal requirements are mandatory or may not be waived by the OSC. ACP guidelines should address: the sampling, testing, and classifying of recovered oil and oiled debris; the segregation, temporary storage, and stockpiling of recovered oil and oiled debris; prior state disposal approvals and permits; and the routes; methods (e.g. recycle/reuse, on-site burning, incineration, landfilling, etc.); and sites for the disposal of collected oil, oiled debris, and animal carcasses; and procedures for obtaining waivers, exemptions, or authorizations associated with handling or transporting waste materials. The ACPs may identify a hierarchy of preferences for disposal alternatives, with recycling (reprocessing) being the most preferred, and other alternatives preferred based on priorities for health or the environment.

§ 300.315 Phase IV—Documentation and cost recovery.

(a) All OSLTF users need to collect and maintain documentation to support all actions taken under the CWA. In general, documentation shall be sufficient to support full cost recovery for resources utilized and shall identify the source and circumstances of the incident, the responsible party or parties, and impacts and potential impacts to public health and welfare and the environment. Documentation procedures are contained in 33 CFR part 136.

(b) When appropriate, documentation shall also be collected for scientific understanding of the environment and for research and development of improved response methods and technology. Funding for these actions is restricted by section 6002 of the OPA.

(c) OSCs shall submit OSC reports to the NRT or RRT, only if requested, as provided by § 300.165.

(d) OSCs shall ensure the necessary collection and safeguarding of information, samples, and reports. Samples and information shall be gathered expeditiously during the response to ensure an accurate record of the impacts incurred. Documentation materials shall be made available to the trustees of affected natural resources. The OSC shall make available to trustees of the affected natural resources information and documentation in the OSC's possession that can assist the trustees in the determination of actual or potential natural resource injuries.

(e) Information and reports obtained by the EPA or USCG OSC shall be transmitted to the appropriate offices responsible for follow-up actions.

§ 300.317 National response priorities.

(a) Safety of human life must be given the top priority during every response action. This includes any search and rescue efforts in the general proximity of the discharge and the insurance of safety of response personnel.

(b) Stabilizing the situation to preclude the event from worsening is the next priority. All efforts must be focused on saving a vessel that has been involved in a grounding, collision, fire, or explosion, so that it does not compound the problem. Comparable measures should be taken to stabilize a situation involving a facility, pipeline, or other source of pollution. Stabilizing the situation includes securing the source of the spill and/or removing the remaining oil from the container (vessel, tank, or pipeline) to prevent additional oil spillage, to reduce the need for follow-up response action, and to minimize adverse impact to the environment.

(c) The response must use all necessary containment and removal tactics in a coordinated manner to ensure a timely, effective response that minimizes adverse impact to the environment.

(d) All parts of this national response strategy should be addressed concurrently, but safety and stabilization are the highest priorities. The OSC should not delay containment and removal decisions unnecessarily and should take actions to minimize adverse impact to the environment that begins as soon as a discharge occurs, as well as actions to minimize further adverse environmental impact from additional discharges.

(e) The priorities set forth in this section are broad in nature, and should not be interpreted to preclude the consideration of other priorities that may arise on a site-specific basis.

§ 300.320 General pattern of response.

(a) When the OSC receives a report of a discharge, actions normally should be taken in the following sequence:

(1) Investigate the report to determine pertinent information such as the threat posed to public health or welfare of the United States or the environment, the type and quantity of polluting material, and the source of the discharge.

(2) Officially classify the size (*i.e.*, minor, medium, major) and type (*i.e.*, substantial threat to the public health or welfare of the United States, worst case discharge) of the discharge and determine the course of action to be followed to ensure effective and immediate removal, mitigation, or prevention of the discharge. Some discharges that are classified as a substantial threat to the public health or welfare

of the United States may be further classified as a spill of national significance by the Administrator of EPA or the Commandant of the USCG. The appropriate course of action may be prescribed in §§ 300.322, 300.323, and 300.324.

(i) When the reported discharge is an actual or potential major discharge, the OSC shall immediately notify the RRT and the NRC.

(ii) When the investigation shows that an actual or potential medium discharge exists, the OSC shall recommend activation of the RRT, if appropriate.

(iii) When the investigation shows that an actual or potential minor discharge exists, the OSC shall monitor the situation to ensure that proper removal action is being taken.

(3) If the OSC determines that effective and immediate removal, mitigation, or prevention of a discharge can be achieved by private party efforts, and where the discharge does not pose a substantial threat to the public health or welfare of the United States, determine whether the responsible party or other person is properly carrying out removal. Removal is being done properly when:

(i) The responsible party is applying the resources called for in its response plan to effectively and immediately remove, minimize, or mitigate threat(s) to public health and welfare and the environment; and

(ii) The removal efforts are in accordance with applicable regulations, including the NCP. Even if the OSC supplements responsible party resources with government resources, the spill response will not be considered improper, unless specifically determined by the OSC.

(4) Where appropriate, determine whether a state or political subdivision thereof has the capability to carry out any or all removal actions. If so, the OSC may arrange funding to support these actions.

(5) Ensure prompt notification of the trustees of affected natural resources in accordance with the applicable RCP and ACP.

(b) Removal shall be considered complete when so determined by the OSC in consultation with the Governor or Governors of the affected states. When the OSC considers removal complete, OSLTF removal funding shall end. This determination shall not preclude additional removal actions under applicable state law.

§ 300.322 Response to substantial threats to public health or welfare of the United States.

(a) As part of the investigation described in § 300.320, the OSC shall determine whether a discharge results in a substantial threat to public health or welfare of the United States (including, but not limited to, fish, shellfish, wildlife, other natural resources, and the public and private beaches and shorelines of the United States). Factors to be considered by the OSC in making this determination include, but are not limited to, the size of the discharge, the character of the discharge, and the nature of the threat to public health or welfare of the United States. Upon obtaining such information, the OSC shall conduct an evaluation of the threat posed, based on the OSC's experience in assessing other discharges, and consultation with senior lead agency officials and readily available authorities on issues outside the OSC's technical expertise.

(b) If the investigation by the OSC shows that the discharge poses or may present a substantial threat to public health or welfare of the United States, the OSC shall direct all federal, state, or private actions to remove the discharge or to mitigate or prevent the threat of such a discharge, as appropriate. In directing the response in such cases, the OSC may act without regard to any other provision of law governing contracting procedures or employment of personnel by the federal government to:

(1) Remove or arrange for the removal of the discharge;

(2) Mitigate or prevent the substantial threat of the discharge; and

(3) Remove and, if necessary, destroy a vessel discharging, or threatening to discharge, by whatever means are available.

(c) In the case of a substantial threat to public health or welfare of the United States, the OSC shall:

(1) Assess opportunities for the use of various special teams and other assistance described in § 300.145, including the use of the services of the NSFCC, as appropriate;

(2) Request immediate activation of the RRT; and

(3) Take whatever additional response actions are deemed appropriate, including, but not limited to, implementation of the ACP as required by section 311(j)(4) of the CWA or relevant tank vessel or facility response plan required by section 311(j)(5) of the CWA. When requested by the OSC, the lead agency or RRT shall dispatch appropriate personnel to the scene of the discharge to assist the OSC. This assistance may include technical support in the agency's areas of expertise and disseminating information to the public. The lead agency shall ensure that a contracting officer is available on scene, at the request of the OSC.

§ 300.323 Spills of national significance.

(a) A discharge may be classified as a spill of national significance (SONS) by the Administrator of EPA for discharges occurring in the inland zone and the Commandant of the USCG for discharges occurring in the coastal zone.

(b) For a SONS in the inland zone, the EPA Administrator may name a senior Agency official to assist the OSC in communicating with affected parties and the public and coordinating federal, state, local, and international resources at the national level. This strategic coordination will involve, as appropriate, the NRT, RRT(s), the Governor(s) of affected state(s), and the mayor(s) or other chief executive(s) of local government(s).

(c) For a SONS in the coastal zone, the USCG Commandant may name a National Incident Commander (NIC) who will assume the role of the OSC in communicating with affected parties and the public, and coordinating federal, state, local, and international resources at the national level. This strategic coordination will involve, as appropriate, the NRT, RRT(s), the Governor(s) of affected state(s), and the mayor(s) or other chief executive(s) of local government(s).

§ 300.324 Response to worst case discharges.

(a) If the investigation by the OSC shows that a discharge is a worst case discharge as defined in the ACP, or there is a substantial threat of such a discharge, the OSC shall:

(1) Notify the NSFCC;

(2) Require, where applicable, implementation of the worst case portion of an approved tank vessel or facility response plan required by section 311(j)(5) of the CWA;

(3) Implement the worst case portion of the ACP required by section 311(j)(4) of the CWA; and

(4) Take whatever additional response actions are deemed appropriate.

(b) Under the direction of the OSC, the NSFCC shall coordinate use of private and public personnel and equipment, including strike teams, to remove a worst case discharge and mitigate or prevent a substantial threat of such a discharge.

§ 300.335 Funding.

(a) The OSLTF is available under certain circumstances to fund removal of oil performed under section 311 of the CWA. Those circumstances and the procedures for accessing the OSLTF are described in 33 CFR part 136. The responsible party is liable for costs of federal removal and damages in accordance with section 311(f) of the CWA, section 1002 of the OPA, and other federal laws.

(b) Where the OSC requests assistance from a federal agency, that agency may be reimbursed in accordance with the provisions of 33 CFR part 136. Specific interagency reimbursement agreements may be used when necessary to ensure that the federal resources will be available for a timely response to a discharge of oil.

(c) Procedures for funding the initiation of natural resource damage assessment are covered in 33 CFR part 136.

(d) Response actions other than removal, such as scientific investigations not in support of removal actions or law enforcement, shall be provided by the agency with legal responsibility for those specific actions.

(e) The funding of a response to a discharge from a federally owned, operated, or supervised facility or vessel is the responsibility of the owning, operating, or supervising agency if it is a responsible party.

(f) The following agencies have funds available for certain discharge removal actions:

(1) DOD has two specific sources of funds that may be applicable to an oil discharge under appropriate circumstances. This does not consider military resources that might be made available under specific conditions.

(i) Funds required for removal of a sunken vessel or similar obstruction of navigation are available to the Corps of Engineers through Civil Works Appropriations, Operations and Maintenance, General.

(ii) USN may conduct salvage operations contingent on defense operational commitments, when funded by the requesting agency. Such funding may be requested on a direct cite basis.

(2) Pursuant to Title I of the OPA, the state or states affected by a discharge of oil may act where necessary to remove such discharge. Pursuant to 33 CFR part 136 states may be reimbursed from the OSLTF for the reasonable costs incurred in such a removal.

Subpart E—Hazardous Substance Response

SOURCE: 55 FR 8839, Mar. 8, 1990, unless otherwise noted.

§ 300.400 General.

(a) This subpart establishes methods and criteria for determining the appropriate extent of response authorized by CERCLA and CWA section 311(c):

(1) When there is a release of a hazardous substance into the environment; or

(2) When there is a release into the environment of any pollutant or contaminant that may present an imminent and substantial danger to the public health or welfare of the United States.

(b) *Limitations on response.* Unless the lead agency determines that a release constitutes a public health or environmental emergency and no other person with the authority and capability to respond will do so in a timely manner, a removal or remedial action under section 104 of CERCLA shall not be undertaken in response to a release:

(1) Of a naturally occurring substance in its unaltered form, or altered solely through naturally occurring processes or phenomena, from a location where it is naturally found;

(2) From products that are part of the structure of, and result in exposure within, residential buildings or business or community structures; or

(3) Into public or private drinking water supplies due to deterioration of the system through ordinary use.

(c) *Fund-financed action.* In determining the need for and in planning or undertaking Fund-financed action, the lead agency shall, to the extent practicable:

(1) Engage in prompt response;

(2) Provide for state participation in response actions, as described in subpart F of this part;

(3) Conserve Fund monies by encouraging private party response;

(4) Be sensitive to local community concerns;

(5) Consider using treatment technologies;

(6) Involve the Regional Response Team (RRT) in both removal and remedial response actions at appropriate decision-making stages;

(7) Encourage the involvement and sharing of technology by industry and other experts; and

(8) Encourage the involvement of organizations to coordinate responsible party actions, foster site response, and provide technical advice to the public, federal and state governments, and industry.

(d) *Entry and access.* (1) For purposes of determining the need for response, or choosing or taking a response action, or otherwise enforcing the provisions of CERCLA, EPA, or the appropriate federal agency, and a state or political subdivision operating pursuant to a contract or cooperative agreement under CERCLA section 104(d)(1), has the authority to enter any vessel, facility, establishment or other place, property, or location described in paragraph (d)(2) of this section and conduct, complete, operate, and maintain any response actions authorized by CERCLA or these regulations.

(2)(i) Under the authorities described in paragraph (d)(1) of this section, EPA, or the appropriate federal agency, and a state or political subdivision operating pursuant to a contract or cooperative agreement under CERCLA section 104(d)(1), may enter:

(A) Any vessel, facility, establishment, or other place or property where any hazardous substance or pollutant or contaminant may be or has been generated, stored, treated, disposed of, or transported from;

(B) Any vessel, facility, establishment, or other place or property from which, or to which, a hazardous substance or pollutant or contaminant has been, or may have been, released or where such release is or may be threatened;

(C) Any vessel, facility, establishment, or other place or property where entry is necessary to determine the need for response or the appropriate response or to effectuate a response action; or

(D) Any vessel, facility, establishment, or other place, property, or location adjacent to those vessels, facilities, establishments, places, or properties described in paragraphs (d)(2)(i)(A), (B), or (C) of this section.

(ii) Once a determination has been made that there is a reasonable basis to believe that there has been or may be a release, EPA, or the appropriate federal agency, and a state or political subdivision operating pursuant to a contract or cooperative agreement under CERCLA section 104(d)(1), is authorized to enter all vessels, facilities, establishments, places, properties, or locations specified in paragraph (d)(2)(i) of this section, at which the release is believed to be, and all other vessels, facilities, establishments, places, properties, or locations identified in paragraph (d)(2)(i) of this section that are related to the response or are necessary to enter in responding to that release.

(3) The lead agency may designate as its representative solely for the purpose of access, among others, one or more potentially responsible parties, including representatives, employees, agents, and contractors of such parties. EPA, or the appropriate federal agency, may exercise the authority contained in section 104(e) of CERCLA to obtain access for its designated representative. A potentially responsible party may only be designated as a representative of the lead agency where that potentially responsible party has agreed to conduct response activities pursuant to an administrative order or consent decree.

(4)(i) If consent is not granted under the authorities described in paragraph (d)(1) of this section, or if consent is conditioned in any manner, EPA, or the appropriate federal agency, may issue an order pursuant to section 104(e)(5) of CERCLA directing compliance with the request for access made under § 300.400(d)(1). EPA or the appropriate federal agency may ask the Attorney General to commence a civil action to compel compliance with either a request for access or an order directing compliance.

(ii) EPA reserves the right to proceed, where appropriate, under applicable authority other than CERCLA section 104(e).

(iii) The administrative order may direct compliance with a request to enter or inspect any vessel, facility, establishment, place, property, or location described in paragraph (d)(2) of this section.

(iv) Each order shall contain:

(A) A determination by EPA, or the appropriate federal agency, that it is reasonable to believe that there may be or has been a release or threat of a release of a hazardous substance or pollutant or contaminant and a statement of the facts upon which the determination is based;

(B) A description, in light of CERCLA response authorities, of the purpose and estimated scope and duration of the entry, including a description of the specific anticipated activities to be conducted pursuant to the order;

(C) A provision advising the person who failed to consent that an officer or employee of the agency that issued the order will be available to confer with respondent prior to effective date of the order; and

(D) A provision advising the person who failed to consent that a court may impose a penalty of up to $25,000 per day for unreasonable failure to comply with the order.

(v) Orders shall be served upon the person or responsible party who failed to consent prior to their effective date. Force shall not be used to compel compliance with an order.

(vi) Orders may not be issued for any criminal investigations.

(e) *Permit requirements.* (1) No federal, state, or local permits are required for on-site response actions conducted pursuant to CERCLA sections 104, 106, 120, 121, or 122. The term *on-site* means the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action.

(2) Permits, if required, shall be obtained for all response activities conducted off-site.

(f) *Health assessments.* Health assessments shall be performed by ATSDR at facilities on or proposed to be listed on the NPL and may be performed at other releases or facilities in response to petitions made to ATSDR. Where available, these health assessments may be used by the lead agency to assist in determining whether response actions should be taken and/or to identify the need for additional studies to assist in the assessment of potential human health effects associated with releases or potential releases of hazardous substances.

(g) *Identification of applicable or relevant and appropriate requirements.* (1) The lead and support agencies shall identify requirements applicable to the release or remedial action contemplated based upon an objective determination of whether the requirement specifically addresses a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site.

(2) If, based upon paragraph (g)(1) of this section, it is determined that a requirement is not applicable to a specific release, the requirement may still be relevant and appropriate to the circumstances of the release. In evaluating relevance and appropriateness, the factors in paragraphs (g)(2)(i) through (viii) of this section shall be examined, where pertinent, to determine whether a requirement addresses problems or situations sufficiently similar to the circumstances of the release or remedial action contemplated, and whether the requirement is well-suited to the site, and therefore is both relevant and appropriate. The pertinence of each of the following factors will depend, in part, on whether a requirement addresses a chemical, location, or action. The following comparisons shall be made, where pertinent, to determine relevance and appropriateness:

(i) The purpose of the requirement and the purpose of the CERCLA action;

(ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site;

(iii) The substances regulated by the requirement and the substances found at the CERCLA site;

(iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site;

(v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site;

(vi) The type of place regulated and the type of place affected by the release or CERCLA action;

(vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action;

(viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.

(3) In addition to applicable or relevant and appropriate requirements, the lead and support agencies may, as appropriate, identify other advisories, criteria, or guidance to be considered for a particular release. The ‘‘to be considered’’ (TBC) category consists of advisories, criteria, or guidance that were developed by EPA, other federal agencies, or states that may be useful in developing CERCLA remedies.

(4) Only those state standards that are promulgated, are identified by the state in a timely manner, and are more stringent than federal requirements

may be applicable or relevant and appropriate. For purposes of identification and notification of promulgated state standards, the term *promulgated* means that the standards are of general applicability and are legally enforceable.

(5) The lead agency and support agency shall identify their specific requirements that are applicable or relevant and appropriate for a particular site. These agencies shall notify each other, in a timely manner as described in §300.515(d), of the requirements they have determined to be applicable or relevant and appropriate. When identifying a requirement as an ARAR, the lead agency and support agency shall include a citation to the statute or regulation from which the requirement is derived.

(6) Notification of ARARs shall be according to procedures and timeframes specified in §300.515 (d)(2) and (h)(2).

(h) *Oversight.* The lead agency may provide oversight for actions taken by potentially responsible parties to ensure that a response is conducted consistent with this part. The lead agency may also monitor the actions of third parties preauthorized under subpart H of this part. EPA will provide oversight when the response is pursuant to an EPA order or federal consent decree.

(i) *Other.* (1) This subpart does not establish any preconditions to enforcement action by either the federal or state governments to compel response actions by potentially responsible parties.

(2) While much of this subpart is oriented toward federally funded response actions, this subpart may be used as guidance concerning methods and criteria for response actions by other parties under other funding mechanisms. Except as provided in subpart H of this part, nothing in this part is intended to limit the rights of any person to seek recovery of response costs from responsible parties pursuant to CERCLA section 107.

(3) Activities by the federal and state governments in implementing this subpart are discretionary governmental functions. This subpart does not create in any private party a right to federal response or enforcement action. This subpart does not create any duty of the federal government to take any response action at any particular time.

[55 FR 8839, Mar. 8, 1990, as amended at 59 FR 47447, Sept. 15, 1994]

§ 300.405 Discovery or notification.

(a) A release may be discovered through:

(1) A report submitted in accordance with section 103(a) of CERCLA, *i.e.*, reportable quantities codified at 40 CFR part 302;

(2) A report submitted to EPA in accordance with section 103(c) of CERCLA;

(3) Investigation by government authorities conducted in accordance with section 104(e) of CERCLA or other statutory authority;

(4) Notification of a release by a federal or state permit holder when required by its permit;

(5) Inventory or survey efforts or random or incidental observation reported by government agencies or the public;

(6) Submission of a citizen petition to EPA or the appropriate federal facility requesting a preliminary assessment, in accordance with section 105(d) of CERCLA;

(7) A report submitted in accordance with section 311(b)(5) of the CWA; and

(8) Other sources.

(b) Any person in charge of a vessel or a facility shall report releases as described in paragraph (a)(1) of this section to the National Response Center (NRC). If direct reporting to the NRC is not practicable, reports may be made to the United States Coast Guard (USCG) on-scene coordinator (OSC) for the geographic area where the release occurs. The EPA predesignated OSC may also be contacted through the regional 24-hour emergency response telephone number. All such reports shall be promptly relayed to the NRC. If it is not possible to notify the NRC or predesignated OSC immediately, reports may be made immediately to the nearest USCG unit. In any event, such person in charge of the vessel or facility shall notify the NRC as soon as possible.

(c) All other reports of releases described under paragraph (a) of this section, except releases reported under paragraphs (a)(2) and (6) of this section, shall, as appropriate, be made to the NRC.

(d) The NRC will generally need information that will help to characterize the release. This will include, but not be limited to: Location of the release; type(s) of material(s) released; an estimate of the quantity of material released; possible source of the release; and date and time of the release. Reporting under paragraphs (b) and (c) of this section shall not be delayed due to incomplete notification information.

(e) Upon receipt of a notification of a release, the NRC shall promptly notify the appropriate OSC. The OSC shall notify the Governor, or designee, of the state affected by the release.

(f)(1) When the OSC is notified of a release that may require response pursuant to §300.415(b), a removal site evaluation shall, as appropriate, be promptly undertaken pursuant to §300.410.

(2) When notification indicates that removal action pursuant to §300.415(b) is not required, a remedial site evaluation shall, if appropriate, be undertaken by the lead agency pursuant to §300.420, if one has not already been performed.

(3) If radioactive substances are present in a release, the EPA Radiological Response Coordinator should be notified for evaluation and assistance either directly or via the NRC, consistent with §§300.130(e) and 300.145(f).

(g) Release notification made to the NRC under this section does not relieve the owner/operator of a facility from any obligations to which it is subject under SARA Title III or state law. In particular, it does not relieve the owner/operator from the requirements of section 304 of SARA Title III and 40 CFR part 355 and §300.215(f) of this part for notifying the community emergency coordinator for the appropriate local emergency planning committee of all affected areas and the state emergency response commission of any state affected that there has been a release. Federal agencies are not legally obligated to comply with the requirements of Title III of SARA.

[55 FR 8839, Mar. 8, 1990, as amended at 59 FR 47447, Sept. 15, 1994]

§ 300.410 Removal site evaluation.

(a) A removal site evaluation includes a removal preliminary assessment and, if warranted, a removal site inspection.

(b) A removal site evaluation of a release identified for possible CERCLA response pursuant to §300.415 shall, as appropriate, be undertaken by the lead agency as promptly as possible. The lead agency may perform a removal preliminary assessment in response to petitions submitted by a person who is, or may be, affected by a release of a hazardous substance, pollutant, or contaminant pursuant to §300.420(b)(5).

(c)(1) The lead agency shall, as appropriate, base the removal preliminary assessment on readily available information. A removal preliminary assessment may include, but is not limited to:

(i) Identification of the source and nature of the release or threat of release;

(ii) Evaluation by ATSDR or by other sources, for example, state public health agencies, of the threat to public health;

(iii) Evaluation of the magnitude of the threat;

(iv) Evaluation of factors necessary to make the determination of whether a removal is necessary; and

(v) Determination of whether a nonfederal party is undertaking proper response.

(2) A removal preliminary assessment of releases from hazardous waste management facilities may include collection or review of data such as site management practices, information from generators, photographs, analysis of historical photographs, literature searches, and personal interviews conducted, as appropriate.

(d) A removal site inspection may be performed if more information is needed. Such inspection may include a perimeter (*i.e.*, off-site) or on-site inspection, taking into consideration whether such inspection can be performed safely.

(e)(1) As part of the evaluation under this section, the OSC shall determine whether a release governed by CWA section 311(c)(1), as amended by OPA section 4201(a), has occurred.

(2) If such a release of a CWA hazardous substance has occurred, the OSC shall determine whether the release results in a substantial threat to the public health or welfare of the United States. Factors to be considered by the OSC in making this determination include, but are not limited to, the size of the release, the character of the release, and the nature of the threat to public health or welfare of the United States. Upon obtaining relevant elements of such information, the OSC shall conduct an evaluation of the threat posed, based on the OSC's experience in assessing other releases, and consultation with senior lead agency officials and readily available authorities on issues outside the OSC's technical expertise.

(f) A removal site evaluation shall be terminated when the OSC or lead agency determines:

(1) There is no release;

(2) The source is neither a vessel nor a facility as defined in § 300.5 of the NCP;

(3) The release involves neither a hazardous substance, nor a pollutant or contaminant that may present an imminent and substantial danger to public health or welfare of the United States;

(4) The release consists of a situation specified in § 300.400(b)(1) through (3) subject to limitations on response;

(5) The amount, quantity, or concentration released does not warrant federal response;

(6) A party responsible for the release, or any other person, is providing appropriate response, and on-scene monitoring by the government is not required; or

(7) The removal site evaluation is completed.

(g) The results of the removal site evaluation shall be documented.

(h) The OSC or lead agency shall ensure that natural resource trustees are promptly notified in order that they may initiate appropriate actions, including those identified in subpart G of this part. The OSC or lead agency shall coordinate all response activities with such affected trustees.

(i) If the removal site evaluation indicates that removal action under § 300.415 is not required, but that remedial action under § 300.430 may be necessary, the lead agency shall, as appropriate, initiate a remedial site evaluation pursuant to § 300.420.

[59 FR 47448, Sept. 15, 1994]

§ 300.415 Removal action.

(a)(1) In determining the appropriate extent of action to be taken in response to a given release, the lead agency shall first review the removal site evaluation, any information produced through a remedial site evaluation, if any has been done previously, and the current site conditions, to determine if removal action is appropriate.

(2) Where the responsible parties are known, an effort initially shall be made, to the extent practicable, to determine whether they can and will perform the necessary removal action promptly and properly.

(3) This section does not apply to removal actions taken pursuant to section 104(b) of CERCLA. The criteria for such actions are set forth in section 104(b) of CERCLA.

(b)(1) At any release, regardless of whether the site is included on the National Priorities List (NPL), where the lead agency makes the determination, based on the factors in paragraph (b)(2) of this section, that there is a threat to public health or welfare of the United States or the environment, the lead agency may take any appropriate removal action to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or the threat of release.

(2) The following factors shall be considered in determining the appropriateness of a removal action pursuant to this section:

(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;

(ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems;

(iii) Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release;

(iv) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;

(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

(vi) Threat of fire or explosion;

(vii) The availability of other appropriate federal or state response mechanisms to respond to the release; and

(viii) Other situations or factors that may pose threats to public health or welfare of the United States or the environment.

(3) If the lead agency determines that a removal action is appropriate, actions shall, as appropriate, begin as soon as possible to abate, prevent, minimize, stabilize, mitigate, or eliminate the threat to public health or welfare of the United States or the environment. The lead agency shall, at the earliest possible time, also make any necessary determinations pursuant to paragraph (b)(4) of this section.

(4) Whenever a planning period of at least six months exists before on-site activities must be initiated, and the lead agency determines, based on a site evaluation, that a removal action is appropriate:

(i) The lead agency shall conduct an engineering evaluation/cost analysis (EE/CA) or its equivalent. The EE/CA is an analysis of removal alternatives for a site.

(ii) If environmental samples are to be collected, the lead agency shall develop sampling and analysis plans that shall provide a process for obtaining data of sufficient quality and quantity to satisfy data needs. Sampling and analysis plans shall be reviewed and approved by EPA. The sampling and analysis plans shall consist of two parts:

(A) The field sampling plan, which describes the number, type, and location of samples and the type of analyses; and

(B) The quality assurance project plan, which describes policy, organization, and functional activities and the data quality objectives and measures necessary to achieve adequate data for use in planning and documenting the removal action.

(5) CERCLA fund-financed removal actions, other than those authorized under section 104(b) of CERCLA, shall be terminated after $2 million has been obligated for the action or 12 months have elapsed from the date that removal activities begin on-site, unless the lead agency determines that:

(i) There is an immediate risk to public health or welfare of the United States or the environment; continued response actions are immediately required to prevent, limit, or mitigate an emergency; and such assistance will not otherwise be provided on a timely basis; or

(ii) Continued response action is otherwise appropriate and consistent with the remedial action to be taken.

(c)(1) In carrying out a response to a release of a CWA hazardous substance, as described in CWA section 311(c)(1), as amended by OPA section 4201(a), the OSC may:

(i) Remove or arrange for the removal of a release, and mitigate or prevent a substantial threat of a release, at any time;

(ii) Direct or monitor all federal, state, and private actions to remove a release; and

(iii) Remove and, if necessary, destroy a vessel releasing or threatening to release CWA hazardous substances, by whatever means are available.

(2) If the investigation by the OSC under § 300.410 shows that the release of a CWA hazardous substance results in a substantial threat to public health or welfare of the United States, the OSC shall direct all federal, state, or private actions to remove the release or to mitigate or prevent the threat of such a release, as appropriate. In directing the response, the OSC may act without regard to any other provision of law governing contracting procedures or employment of personnel by the federal government to:

(i) Remove or arrange for the removal of the release;

(ii) Mitigate or prevent the substantial threat of the release; and

(iii) Remove and, if necessary, destroy a vessel releasing, or threatening to release, by whatever means are available.

(3) In the case of a release of a CWA hazardous substance posing a substantial threat to public health or welfare of the United States, the OSC shall:

(i) Assess opportunities for the use of various special teams and other assistance described in § 300.145, as appropriate;

(ii) Request immediate activation of the RRT; and

(iii) Take whatever additional response actions are deemed appropriate. When requested by the OSC, the lead agency or RRT shall dispatch appropriate personnel to the scene of the release to assist the OSC. This assistance may include technical support in the agency's areas of expertise and disseminating information to the public in accordance with § 300.155. The lead agency shall ensure that a contracting officer is available on-scene, at the request of the OSC.

(d) Removal actions shall, to the extent practicable, contribute to the efficient performance of any anticipated long-term remedial action with respect to the release concerned.

(e) The following removal actions are, as a general rule, appropriate in the types of situations shown; however, this list is not exhaustive and is not intended to prevent the lead agency from taking any other actions deemed necessary under CERCLA, CWA section 311, or other appropriate federal or state enforcement or response authorities, and the list does not create a duty on the lead agency to take action at any particular time:

(1) Fences, warning signs, or other security or site control precautions—where humans or animals have access to the release;

(2) Drainage controls, for example, run-off or run-on diversion—where needed to reduce migration of hazardous substances or pollutants or contaminants off-site or to prevent precipitation or run-off from other sources, for example, flooding, from entering the release area from other areas;

(3) Stabilization of berms, dikes, or impoundments or drainage or closing of lagoons—where needed to maintain the integrity of the structures;

(4) Capping of contaminated soils or sludges—where needed to reduce migration of hazardous substances or pollutants or contaminants into soil, ground or surface water, or air;

(5) Using chemicals and other materials to retard the spread of the release or to mitigate its effects—where the use of such chemicals will reduce the spread of the release;

(6) Excavation, consolidation, or removal of highly contaminated soils from drainage or other areas—where such actions will reduce the spread of, or direct contact with, the contamination;

(7) Removal of drums, barrels, tanks, or other bulk containers that contain or may contain hazardous substances or pollutants or contaminants—where it will reduce the likelihood of spillage; leakage; exposure to humans, animals, or food chain; or fire or explosion;

(8) Containment, treatment, disposal, or incineration of hazardous materials—where needed to reduce the likelihood of human, animal, or food chain exposure; or

(9) Provision of alternative water supply—where necessary immediately to reduce exposure to contaminated household water and continuing until such time as local authorities can satisfy the need for a permanent remedy.

(f) Where necessary to protect public health or welfare, the lead agency shall request that FEMA conduct a temporary relocation or that state/local officials conduct an evacuation.

(g) If the lead agency determines that the removal action will not fully address the threat posed by the release and the release may require remedial action, the lead agency shall ensure an orderly transition from removal to remedial response activities.

(h) CERCLA removal actions conducted by states under cooperative agreements, described in subpart F of this part, shall comply with all requirements of this section.

(i) Facilities operated by a state or political subdivision at the time of disposal require a state cost share of at least 50 percent of Fund-financed response costs if a Fund-financed remedial action is conducted.

(j) Fund-financed removal actions under CERCLA section 104 and removal actions pursuant to CERCLA section 106 shall, to the extent practicable considering the exigencies of the situation, attain applicable or relevant and appropriate requirements (ARARs) under federal environmental or state environmental or facility siting laws. Waivers described in § 300.430(f)(1)(ii)(C) may be used for removal actions. Other federal and state advisories, criteria, or guidance may, as appropriate, be considered in formulating the removal action (see § 300.400(g)(3)). In determining whether compliance with ARARs is practicable, the lead agency may consider appropriate factors, including:

(1) The urgency of the situation; and

(2) The scope of the removal action to be conducted.

(k) Removal actions pursuant to section 106 or 122 of CERCLA are not subject to the following requirements of this section:

(1) Section 300.415(a)(2) requirement to locate responsible parties and have them undertake the response;

(2) Section 300.415(b)(2)(vii) requirement to consider the availability of other appropriate federal or state response and enforcement mechanisms to respond to the release;

(3) Section 300.415(b)(5) requirement to terminate response after $2 million has been obligated or 12 months have elapsed from the date of the initial response; and

(4) Section 300.415(g) requirement to assure an orderly transition from removal to remedial action.

(l) To the extent practicable, provision for post-removal site control following a CERCLA Fund-financed removal action at both NPL and non-NPL sites is encouraged to be made prior to the initiation of the removal action. Such post-removal site control includes actions necessary to ensure the effectiveness and integrity of the removal action after the completion of the on-site removal action or after the $2 million or 12-month statutory limits are reached for sites that do not meet the exemption criteria in paragraph (b)(5) of this section. Post-removal site control may be conducted by:

(1) The affected state or political subdivision thereof or local units of government for any removal;

(2) Potentially responsible parties; or

(3) EPA's remedial program for some federal-lead Fund-financed responses at NPL sites.

(m) OSCs/RPMs conducting removal actions shall submit OSC reports to the RRT as required by § 300.165.

(n) *Community relations in removal actions.* (1) In the case of all CERCLA removal actions taken pursuant to § 300.415 or CERCLA enforcement actions to compel removal response, a spokesperson shall be designated by the lead agency. The spokesperson shall inform the community of actions taken, respond to inquiries, and provide information concerning the release. All news releases or statements made by participating agencies shall be coordinated with the OSC/RPM. The spokesperson shall notify, at a minimum, immediately affected citizens, state and local officials, and, when appropriate, civil defense or emergency management agencies.

(2) For CERCLA actions where, based on the site evaluation, the lead agency determines that a removal is appropriate, and that less than six months exists before on-site removal activity must begin, the lead agency shall:

(i) Publish a notice of availability of the administrative record file established pursuant to § 300.820 in a major local newspaper of general circulation or use one or more other mechanisms to give adequate notice to a community within 60 days of initiation of on-site removal activity;

(ii) Provide a public comment period, as appropriate, of not less than 30 days from the time the administrative record file is made available for public inspection, pursuant to § 300.820(b)(2); and

(iii) Prepare a written response to significant comments pursuant to § 300.820(b)(3).

(3) For CERCLA removal actions where on-site action is expected to extend beyond 120 days from the initiation of on-site removal activities, the lead agency shall by the end of the 120-day period:

(i) Conduct interviews with local officials, community residents, public interest groups, or other interested or affected parties, as appropriate, to solicit their concerns, information needs, and how or when citizens would like to be involved in the Superfund process;

(ii) Prepare a formal community relations plan (CRP) based on the community interviews and other relevant information, specifying the community relations activities that the lead agency expects to undertake during the response; and

(iii) Establish at least one local information repository at or near the location of the response action. The information repository should contain items made available for public information. Further, an administrative record file established pursuant to subpart I for all removal actions shall be available for public inspection in at least one of the repositories. The lead agency shall inform the public of the establishment of the information repository and provide notice of availability of the administrative record file for public review. All items in the repository shall be available for public inspection and copying.

(4) Where, based on the site evaluation, the lead agency determines that a CERCLA removal action is appropriate and that a planning period of at least six months exists prior to initiation of the on-site removal activities, the lead agency shall at a minimum:

(i) Comply with the requirements set forth in paragraphs (n)(3)(i), (ii), and (iii) of this section, prior to the completion of the EE/CA, or its equivalent, except that the information repository and the administrative record file will be established no later than when the EE/CA approval memorandum is signed;

(ii) Publish a notice of availability and brief description of the EE/CA in a major local newspaper of general circulation or use one or more other mechanisms to give adequate notice to a community pursuant to § 300.820;

(iii) Provide a reasonable opportunity, not less than 30 calendar days, for submission of written and oral comments after completion of the EE/CA pursuant to § 300.820(a). Upon timely request, the lead agency will extend the public comment period by a minimum of 15 days; and

(iv) Prepare a written response to significant comments pursuant to § 300.820(a).

[59 FR 47448, Sept. 15, 1994, as amended at 80 FR 17706, Apr. 2, 2015]

§ 300.420 Remedial site evaluation.

(a) *General.* The purpose of this section is to describe the methods, procedures, and criteria the lead agency shall use to collect data, as required, and evaluate releases of hazardous substances, pollutants, or contaminants. The evaluation may consist of two steps: a remedial preliminary assessment (PA) and a remedial site inspection (SI).

(b) *Remedial preliminary assessment.* (1) The lead agency shall perform a remedial PA on all sites entered into the SEMS remedial assessment active inventory as defined in § 300.5 to:

(i) Eliminate from further consideration those sites that pose no threat to public health or the environment;

(ii) Determine if there is any potential need for removal action;

(iii) Set priorities for site inspections; and

(iv) Gather existing data to facilitate later evaluation of the release pursuant to the Hazard Ranking System (HRS) if warranted.

(2) A remedial PA shall consist of a review of existing information about a release such as information on the pathways of exposure, exposure targets, and source and nature of release. A remedial PA shall also include an off-site reconnaissance as appropriate. A remedial PA may include an on-site reconnaissance where appropriate.

(3) If the remedial PA indicates that a removal action may be warranted, the lead agency shall initiate removal evaluation pursuant to § 300.410.

(4) In performing a remedial PA, the lead agency may complete the EPA Preliminary Assessment form, available from EPA regional offices, or its equivalent, and shall prepare a PA report, which shall include:

(i) A description of the release;

(ii) A description of the probable nature of the release; and

(iii) A recommendation on whether further action is warranted, which lead agency should conduct further action, and whether an SI or removal action or both should be undertaken.

(5) Any person may petition the lead federal agency (EPA or the appropriate federal agency in the case of a release or suspected release from a federal facility), to perform a PA of a release

when such person is, or may be, affected by a release of a hazardous substance, pollutant, or contaminant. Such petitions shall be addressed to the EPA Regional Administrator for the region in which the release is located, except that petitions for PAs involving federal facilities should be addressed to the head of the appropriate federal agency.

(i) Petitions shall be signed by the petitioner and shall contain the following:

(A) The full name, address, and phone number of petitioner;

(B) A description, as precisely as possible, of the location of the release; and

(C) How the petitioner is or may be affected by the release.

(ii) Petitions should also contain the following information to the extent available:

(A) What type of substances were or may be released;

(B) The nature of activities that have occurred where the release is located; and

(C) Whether local and state authorities have been contacted about the release.

(iii) The lead federal agency shall complete a remedial or removal PA within one year of the date of receipt of a complete petition pursuant to paragraph (b)(5) of this section, if one has not been performed previously, unless the lead federal agency determines that a PA is not appropriate. Where such a determination is made, the lead federal agency shall notify the petitioner and will provide a reason for the determination.

(iv) When determining if performance of a PA is appropriate, the lead federal agency shall take into consideration:

(A) Whether there is information indicating that a release has occurred or there is a threat of a release of a hazardous substance, pollutant, or contaminant; and

(B) Whether the release is eligible for response under CERCLA.

(c) *Remedial site inspection.* (1) The lead agency shall perform a remedial SI as appropriate to:

(i) Eliminate from further consideration those releases that pose no significant threat to public health or the environment;

(ii) Determine the potential need for removal action;

(iii) Collect or develop additional data, as appropriate, to evaluate the release pursuant to the HRS; and

(iv) Collect data in addition to that required to score the release pursuant to the HRS, as appropriate, to better characterize the release for more effective and rapid initiation of the RI/FS or response under other authorities.

(2) The remedial SI shall build upon the information collected in the remedial PA. The remedial SI shall involve, as appropriate, both on- and off-site field investigatory efforts, and sampling.

(3) If the remedial SI indicates that removal action may be appropriate, the lead agency shall initiate removal site evaluation pursuant to §300.410.

(4) Prior to conducting field sampling as part of site inspections, the lead agency shall develop sampling and analysis plans that shall provide a process for obtaining data of sufficient quality and quantity to satisfy data needs. The sampling and analysis plans shall consist of two parts:

(i) The field sampling plan, which describes the number, type, and location of samples, and the type of analyses, and

(ii) The quality assurance project plan (QAPP), which describes policy, organization, and functional activities, and the data quality objectives and measures necessary to achieve adequate data for use in site evaluation and hazard ranking system activities.

(5) Upon completion of a remedial SI, the lead agency shall prepare a report that includes the following:

(i) A description/history/nature of waste handling;

(ii) A description of known contaminants;

(iii) A description of pathways of migration of contaminants;

(iv) An identification and description of human and environmental targets; and

(v) A recommendation on whether further action is warranted.

[55 FR 8839, Mar. 8, 1990, as amended at 79 FR 65592, Nov. 5, 2014]

§ 300.425 Establishing remedial priorities.

(a) *General.* The purpose of this section is to identify the criteria as well as the methods and procedures EPA uses to establish its priorities for remedial actions.

(b) *National Priorities List.* The NPL is the list of priority releases for long-term remedial evaluation and response.

(1) Only those releases included on the NPL shall be considered eligible for Fund-financed remedial action. Removal actions (including remedial planning activities, RI/FSs, and other actions taken pursuant to CERCLA section 104(b)) are not limited to NPL sites.

(2) Inclusion of a release on the NPL does not imply that monies will be expended, nor does the rank of a release on the NPL establish the precise priorities for the allocation of Fund resources. EPA may also pursue other appropriate authorities to remedy the release, including enforcement actions under CERCLA and other laws. A site's rank on the NPL serves, along with other factors, including enforcement actions, as a basis to guide the allocation of Fund resources among releases.

(3) Federal facilities that meet the criteria identified in paragraph (c) of this section are eligible for inclusion on the NPL. Except as provided by CERCLA sections 111(e)(3) and 111(c), federal facilities are not eligible for Fund-financed remedial actions.

(4) Inclusion on the NPL is not a precondition to action by the lead agency under CERCLA sections 106 or 122 or to action under CERCLA section 107 for recovery of non-Fund-financed costs or Fund-financed costs other than Fund-financed remedial construction costs.

(c) *Methods for determining eligibility for NPL.* A release may be included on the NPL if the release meets one of the following criteria:

(1) The release scores sufficiently high pursuant to the Hazard Ranking System described in appendix A to this part.

(2) A state (not including Indian tribes) has designated a release as its highest priority. States may make only one such designation; or

(3) The release satisfies all of the following criteria:

(i) The Agency for Toxic Substances and Disease Registry has issued a health advisory that recommends dissociation of individuals from the release;

(ii) EPA determines that the release poses a significant threat to public health; and

(iii) EPA anticipates that it will be more cost-effective to use its remedial authority than to use removal authority to respond to the release.

(d) *Procedures for placing sites on the NPL.* Lead agencies may submit candidates to EPA by scoring the release using the HRS and providing the appropriate backup documentation.

(1) Lead agencies may submit HRS scoring packages to EPA anytime throughout the year.

(2) EPA shall review lead agencies' HRS scoring packages and revise them as appropriate. EPA shall develop any additional HRS scoring packages on releases known to EPA.

(3) EPA shall compile the NPL based on the methods identified in paragraph (c) of this section.

(4) EPA shall update the NPL at least once a year.

(5) To ensure public involvement during the proposal to add a release to the NPL, EPA shall:

(i) Publish the proposed rule in the FEDERAL REGISTER and solicit comments through a public comment period; and

(ii) Publish the final rule in the FEDERAL REGISTER, and make available a response to each significant comment and any significant new data submitted during the comment period.

(6) Releases may be categorized on the NPL when deemed appropriate by EPA.

(e) *Deletion from the NPL.* Releases may be deleted from or recategorized on the NPL where no further response is appropriate.

(1) EPA shall consult with the state on proposed deletions from the NPL prior to developing the notice of intent to delete. In making a determination to delete a release from the NPL, EPA shall consider, in consultation with the state, whether any of the following criteria has been met:

(i) Responsible parties or other persons have implemented all appropriate response actions required;

(ii) All appropriate Fund-financed response under CERCLA has been implemented, and no further response action by responsible parties is appropriate; or

(iii) The remedial investigation has shown that the release poses no significant threat to public health or the environment and, therefore, taking of remedial measures is not appropriate.

(2) Releases shall not be deleted from the NPL until the state in which the release was located has concurred on the proposed deletion. EPA shall provide the state 30 working days for review of the deletion notice prior to its publication in the FEDERAL REGISTER.

(3) All releases deleted from the NPL are eligible for further Fund-financed remedial actions should future conditions warrant such action. Whenever there is a significant release from a site deleted from the NPL, the site shall be restored to the NPL without application of the HRS.

(4) To ensure public involvement during the proposal to delete a release from the NPL, EPA shall:

(i) Publish a notice of intent to delete in the FEDERAL REGISTER and solicit comment through a public comment period of a minimum of 30 calendar days;

(ii) In a major local newspaper of general circulation at or near the release that is proposed for deletion, publish a notice of availability or use one or more other mechanisms to give adequate notice to a community of the intent to delete;

(iii) Place copies of information supporting the proposed deletion in the information repository, described in §300.430(c)(2)(iii), at or near the release proposed for deletion. These items shall be available for public inspection and copying; and

(iv) Respond to each significant comment and any significant new data submitted during the comment period and include this response document in the final deletion package.

(5) EPA shall place the final deletion package in the local information repository once the notice of final deletion has been published in the FEDERAL REGISTER.

[55 FR 8839, Mar. 8, 1990, as amended at 80 FR 17706, Apr. 2, 2015]

§ 300.430 Remedial investigation/feasibility study and selection of remedy.

(a) *General*—(1) *Introduction*. The purpose of the remedy selection process is to implement remedies that eliminate, reduce, or control risks to human health and the environment. Remedial actions are to be implemented as soon as site data and information make it possible to do so. Accordingly, EPA has established the following program goal, expectations, and program management principles to assist in the identification and implementation of appropriate remedial actions.

(i) *Program goal*. The national goal of the remedy selection process is to select remedies that are protective of human health and the environment, that maintain protection over time, and that minimize untreated waste.

(ii) *Program management principles*. EPA generally shall consider the following general principles of program management during the remedial process:

(A) Sites should generally be remediated in operable units when early actions are necessary or appropriate to achieve significant risk reduction quickly, when phased analysis and response is necessary or appropriate given the size or complexity of the site, or to expedite the completion of total site cleanup.

(B) Operable units, including interim action operable units, should not be inconsistent with nor preclude implementation of the expected final remedy.

(C) Site-specific data needs, the evaluation of alternatives, and the documentation of the selected remedy should reflect the scope and complexity of the site problems being addressed.

(iii) *Expectations*. EPA generally shall consider the following expectations in developing appropriate remedial alternatives:

(A) EPA expects to use treatment to address the principal threats posed by a site, wherever practicable. Principal threats for which treatment is most likely to be appropriate include liquids, areas contaminated with high concentrations of toxic compounds, and highly mobile materials.

(B) EPA expects to use engineering controls, such as containment, for waste that poses a relatively low long-term threat or where treatment is impracticable.

(C) EPA expects to use a combination of methods, as appropriate, to achieve protection of human health and the environment. In appropriate site situations, treatment of the principal threats posed by a site, with priority placed on treating waste that is liquid, highly toxic or highly mobile, will be combined with engineering controls (such as containment) and institutional controls, as appropriate, for treatment residuals and untreated waste.

(D) EPA expects to use institutional controls such as water use and deed restrictions to supplement engineering controls as appropriate for short- and long-term management to prevent or limit exposure to hazardous substances, pollutants, or contaminants. Institutional controls may be used during the conduct of the remedial investigation/feasibility study (RI/FS) and implementation of the remedial action and, where necessary, as a component of the completed remedy. The use of institutional controls shall not substitute for active response measures (e.g., treatment and/or containment of source material, restoration of ground waters to their beneficial uses) as the sole remedy unless such active measures are determined not to be practicable, based on the balancing of trade-offs among alternatives that is conducted during the selection of remedy.

(E) EPA expects to consider using innovative technology when such technology offers the potential for comparable or superior treatment performance or implementability, fewer or lesser adverse impacts than other available approaches, or lower costs for similar levels of performance than demonstrated technologies.

(F) EPA expects to return usable ground waters to their beneficial uses wherever practicable, within a timeframe that is reasonable given the particular circumstances of the site. When restoration of ground water to beneficial uses is not practicable, EPA expects to prevent further migration of the plume, prevent exposure to the contaminated ground water, and evaluate further risk reduction.

(2) *Remedial investigation/feasibility study*. The purpose of the remedial investigation/feasibility study (RI/FS) is to assess site conditions and evaluate alternatives to the extent necessary to select a remedy. Developing and conducting an RI/FS generally includes the following activities: project scoping, data collection, risk assessment, treatability studies, and analysis of alternatives. The scope and timing of these activities should be tailored to the nature and complexity of the problem and the response alternatives being considered.

(b) *Scoping*. In implementing this section, the lead agency should consider the program goal, program management principles, and expectations contained in this rule. The investigative and analytical studies should be tailored to site circumstances so that the scope and detail of the analysis is appropriate to the complexity of site problems being addressed. During scoping, the lead and support agencies shall confer to identify the optimal set and sequence of actions necessary to address site problems. Specifically, the lead agency shall:

(1) Assemble and evaluate existing data on the site, including the results of any removal actions, remedial preliminary assessment and site inspections, and the NPL listing process.

(2) Develop a conceptual understanding of the site based on the evaluation of existing data described in paragraph (b)(1) of this section.

(3) Identify likely response scenarios and potentially applicable technologies and operable units that may address site problems.

(4) Undertake limited data collection efforts or studies where this information will assist in scoping the RI/FS or accelerate response actions, and begin to identify the need for treatability studies, as appropriate.

(5) Identify the type, quality, and quantity of the data that will be collected during the RI/FS to support decisions regarding remedial response activities.

(6) Prepare site-specific health and safety plans that shall specify, at a minimum, employee training and protective equipment, medical surveillance requirements, standard operating procedures, and a contingency plan that conforms with 29 CFR 1910.120 (l)(1) and (l)(2).

(7) If natural resources are or may be injured by the release, ensure that state and federal trustees of the affected natural resources have been notified in order that the trustees may initiate appropriate actions, including those identified in subpart G of this part. The lead agency shall seek to coordinate necessary assessments, evaluations, investigations, and planning with such state and federal trustees.

(8) Develop sampling and analysis plans that shall provide a process for obtaining data of sufficient quality and quantity to satisfy data needs. Sampling and analysis plans shall be reviewed and approved by EPA. The sampling and analysis plans shall consist of two parts:

(i) The field sampling plan, which describes the number, type, and location of samples and the type of analyses; and

(ii) The quality assurance project plan, which describes policy, organization, and functional activities and the data quality objectives and measures necessary to achieve adequate data for use in selecting the appropriate remedy.

(9) Initiate the identification of potential federal and state ARARs and, as appropriate, other criteria, advisories, or guidance to be considered.

(c) *Community relations.* (1) The community relations requirements described in this section apply to all remedial activities undertaken pursuant to CERCLA section 104 and to section 106 or section 122 consent orders or decrees, or section 106 administrative orders.

(2) The lead agency shall provide for the conduct of the following community relations activities, to the extent practicable, prior to commencing field work for the remedial investigation:

(i) Conducting interviews with local officials, community residents, public interest groups, or other interested or affected parties, as appropriate, to solicit their concerns and information needs, and to learn how and when citizens would like to be involved in the Superfund process.

(ii) Preparing a formal community relations plan (CRP), based on the community interviews and other relevant information, specifying the community relations activities that the lead agency expects to undertake during the remedial response. The purpose of the CRP is to:

(A) Ensure the public appropriate opportunities for involvement in a wide variety of site-related decisions, including site analysis and characterization, alternatives analysis, and selection of remedy;

(B) Determine, based on community interviews, appropriate activities to ensure such public involvement, and

(C) Provide appropriate opportunities for the community to learn about the site.

(iii) Establishing at least one local information repository at or near the location of the response action. Each information repository should contain a copy of items made available to the public, including information that describes the technical assistance grants application process. The lead agency shall inform interested parties of the establishment of the information repository.

(iv) Informing the community of the availability of technical assistance grants.

(3) For PRP actions, the lead agency shall plan and implement the community relations program at a site. PRPs may participate in aspects of the community relations program at the discretion of and with oversight by the lead agency.

(4) The lead agency may conduct technical discussions involving PRPs and the public. These technical discussions may be held separately from, but contemporaneously with, the negotiations/settlement discussions.

(5) In addition, the following provisions specifically apply to enforcement actions:

(i) Lead agencies entering into an enforcement agreement with de minimis parties under CERCLA section 122(g) or cost recovery settlements under section 122(h) shall publish a notice of the proposed agreement in the FEDERAL REGISTER at least 30 days before the agreement becomes final, as required by section 122(i). The notice must identify the name of the facility and the parties to the proposed agreement and must allow an opportunity for comment and consideration of comments; and

(ii) Where the enforcement agreement is embodied in a consent decree, public notice and opportunity for public comment shall be provided in accordance with 28 CFR 50.7.

(d) *Remedial investigation.* (1) The purpose of the remedial investigation (RI) is to collect data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives. To characterize the site, the lead agency shall, as appropriate, conduct field investigations, including treatability studies, and conduct a baseline risk assessment. The RI provides information to assess the risks to human health and the environment and to support the development, evaluation, and selection of appropriate response alternatives. Site characterization may be conducted in one or more phases to focus sampling efforts and increase the efficiency of the investigation. Because estimates of actual or potential exposures and associated impacts on human and environmental receptors may be refined throughout the phases of the RI as new information is obtained, site characterization activities should be fully integrated with the development and evaluation of alternatives in the feasibility study. Bench- or pilot-scale treatability studies shall be conducted, when appropriate and practicable, to provide additional data for the detailed analysis and to support engineering design of remedial alternatives.

(2) The lead agency shall characterize the nature of and threat posed by the hazardous substances and hazardous materials and gather data necessary to assess the extent to which the release poses a threat to human health or the environment or to support the analysis and design of potential response actions by conducting, as appropriate, field investigations to assess the following factors:

(i) Physical characteristics of the site, including important surface features, soils, geology, hydrogeology, meteorology, and ecology;

(ii) Characteristics or classifications of air, surface water, and ground water;

(iii) The general characteristics of the waste, including quantities, state, concentration, toxicity, propensity to bioaccumulate, persistence, and mobility;

(iv) The extent to which the source can be adequately identified and characterized;

(v) Actual and potential exposure pathways through environmental media;

(vi) Actual and potential exposure routes, for example, inhalation and ingestion; and

(vii) Other factors, such as sensitive populations, that pertain to the characterization of the site or support the analysis of potential remedial action alternatives.

(3) The lead and support agency shall identify their respective potential ARARs related to the location of and contaminants at the site in a timely manner. The lead and support agencies may also, as appropriate, identify other pertinent advisories, criteria, or guidance in a timely manner (see § 300.400(g)(3)).

(4) Using the data developed under paragraphs (d)(1) and (2) of this section, the lead agency shall conduct a site-specific baseline risk assessment to characterize the current and potential threats to human health and the environment that may be posed by contaminants migrating to ground water or surface water, releasing to air, leaching through soil, remaining in the soil, and bioaccumulating in the food chain. The results of the baseline risk assessment will help establish acceptable exposure levels for use in developing remedial alternatives in the FS, as described in paragraph (e) of this section.

(e) *Feasibility study.* (1) The primary objective of the feasibility study (FS) is to ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy selected. The lead agency may develop a feasibility study to address a specific site problem or the entire site. The development and evaluation of alternatives shall reflect the scope and complexity of the remedial action under consideration and the site problems being addressed. Development of alternatives shall be fully integrated with the site characterization activities of the remedial investigation described in paragraph (d) of this section. The lead agency shall include an alternatives screening step, when needed, to select a reasonable number of alternatives for detailed analysis.

(2) Alternatives shall be developed that protect human health and the environment by recycling waste or by eliminating, reducing, and/or controlling risks posed through each pathway by a site. The number and type of alternatives to be analyzed shall be determined at each site, taking into account the scope, characteristics, and complexity of the site problem that is being addressed. In developing and, as appropriate, screening the alternatives, the lead agency shall:

(i) Establish remedial action objectives specifying contaminants and media of concern, potential exposure pathways, and remediation goals. Initially, preliminary remediation goals are developed based on readily available information, such as chemical-specific ARARs or other reliable information. Preliminary remediation goals should be modified, as necessary, as more information becomes available during the RI/FS. Final remediation goals will be determined when the remedy is selected. Remediation goals shall establish acceptable exposure levels that are protective of human health and the environment and shall be developed by considering the following:

(A) Applicable or relevant and appropriate requirements under federal environmental or state environmental or facility siting laws, if available, and the following factors:

(*1*) For systemic toxicants, acceptable exposure levels shall represent concentration levels to which the human population, including sensitive subgroups, may be exposed without adverse effect during a lifetime or part of a lifetime, incorporating an adequate margin of safety;

(*2*) For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} using information on the relationship between dose and response. The 10^{-6} risk level shall be used as the point of departure for determining remediation goals for alternatives when ARARs are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure;

(*3*) Factors related to technical limitations such as detection/quantification limits for contaminants;

(*4*) Factors related to uncertainty; and

(*5*) Other pertinent information.

(B) Maximum contaminant level goals (MCLGs), established under the Safe Drinking Water Act, that are set at levels above zero, shall be attained by remedial actions for ground or surface waters that are current or potential sources of drinking water, where the MCLGs are relevant and appropriate under the circumstances of the release based on the factors in § 300.400(g)(2). If an MCLG is determined not to be relevant and appropriate, the corresponding maximum contaminant level (MCL) shall be attained where relevant and appropriate to the circumstances of the release.

(C) Where the MCLG for a contaminant has been set at a level of zero, the MCL promulgated for that contaminant under the Safe Drinking Water Act shall be attained by remedial actions for ground or surface waters that are current or potential sources of drinking water, where the MCL is relevant and appropriate under the circumstances of the release based on the factors in § 300.400(g)(2).

(D) In cases involving multiple contaminants or pathways where attainment of chemical-specific ARARs will result in cumulative risk in excess of 10^{-4}, criteria in paragraph (e)(2)(i)(A) of this section may also be considered when determining the cleanup level to be attained.

(E) Water quality criteria established under sections 303 or 304 of the Clean Water Act shall be attained where relevant and appropriate under the circumstances of the release.

(F) An alternate concentration limit (ACL) may be established in accordance with CERCLA section 121(d)(2)(B)(ii).

(G) Environmental evaluations shall be performed to assess threats to the environment, especially sensitive habitats and critical habitats of species protected under the Endangered Species Act.

(ii) Identify and evaluate potentially suitable technologies, including innovative technologies;

(iii) Assemble suitable technologies into alternative remedial actions.

(3) For source control actions, the lead agency shall develop, as appropriate:

(i) A range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances, pollutants, or contaminants is a principal element. As appropriate, this range shall include an alternative that removes or destroys hazardous substances, pollutants, or contaminants to the maximum extent feasible, eliminating or minimizing, to the degree possible, the need for long-term management. The lead agency also shall develop, as appropriate, other alternatives which, at a minimum, treat the principal threats posed by the site but vary in the degree of treatment employed and the quantities and characteristics of the treatment residuals and untreated waste that must be managed; and

(ii) One or more alternatives that involve little or no treatment, but provide protection of human health and the environment primarily by preventing or controlling exposure to hazardous substances, pollutants, or contaminants, through engineering controls, for example, containment, and, as necessary, institutional controls to protect human health and the environment and to assure continued effectiveness of the response action.

(4) For ground-water response actions, the lead agency shall develop a limited number of remedial alternatives that attain site-specific remediation levels within different restoration time periods utilizing one or more different technologies.

(5) The lead agency shall develop one or more innovative treatment technologies for further consideration if those technologies offer the potential for comparable or superior performance or implementability; fewer or lesser adverse impacts than other available approaches; or lower costs for similar levels of performance than demonstrated treatment technologies.

(6) The no-action alternative, which may be no further action if some removal or remedial action has already occurred at the site, shall be developed.

(7) As appropriate, and to the extent sufficient information is available, the short- and long-term aspects of the following three criteria shall be used to guide the development and screening of remedial alternatives:

(i) *Effectiveness.* This criterion focuses on the degree to which an alternative reduces toxicity, mobility, or volume through treatment, minimizes residual risks and affords long-term protection, complies with ARARs, minimizes short-term impacts, and how quickly it achieves protection. Alternatives providing significantly less effectiveness than other, more promising alternatives may be eliminated. Alternatives that do not provide adequate protection of human health and the environment shall be eliminated from further consideration.

(ii) *Implementability.* This criterion focuses on the technical feasibility and availability of the technologies each alternative would employ and the administrative feasibility of implementing the alternative. Alternatives that are technically or administratively infeasible or that would require equipment, specialists, or facilities that are not available within a reasonable period of time may be eliminated from further consideration.

(iii) *Cost.* The costs of construction and any long-term costs to operate and maintain the alternatives shall be considered. Costs that are grossly excessive compared to the overall effectiveness of alternatives may be considered as one of several factors used to eliminate alternatives. Alternatives providing effectiveness and implementability similar to that of another alternative by employing a similar method of treatment or engineering control, but at greater cost, may be eliminated.

(8) The lead agency shall notify the support agency of the alternatives that will be evaluated in detail to facilitate the identification of ARARs and, as appropriate, pertinent advisories, criteria, or guidance to be considered.

(9) *Detailed analysis of alternatives.* (i) A detailed analysis shall be conducted on the limited number of alternatives that represent viable approaches to remedial action after evaluation in the screening stage. The lead and support agencies must identify their ARARs related to specific actions in a timely manner and no later than the early stages of the comparative analysis. The lead and support agencies may also, as appropriate, identify other pertinent advisories, criteria, or guidance in a timely manner.

(ii) The detailed analysis consists of an assessment of individual alternatives against each of nine evaluation criteria and a comparative analysis that focuses upon the relative performance of each alternative against those criteria.

(iii) *Nine criteria for evaluation.* The analysis of alternatives under review shall reflect the scope and complexity of site problems and alternatives being evaluated and consider the relative significance of the factors within each criteria. The nine evaluation criteria are as follows:

(A) *Overall protection of human health and the environment.* Alternatives shall be assessed to determine whether they can adequately protect human health and the environment, in both the short- and long-term, from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site by eliminating, reducing, or controlling exposures to levels established during development of remediation goals consistent with §300.430(e)(2)(i). Overall protection of human health and the environment draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

(B) *Compliance with ARARs.* The alternatives shall be assessed to determine whether they attain applicable or relevant and appropriate requirements under federal environmental laws and state environmental or facility siting laws or provide grounds for invoking one of the waivers under paragraph (f)(1)(ii)(C) of this section.

(C) *Long-term effectiveness and permanence.* Alternatives shall be assessed for the long-term effectiveness and permanence they afford, along with the degree of certainty that the alternative will prove successful. Factors that shall be considered, as appropriate, include the following:

(*1*) Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities. The characteristics of the residuals should be considered to the degree that they remain hazardous, taking into account their volume, toxicity, mobility, and propensity to bioaccumulate.

(*2*) Adequacy and reliability of controls such as containment systems and institutional controls that are necessary to manage treatment residuals and untreated waste. This factor addresses in particular the uncertainties associated with land disposal for providing long-term protection from residuals; the assessment of the potential need to replace technical components of the alternative, such as a cap, a slurry wall, or a treatment system; and the potential exposure pathways and risks posed should the remedial action need replacement.

(D) *Reduction of toxicity, mobility, or volume through treatment.* The degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume shall be assessed, including how treatment is used to address the principal threats posed by the site. Factors that shall be considered, as appropriate, include the following:

(*1*) The treatment or recycling processes the alternatives employ and materials they will treat;

(*2*) The amount of hazardous substances, pollutants, or contaminants that will be destroyed, treated, or recycled;

(*3*) The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment or recycling and the specification of which reduction(s) are occurring;

(*4*) The degree to which the treatment is irreversible;

(*5*) The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents; and

(*6*) The degree to which treatment reduces the inherent hazards posed by principal threats at the site.

(E) *Short-term effectiveness.* The short-term impacts of alternatives shall be assessed considering the following:

(*1*) Short-term risks that might be posed to the community during implementation of an alternative;

(*2*) Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures;

(*3*) Potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation; and

(*4*) Time until protection is achieved.

(F) *Implementability.* The ease or difficulty of implementing the alternatives shall be assessed by considering the following types of factors as appropriate:

(*1*) Technical feasibility, including technical difficulties and unknowns associated with the construction and operation of a technology, the reliability of the technology, ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of the remedy.

(*2*) Administrative feasibility, including activities needed to coordinate with other offices and agencies and the ability and time required to obtain any necessary approvals and permits from other agencies (for off-site actions);

(*3*) Availability of services and materials, including the availability of adequate off-site treatment, storage capacity, and disposal capacity and services; the availability of necessary equipment and specialists, and provisions to ensure any necessary additional resources; the availability of services and materials; and availability of prospective technologies.

(G) *Cost.* The types of costs that shall be assessed include the following:

(*1*) Capital costs, including both direct and indirect costs;

(*2*) Annual operation and maintenance costs; and

(*3*) Net present value of capital and O&M costs.

(H) *State acceptance.* Assessment of state concerns may not be completed until comments on the RI/FS are received but may be discussed, to the extent possible, in the proposed plan issued for public comment. The state concerns that shall be assessed include the following:

(*1*) The state's position and key concerns related to the preferred alternative and other alternatives; and

(*2*) State comments on ARARs or the proposed use of waivers.

(I) *Community acceptance.* This assessment includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose. This assessment may not be completed until comments on the proposed plan are received.

(f) *Selection of remedy*—(1) Remedies selected shall reflect the scope and purpose of the actions being undertaken and how the action relates to long-term, comprehensive response at the site.

(i) The criteria noted in paragraph (e)(9)(iii) of this section are used to select a remedy. These criteria are categorized into three groups.

(A) *Threshold criteria.* Overall protection of human health and the environment and compliance with ARARs (unless a specific ARAR is waived) are threshold requirements that each alternative must meet in order to be eligible for selection.

(B) *Primary balancing criteria.* The five primary balancing criteria are long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost.

(C) *Modifying criteria.* State and community acceptance are modifying criteria that shall be considered in remedy selection.

(ii) The selection of a remedial action is a two-step process and shall proceed in accordance with § 300.515(e). First, the lead agency, in conjunction with the support agency, identifies a preferred alternative and presents it to the public in a proposed plan, for review and comment. Second, the lead agency shall review the public comments and consult with the state (or support agency) in order to determine if the alternative remains the most appropriate remedial action for the site or site problem. The lead agency, as specified in § 300.515(e), makes the final remedy selection decision, which shall be documented in the ROD. Each remedial alternative selected as a Superfund remedy will employ the criteria as indicated in paragraph (f)(1)(i) of this section to make the following determination:

(A) Each remedial action selected shall be protective of human health and the environment.

(B) On-site remedial actions selected in a ROD must attain those ARARs that are identified at the time of ROD signature or provide grounds for invoking a waiver under § 300.430(f)(1)(ii)(C).

(*1*) Requirements that are promulgated or modified after ROD signature must be attained (or waived) only when determined to be applicable or relevant and appropriate and necessary to ensure that the remedy is protective of human health and the environment.

(*2*) Components of the remedy not described in the ROD must attain (or waive) requirements that are identified as applicable or relevant and appropriate at the time the amendment to the ROD or the explanation of significant difference describing the component is signed.

(C) An alternative that does not meet an ARAR under federal environmental or state environmental or facility siting laws may be selected under the following circumstances:

(*1*) The alternative is an interim measure and will become part of a total remedial action that will attain the applicable or relevant and appropriate federal or state requirement;

(*2*) Compliance with the requirement will result in greater risk to human health and the environment than other alternatives;

(*3*) Compliance with the requirement is technically impracticable from an engineering perspective;

(*4*) The alternative will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, or limitation through use of another method or approach;

(*5*) With respect to a state requirement, the state has not consistently applied, or demonstrated the intention to consistently apply, the promulgated requirement in similar circumstances at other remedial actions within the state; or

(*6*) For Fund-financed response actions only, an alternative that attains the ARAR will not provide a balance between the need for protection of human health and the environment at the site and the availability of Fund monies to respond to other sites that may present a threat to human health and the environment.

(D) Each remedial action selected shall be cost-effective, provided that it first satisfies the threshold criteria set forth in § 300.430(f)(1)(ii)(A) and (B). Cost-effectiveness is determined by evaluating the following three of the five balancing criteria noted in § 300.430(f)(1)(i)(B) to determine overall effectiveness: long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost-effective. A remedy shall be cost-effective if its costs are proportional to its overall effectiveness.

(E) Each remedial action shall utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This requirement shall be fulfilled by selecting the alternative that satisfies paragraph (f)(1)(ii)(A) and (B) of this section and provides the best balance of trade-offs among alternatives in terms of the five primary balancing criteria noted in paragraph (f)(1)(i)(B) of this section. The balancing shall emphasize long-term effectiveness and reduction of toxicity, mobility, or volume through treatment. The balancing shall also consider the preference for treatment as a principal element and the bias against off-site land disposal of untreated waste. In making the determination under this paragraph, the modifying criteria of state acceptance and community acceptance described in paragraph (f)(1)(i)(C) of this section shall also be considered.

(2) *The proposed plan.* In the first step in the remedy selection process, the lead agency shall identify the alternative that best meets the requirements in §300.430(f)(1), above, and shall present that alternative to the public in a proposed plan. The lead agency, in conjunction with the support agency and consistent with §300.515(e), shall prepare a proposed plan that briefly describes the remedial alternatives analyzed by the lead agency, proposes a preferred remedial action alternative, and summarizes the information relied upon to select the preferred alternative. The selection of remedy process for an operable unit may be initiated at any time during the remedial action process. The purpose of the proposed plan is to supplement the RI/FS and provide the public with a reasonable opportunity to comment on the preferred alternative for remedial action, as well as alternative plans under consideration, and to participate in the selection of remedial action at a site. At a minimum, the proposed plan shall:

(i) Provide a brief summary description of the remedial alternatives evaluated in the detailed analysis established under paragraph (e)(9) of this section;

(ii) Identify and provide a discussion of the rationale that supports the preferred alternative;

(iii) Provide a summary of any formal comments received from the support agency; and

(iv) Provide a summary explanation of any proposed waiver identified under paragraph (f)(1)(ii)(C) of this section from an ARAR.

(3) *Community relations to support the selection of remedy.* (i) The lead agency, after preparation of the proposed plan and review by the support agency, shall conduct the following activities:

(A) Publish a notice of availability and brief analysis of the proposed plan in a major local newspaper of general circulation;

(B) Make the proposed plan and supporting analysis and information available in the administrative record required under subpart I of this part;

(C) Provide a reasonable opportunity, not less than 30 calendar days, for submission of written and oral comments on the proposed plan and the supporting analysis and information located in the information repository, including the RI/FS. Upon timely request, the lead agency will extend the public comment period by a minimum of 30 additional days;

(D) Provide the opportunity for a public meeting to be held during the public comment period at or near the site at issue regarding the proposed plan and the supporting analysis and information;

(E) Keep a transcript of the public meeting held during the public comment period pursuant to CERCLA section 117(a) and make such transcript available to the public; and

(F) Prepare a written summary of significant comments, criticisms, and new relevant information submitted during the public comment period and the lead agency response to each issue. This responsiveness summary shall be made available with the record of decision.

(ii) After publication of the proposed plan and prior to adoption of the selected remedy in the record of decision, if new information is made available that significantly changes the basic features of the remedy with respect to scope, performance, or cost, such that the remedy significantly differs from the original proposal in the proposed plan and the supporting analysis and information, the lead agency shall:

(A) Include a discussion in the record of decision of the significant changes and reasons for such changes, if the lead agency determines such changes could be reasonably anticipated by the public based on the alternatives and other information available in the proposed plan or the supporting analysis and information in the administrative record; or

(B) Seek additional public comment on a revised proposed plan, when the lead agency determines the change could not have been reasonably anticipated by the public based on the information available in the proposed plan or the supporting analysis and information in the administrative record. The lead agency shall, prior to adoption of the selected remedy in the ROD, issue a revised proposed plan, which shall include a discussion of the significant changes and the reasons for such changes, in accordance with the public participation requirements described in paragraph (f)(3)(i) of this section.

(4) *Final remedy selection.* (i) In the second and final step in the remedy selection process, the lead agency shall reassess its initial determination that the preferred alternative provides the best balance of trade-offs, now factoring in any new information or points of view expressed by the state (or support agency) and community during the public comment period. The lead agency shall consider state (or support agency) and community comments regarding the lead agency's evaluation of alternatives with respect to the other criteria. These comments may prompt the lead agency to modify aspects of the preferred alternative or decide that another alternative provides a more appropriate balance. The lead agency, as specified in §300.515(e), shall make the final remedy selection decision and document that decision in the ROD.

(ii) If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.

(iii) The process for selection of a remedial action at a federal facility on the NPL, pursuant to CERCLA section 120, shall entail:

(A) Joint selection of remedial action by the head of the relevant department, agency, or instrumentality and EPA; or

(B) If mutual agreement on the remedy is not reached, selection of the remedy is made by EPA.

(5) *Documenting the decision.* (i) To support the selection of a remedial action, all facts, analyses of facts, and site-specific policy determinations considered in the course of carrying out activities in this section shall be documented, as appropriate, in a record of decision, in a level of detail appropriate to the site situation, for inclusion in the administrative record required under subpart I of this part. Documentation shall explain how the evaluation criteria in paragraph (e)(9)(iii) of this section were used to select the remedy.

(ii) The ROD shall describe the following statutory requirements as they relate to the scope and objectives of the action:

(A) How the selected remedy is protective of human health and the environment, explaining how the remedy eliminates, reduces, or controls exposures to human and environmental receptors;

(B) The federal and state requirements that are applicable or relevant and appropriate to the site that the remedy will attain;

(C) The applicable or relevant and appropriate requirements of other federal and state laws that the remedy will not meet, the waiver invoked, and the justification for invoking the waiver;

(D) How the remedy is cost-effective, *i.e.*, explaining how the remedy provides overall effectiveness proportional to its costs;

(E) How the remedy utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and

(F) Whether the preference for remedies employing treatment which permanently and significantly reduces the toxicity, mobility, or volume of the hazardous substances, pollutants, or contaminants as a principal element is or is not satisfied by the selected remedy. If this preference is not satisfied, the record of decision must explain why a remedial action involving such reductions in toxicity, mobility, or volume was not selected.

(iii) The ROD also shall:

(A) Indicate, as appropriate, the remediation goals, discussed in paragraph (e)(2)(i) of this section, that the remedy is expected to achieve. Performance shall be measured at appropriate locations in the ground water, surface water, soils, air, and other affected environmental media. Measurement relating to the performance of the treatment processes and the engineering controls may also be identified, as appropriate;

(B) Discuss significant changes and the response to comments described in paragraph (f)(3)(i)(F) of this section;

(C) Describe whether hazardous substances, pollutants, or contaminants will remain at the site such that a review of the remedial action under paragraph (f)(4)(ii) of this section no less often than every five years shall be required; and

(D) When appropriate, provide a commitment for further analysis and selection of long-term response measures within an appropriate time-frame.

(6) *Community relations when the record of decision is signed.* After the ROD is signed, the lead agency shall:

(i) Publish a notice of the availability of the ROD in a major local newspaper of general circulation; and

(ii) Make the record of decision available for public inspection and copying at or near the facility at issue prior to the commencement of any remedial action.

§ 300.435 Remedial design/remedial action, operation and maintenance.

(a) *General.* The remedial design/remedial action (RD/RA) stage includes the development of the actual design of the selected remedy and implementation of the remedy through construction. A period of operation and maintenance may follow the RA activities.

(b) *RD/RA activities.* (1) All RD/RA activities shall be in conformance with the remedy selected and set forth in the ROD or other decision document for that site. Those portions of RD/RA sampling and analysis plans describing the QA/QC requirements for chemical and analytical testing and sampling procedures of samples taken for the purpose of determining whether cleanup action levels specified in the ROD are achieved, generally will be consistent with the requirements of § 300.430(b)(8).

(2) During the course of the RD/RA, the lead agency shall be responsible for ensuring that all federal and state requirements that are identified in the ROD as applicable or relevant and appropriate requirements for the action are met. If waivers from any ARARs are involved, the lead agency shall be responsible for ensuring that the conditions of the waivers are met.

(c) *Community relations.* (1) Prior to the initiation of RD, the lead agency shall review the CRP to determine whether it should be revised to describe further public involvement activities during RD/RA that are not already addressed or provided for in the CRP.

(2) After the adoption of the ROD, if the remedial action or enforcement action taken, or the settlement or consent decree entered into, differs significantly from the remedy selected in the ROD with respect to scope, performance, or cost, the lead agency shall consult with the support agency, as appropriate, and shall either:

(i) Publish an explanation of significant differences when the differences in the remedial or enforcement action, settlement, or consent decree significantly change but do not fundamentally alter the remedy selected in the ROD with respect to scope, performance, or cost. To issue an explanation of significant differences, the lead agency shall:

(A) Make the explanation of significant differences and supporting information available to the public in the administrative record established under § 300.815 and the information repository; and

(B) Publish a notice that briefly summarizes the explanation of significant differences, including the reasons for such differences, in a major local newspaper of general circulation; or

(ii) Propose an amendment to the ROD if the differences in the remedial or enforcement action, settlement, or consent decree fundamentally alter the basic features of the selected remedy with respect to scope, performance, or cost. To amend the ROD, the lead agency, in conjunction with the support agency, as provided in §300.515(e), shall:

(A) Issue a notice of availability and brief description of the proposed amendment to the ROD in a major local newspaper of general circulation;

(B) Make the proposed amendment to the ROD and information supporting the decision available for public comment;

(C) Provide a reasonable opportunity, not less than 30 calendar days, for submission of written or oral comments on the amendment to the ROD. Upon timely request, the lead agency will extend the public comment period by a minimum of 30 additional days;

(D) Provide the opportunity for a public meeting to be held during the public comment period at or near the facility at issue;

(E) Keep a transcript of comments received at the public meeting held during the public comment period;

(F) Include in the amended ROD a brief explanation of the amendment and the response to each of the significant comments, criticisms, and new relevant information submitted during the public comment period;

(G) Publish a notice of the availability of the amended ROD in a major local newspaper of general circulation; and

(H) Make the amended ROD and supporting information available to the public in the administrative record and information repository prior to the commencement of the remedial action affected by the amendment.

(3) After the completion of the final engineering design, the lead agency shall issue a fact sheet and provide, as appropriate, a public briefing prior to the initiation of the remedial action.

(d) *Contractor conflict of interest.* (1) For Fund-financed RD/RA and O&M activities, the lead agency shall:

(i) Include appropriate language in the solicitation requiring potential prime contractors to submit information on their status, as well as the status of their subcontractors, parent companies, and affiliates, as potentially responsible parties at the site.

(ii) Require potential prime contractors to certify that, to the best of their knowledge, they and their potential subcontractors, parent companies, and affiliates have disclosed all information described in §300.435(d)(1)(i) or that no such information exists, and that any such information discovered after submission of their bid or proposal or contract award will be disclosed immediately.

(2) Prior to contract award, the lead agency shall evaluate the information provided by the potential prime contractors and:

(i) Determine whether they have conflicts of interest that could significantly impact the performance of the contract or the liability of potential prime contractors or subcontractors.

(ii) If a potential prime contractor or subcontractor has a conflict of interest that cannot be avoided or otherwise resolved, and using that potential prime contractor or subcontractor to conduct RD/RA or O&M work under a Fund-financed action would not be in the best interests of the state or federal government, an offeror or bidder contemplating use of that prime contractor or subcontractor may be declared nonresponsible or ineligible for award in accordance with appropriate acquisition regulations, and the contract may be awarded to the next eligible offeror or bidder.

(e) *Recontracting.* (1) If a Fund-financed contract must be terminated because additional work outside the scope of the contract is needed, EPA is authorized to take appropriate steps to continue interim RAs as necessary to reduce risks to public health and the environment. Appropriate steps may include extending an existing contract for a federal-lead RA or amending a cooperative agreement for a state-lead RA. Until the lead agency can reopen the bidding process and recontract to complete the RA, EPA may take such appropriate steps as described above to cover interim work to reduce such risks, where:

(i) Additional work is found to be needed as a result of such unforeseen situations as newly discovered sources, types, or quantities of hazardous substances at a facility; and

(ii) Performance of the complete RA requires the lead agency to rebid the contract because the existing contract does not encompass this newly discovered work.

(2) The cost of such interim actions shall not exceed $2 million.

(f) *Operation and maintenance.* (1) Operation and maintenance (O&M) measures are initiated after the remedy has achieved the remedial action objectives and remediation goals in the ROD, and is determined to be operational and functional, except for ground- or surface-water restoration actions covered under § 300.435(f)(4). A state must provide its assurance to assume responsibility for O&M, including, where appropriate, requirements for maintaining institutional controls, under § 300.510(c).

(2) A remedy becomes ‘‘operational and functional’’ either one year after construction is complete, or when the remedy is determined concurrently by EPA and the state to be functioning properly and is performing as designed, whichever is earlier. EPA may grant extensions to the one-year period, as appropriate.

(3) For Fund-financed remedial actions involving treatment or other measures to restore ground- or surface-water quality to a level that assures protection of human health and the environment, the operation of such treatment or other measures for a period of up to 10 years after the remedy becomes operational and functional will be considered part of the remedial action. Activities required to maintain the effectiveness of such treatment or measures following the 10-year period, or after remedial action is complete, whichever is earlier, shall be considered O&M. For the purposes of federal funding provided under CERCLA section 104(c)(6), a restoration activity will be considered administratively ‘‘complete’’ when:

(i) Measures restore ground- or surface-water quality to a level that assures protection of human health and the environment;

(ii) Measures restore ground or surface water to such a point that reductions in contaminant concentrations are no longer significant; or

(iii) Ten years have elapsed, whichever is earliest.

(4) The following shall not be deemed to constitute treatment or other measures to restore contaminated ground or surface water under § 300.435(f)(3):

(i) Source control maintenance measures; and

(ii) Ground- or surface-water measures initiated for the primary purpose of providing a drinking-water supply, not for the purpose of restoring ground water.

§ 300.440 Procedures for planning and implementing off-site response actions.

(a) *Applicability.* (1) This section applies to any remedial or removal action involving the off-site transfer of any hazardous substance, pollutant, or contaminant as defined under CERCLA sections 101 (14) and (33) (‘‘CERCLA waste’’) that is conducted by EPA, States, private parties, or other Federal agencies, that is Fund-financed and/or is taken pursuant to any CERCLA authority, including cleanups at Federal facilities under section 120 of CERCLA, and cleanups under section 311 of the Clean Water Act (except for cleanup of petroleum exempt under CERCLA). Applicability extends to those actions taken jointly under CERCLA and another authority.

(2) In cases of emergency removal actions under CERCLA, emergency actions taken during remedial actions, or response actions under section 311 of the Clean Water Act where the release poses an immediate and significant threat to human health and the environment, the On-Scene Coordinator (OSC) may determine that it is necessary to transfer CERCLA waste offsite without following the requirements of this section.

(3) This section applies to CERCLA wastes from cleanup actions based on CERCLA decision documents signed or consent decrees lodged after October 17, 1986 (‘‘post-SARA CERCLA wastes’’) as well as those based on CERCLA decision documents signed and consent decrees lodged prior to October 17, 1986 (‘‘pre-SARA CERCLA wastes’’). Pre-SARA and post-SARA CERCLA wastes are subject to the same acceptability criteria in § 300.440(b)(1) and (2).

(4) EPA (usually the EPA Regional Office) will determine the acceptability under this section of any facility selected for the treatment, storage, or

disposal of CERCLA waste. EPA will determine if there are relevant releases or relevant violations at a facility prior to the facility's initial receipt of CERCLA waste. A facility which has previously been evaluated and found acceptable under this rule (or the preceding policy) is acceptable until the EPA Regional Office notifies the facility otherwise pursuant to § 300.440(d).

(5) Off-site transfers of those laboratory samples and treatability study CERCLA wastes from CERCLA sites set out in paragraphs (a)(5)(i) through (iii) of this section, are not subject to the requirements of this section. However, those CERCLA wastes may not be transferred back to the CERCLA site unless the Remedial Project Manager or OSC assures the proper management of the CERCLA waste samples or residues and gives permission to the laboratory or treatment facility for the samples and/or residues to be returned to the site.

(i) Samples of CERCLA wastes sent to a laboratory for characterization;

(ii) RCRA hazardous wastes that are being transferred from a CERCLA site for treatability studies and that meet the requirements for an exemption for RCRA under 40 CFR 261.4(e); and

(iii) Non-RCRA wastes that are being transferred from a CERCLA site for treatability studies and that are below the quantity threshold established at 40 CFR 261.4(e)(2).

(b) *Acceptability criteria*—(1) *Facility compliance.* (i) A facility will be deemed in compliance for the purpose of this rule if there are no relevant violations at or affecting the unit or units receiving CERCLA waste:

(A) For treatment to standards specified in 40 CFR part 268, subpart D, including any pre-treatment or storage units used prior to treatment;

(B) For treatment to substantially reduce its mobility, toxicity or persistence in the absence of a defined treatment standard, including any pre-treatment or storage units used prior to treatment; or

(C) For storage or ultimate disposal of CERCLA waste not treated to the previous criteria at the same facility.

(ii) Relevant violations include significant deviations from regulations, compliance order provisions, or permit conditions designed to: ensure that CERCLA waste is destined for and delivered to authorized facilities; prevent releases of hazardous waste, hazardous constituents, or hazardous substances to the environment; ensure early detection of such releases; or compel corrective action for releases. Criminal violations which result in indictment are also relevant violations. In addition, violations of the following requirements may be considered relevant:

(A) Applicable subsections of sections 3004 and 3005 of RCRA or, where applicable, other Federal laws (such as the Toxic Substances Control Act and subtitle D of RCRA);

(B) Applicable sections of State environmental laws; and

(C) In addition, land disposal units at RCRA subtitle C facilities receiving RCRA hazardous waste from response actions authorized or funded under CERCLA must be in compliance with RCRA section 3004(o) minimum technology requirements. Exceptions may be made only if the unit has been granted a waiver from these requirements under 40 CFR 264.301.

(2) *Releases.* (i) Release is defined in § 300.5 of this part. Releases under this section do not include:

(A) *De minimis* releases;

(B) Releases permitted under Federal programs or under Federal programs delegated to the States (Federally permitted releases are defined in § 300.5), except to the extent that such releases are found to pose a threat to human health and the environment; or

(C) Releases to the air that do not exceed standards promulgated pursuant to RCRA section 3004(n), or absent such standards, or where such standards do not apply, releases to the air that do not present a threat to human health or the environment.

(ii) Releases from units at a facility designated for off-site transfer of CERCLA waste must be addressed as follows:

(A) *Receiving units at RCRA subtitle C facilities.* CERCLA wastes may be transferred to an off-site unit regulated under subtitle C of RCRA, including a facility regulated under the permit-by-rule provisions of 40 CFR 270.60 (a), (b) or (c), only if that unit is not releasing any hazardous waste, hazardous constituent, or hazardous substance into the ground water, surface water, soil or air.

(B) *Other units at RCRA subtitle C land disposal facilities.* CERCLA wastes may not be transferred to any unit at a RCRA subtitle C land disposal facility where a non-receiving unit is releasing any hazardous waste, hazardous constituent, or hazardous substance into the ground water, surface water, soil, or air, unless that release is controlled by an enforceable agreement for corrective action under subtitle C of RCRA or other applicable Federal or State authority. For purposes of this section, a RCRA ''land disposal facility'' is any RCRA facility at which a land disposal unit is located, regardless of whether a land disposal unit is the receiving unit.

(C) *Other units at RCRA subtitle C treatment, storage, and permit-by-rule facilities.* CERCLA wastes may not be transferred to any unit at a RCRA subtitle C treatment, storage or permit-by-rule facility, where a release of any hazardous waste, hazardous constituent, or hazardous substance from non-receiving units poses a significant threat to public health or the environment, unless that release is controlled by an enforceable agreement for corrective action under subtitle C of RCRA or other applicable Federal or State authority.

(D) *All other facilities.* CERCLA wastes should not be transferred to any unit at an other-than-RCRA subtitle C facility if the EPA Regional Office has information indicating that an environmentally significant release of hazardous substances has occurred at that facility, unless the release is controlled by an enforceable agreement for corrective action under an applicable Federal or State authority.

(iii) Releases are considered to be ''controlled'' for the purpose of this section as provided in § 300.440 (f)(3)(iv) and (f)(3)(v). A release is not considered ''controlled'' for the purpose of this section during the pendency of administrative or judicial challenges to corrective action requirements, unless the facility has made the requisite showing under § 300.440(e).

(c) *Basis for determining acceptability.* (1) If a State finds that a facility within its jurisdiction is operating in noncompliance with state law requirements including the requirements of any Federal program for which the State has been authorized, EPA will determine, after consulting with the State as appropriate, if the violation is relevant under the rule and if so, issue an initial determination of unacceptability.

(2) If a State finds that releases are occurring at a facility regulated under State law or a Federal program for which the State is authorized, EPA will determine, after consulting with the State as appropriate, if the release is relevant under the rule and if so, issue an initial determination of unacceptability.

(3) EPA may also issue initial determinations of unacceptability based on its own findings. EPA can undertake any inspections, data collection and/or assessments necessary. EPA will then notify with the State about the results and issue a determination notice if a relevant violation or release is found.

(d) *Determination of unacceptability.* (1) Upon initial determination by the EPA Regional Office that a facility being considered for the off-site transfer of any CERCLA waste does not meet the criteria for acceptability stated in § 300.440(b), the EPA Region shall notify the owner/operator of such facility, and the responsible agency in the State in which the facility is located, of the unacceptability finding. The notice will be sent by certified and first-class mail, return receipt requested. The certified notice, if not acknowledged by the return receipt card, should be considered to have been received by the addressee if properly sent by regular mail to the last address known to the EPA Regional Office.

(2) The notice shall generally: state that based on available information from a RCRA Facility Assessment (RFA), inspection, or other data sources, the facility has been found not to meet the requirements of § 300.440; cite the specific acts, omissions, or conditions which form the basis of these findings; and inform the owner/operator of the procedural recourse available under this regulation.

(3) A facility which was previously evaluated and found acceptable under this rule (or the preceding policy) may continue to receive CERCLA waste for 60 calendar days after the date of issuance of the notice, unless otherwise determined in accordance with paragraphs (d)(8) or (d)(9) of this section.

(4) If the owner or operator of the facility in question submits a written request for an informal conference with the EPA Regional Office within 10 calendar days from the issuance of the notice, the EPA Regional Office shall provide the opportunity for such conference no later than 30 calendar days after the date of the notice, if possible, to discuss the basis for the underlying violation or release determination, and its relevance to the facility's acceptability to receive CERCLA cleanup wastes. State representatives may attend the informal conference, submit written comments prior to the informal conference, and/or request additional meetings with the EPA Region, relating to the unacceptability issue during the determination process. If no State representative is present, EPA shall notify the State of the outcome of the conference. An owner/operator may submit written comments by the 30th day after issuance of the notice, in addition to or instead of requesting an informal conference.

(5) If the owner or operator neither requests an informal conference nor submits written comments, the facility becomes unacceptable to receive CERCLA waste on the 60th day after the notice is issued (or on such other date designated under paragraph (d)(9) of this section). The facility will remain unacceptable until such time as the EPA Regional Office notifies the owner or operator otherwise.

(6) If an informal conference is held or written comments are received, the EPA Region shall decide whether or not the information provided is sufficient to show that the facility is operating in physical compliance with respect to the relevant violations cited in the initial notice of unacceptability, and that all relevant releases have been eliminated or controlled, as required in paragraph (b)(2) of this section, such that a determination of acceptability would be appropriate. EPA will notify the owner/operator in writing whether or not the information provided is sufficient to support a determination of acceptability. Unless EPA determines that information provided by the owner/operator and the State is sufficient to support a determination of acceptability, the facility becomes unacceptable on the 60th calendar day after issuance of the original notice of unacceptability (or other date established pursuant to paragraphs (d)(8) or (d)(9) of this section).

(7) Within 10 days of hearing from the EPA Regional Office after the informal conference or the submittal of written comments, the owner/operator or the State may request a reconsideration of the unacceptability determination by the EPA Regional Administrator (RA). Reconsideration may be by review of the record, by conference, or by other means deemed appropriate by the Regional Administrator; reconsideration does not automatically stay the determination beyond the 60-day period. The owner/operator will receive notice in writing of the decision of the RA.

(8) The EPA Regional Administrator may decide to extend the 60-day period if more time is required to review a submission. The facility owner/operator shall be notified in writing if the Regional Administrator extends the 60 days.

(9) The EPA Regional Office may decide that a facility's unacceptability is immediately effective (or effective in less than 60 days) in extraordinary situations such as, but not limited to, emergencies at the facility or egregious violations. The EPA Region shall notify the facility owner/operator of the date of unacceptability, and may modify timeframes for comments and other procedures accordingly.

(e) *Unacceptability during administrative and judicial challenges of corrective action decisions.* For a facility with releases that are subject to a corrective action permit, order, or decree, an administrative or judicial challenge to the corrective action (or a challenge to a permit modification calling for additional corrective action) shall not be considered to be part of a corrective action "program" controlling those releases and shall not act to stay a determination of unacceptability under this rule. However, such facility may remain acceptable to receive CERCLA waste during the pendency of the appeal or litigation if:

(1) It satisfies the EPA Regional Office that adequate interim corrective action measures will continue at the facility; or

(2) It demonstrates to the EPA Regional Office the absence of a need to take corrective action during the short-term, interim period.

Either demonstration may be made during the 60-day review period in the context of the informal conference and RA reconsideration.

(f) *Re-evaluating unacceptability.* If, after notification of unacceptability and the opportunity to confer as described in § 300.440(d), the facility remains unacceptable, the facility can regain acceptability. A facility found to be unacceptable to receive CERCLA wastes based on relevant violations or releases may regain acceptability if the following conditions are met:

(1) *Judgment on the merits.* The facility has prevailed on the merits in an administrative or judicial challenge to the finding of noncompliance or uncontrolled releases upon which the unacceptability determination was based.

(2) *Relevant violations.* The facility has demonstrated to the EPA Region its return to physical compliance for the relevant violations cited in the notice.

(3) *Releases.* The facility has demonstrated to the EPA Region that:

(i) All releases from receiving units at RCRA subtitle C facilities have been eliminated and prior contamination from such releases is controlled by a corrective action program approved under subtitle C of RCRA;

(ii) All releases from other units at RCRA subtitle C land disposal facilities are controlled by a corrective action program approved under subtitle C of RCRA;

(iii) All releases from other units at RCRA subtitle C treatment and storage facilities do not pose a significant threat to human health or the environment, or are controlled by a corrective action program approved under subtitle C of RCRA.

(iv) A RCRA subtitle C corrective action program may be incorporated into a permit, order, or decree, including the following: a corrective action order under RCRA section 3008(h), section 7003 or section 3013, a RCRA permit under 40 CFR 264.100 or 264.101, or a permit under an equivalent authority in a State authorized for corrective action under RCRA section 3004(u). Releases will be deemed controlled upon issuance of the order, permit, or decree which initiates and requires completion of one or more of the following: a RCRA Facility Investigation, a RCRA Corrective Measures Study, and/or Corrective Measures Implementation. The release remains controlled as long as the facility is in compliance with the order, permit, or decree, and enters into subsequent agreements for implementation of additional corrective action measures when necessary, except during periods of administrative or judicial challenges, when the facility must make a demonstration under § 300.440(e) in order to remain acceptable.

(v) Facilities with releases regulated under other applicable Federal laws, or State laws under a Federally-delegated program may regain acceptability under this section if the releases are deemed by the EPA Regional Office not to pose a threat to human health or the environment, or if the facility enters into an enforceable agreement under those laws to conduct corrective action activities to control releases. Releases will be deemed controlled upon the issuance of an order, permit, or decree which initiates and requires one or more of the following: a facility investigation, a corrective action study, and/or corrective measures implementation. The release remains controlled as long as the facility is in compliance with the order, permit, or decree, and enters into subsequent agreements for implementation of additional corrective measures when necessary, except during periods of administrative or judicial challenges, when the facility must make a demonstration under § 300.440(e) in order to remain acceptable.

(4) Prior to the issuance of a determination that a facility has returned to acceptability, the EPA Region shall

notify the State in which the facility is located, and provide an opportunity for the State to discuss the facility's acceptability status with EPA.

(5) An unacceptable facility may be reconsidered for acceptability whenever the EPA Regional Office finds that the facility fulfills the criteria stated in § 300.440(b). Upon such a finding, the EPA Regional Office shall notify the facility and the State in writing.

[58 FR 49215, Sept. 22, 1993]

Subpart F—State Involvement in Hazardous Substance Response

SOURCE: 55 FR 8853, Mar. 8, 1990, unless otherwise noted.

§ 300.500 General.

(a) EPA shall ensure meaningful and substantial state involvement in hazardous substance response as specified in this subpart. EPA shall provide an opportunity for state participation in removal, pre-remedial, remedial, and enforcement response activities. EPA shall encourage states to enter into an EPA/state Superfund Memorandum of Agreement (SMOA) under § 300.505 to increase state involvement and strengthen the EPA/state partnership.

(b) EPA shall encourage states to participate in Fund-financed response in two ways. Pursuant to § 300.515(a), states may either assume the lead through a cooperative agreement for the response action or may be the support agency in EPA-lead remedial response. Section 300.515 sets forth requirements for state involvement in EPA-lead remedial and enforcement response and also addresses comparable requirements for EPA involvement in state-lead remedial and enforcement response. Section 300.520 specifies requirements for state involvement in EPA-lead enforcement negotiations. Section 300.525 specifies requirements for state involvement in removal actions. In addition to the requirements set forth in this subpart, 40 CFR part 35, subpart O, "Cooperative Agreements and Superfund State Contracts for Superfund Response Actions," contains further requirements for state participation during response.

§ 300.505 EPA/State Superfund Memorandum of Agreement (SMOA).

(a) The SMOA may establish the nature and extent of EPA and state interaction during EPA-lead and state-lead response (Indian tribes meeting the requirements of § 300.515(b) may be treated as states for purposes of this section). EPA shall enter into SMOA discussions if requested by a state. The following may be addressed in a SMOA:

(1) The EPA/state or Indian tribe relationship for removal, pre-remedial, remedial, and enforcement response, including a description of the roles and the responsibilities of each.

(2) The general requirements for EPA oversight. Oversight requirements may be more specifically defined in cooperative agreements.

(3) The general nature of lead and support agency interaction regarding the review of key documents and/or decision points in removal, pre-remedial, remedial, and enforcement response. The requirements for EPA and state review of each other's key documents when each is serving as the support agency shall be equivalent to the extent practicable. Review times agreed to in the SMOA must also be documented in site-specific cooperative agreements or Superfund state contracts in order to be binding.

(4) Procedures for modification of the SMOA (e.g., if EPA and a state agree that the lead and support agency roles and responsibilities have changed, or if modifications are required to achieve desired goals).

(b) The SMOA and any modifications thereto shall be executed by the EPA Regional Administrator and the head of the state agency designated as lead agency for state implementation of CERCLA.

(c) Site-specific agreements entered into pursuant to section 104(d)(1) of CERCLA shall be developed in accordance with 40 CFR part 35, subpart O. The SMOA shall not supersede such agreements.

(d)(1) EPA and the state shall consult annually to determine priorities and make lead and support agency designations for removal, pre-remedial, remedial, and enforcement response to be conducted during the next fiscal year and to discuss future priorities and long-term requirements for response. These consultations shall include the exchange of information on both Fund- and non-Fund-financed response activities. The SMOA may describe the timeframe and process for the EPA/state consultation.

(2) The following activities shall be discussed in the EPA/state consultations established in the SMOA, or otherwise initiated and documented in writing in the absence of a SMOA, on a site-specific basis with EPA and the state identifying the lead agency for each response action discussed:

(i) Pre-remedial response actions, including preliminary assessments and site inspections;

(ii) Hazard Ranking System scoring and NPL listing and deletion activities;

(iii) Remedial phase activities, including remedial investigation/feasibility study, identification of potential applicable or relevant and appropriate requirements (ARARs) under federal and state environmental laws and, as appropriate, other advisories, criteria, or guidance to be considered (TBCs), proposed plan, ROD, remedial design, remedial action, and operation and maintenance;

(iv) Potentially responsible party (PRP) searches, notices to PRPs, response to information requests, PRP negotiations, oversight of PRPs, other enforcement actions pursuant to state law, and activities where the state provides support to EPA;

(v) Compilation and maintenance of the administrative record for selection of a response action as required by subpart I of this part;

(vi) Related site support activities;

(vii) State ability to share in the cost and timing of payments; and

(viii) General CERCLA implementation activities.

(3) If a state is designated as the lead agency for a non-Fund-financed action at an NPL site, the SMOA shall be supplemented by site-specific enforcement agreements between EPA and the state which specify schedules and EPA involvement.

(4) In the absence of a SMOA, EPA and the state shall comply with the requirements in § 300.515(h). If the SMOA does not address all of the requirements specified in § 300.515(h), EPA and the state shall comply with any unaddressed requirements in that section.

§ 300.510 State assurances.

(a) A Fund-financed remedial action undertaken pursuant to CERCLA section 104(a) cannot proceed unless a state provides its applicable required assurances. The assurances must be provided by the state prior to the initiation of remedial action pursuant to a Superfund state contract for EPA-lead (or political subdivision-lead) remedial action or pursuant to a cooperative agreement for a state-lead remedial action. The SMOA may not be used for this purpose. Federally recognized Indian tribes are not required to provide CERCLA section 104(c)(3) assurances for Fund-financed response actions. Further requirements pertaining to state, political subdivision, and federally recognized Indian tribe involvement in CERCLA response are found in 40 CFR part 35, subpart O.

(b)(1) The state is not required to share in the cost of state- or EPA-lead Fund-financed removal actions (including remedial planning activities associated with remedial actions) conducted pursuant to CERCLA section 104 unless the facility was operated by the state or a political subdivision thereof at the time of disposal of hazardous substances therein and a remedial action is ultimately undertaken at the site. Such remedial planning activities include, but are not limited to, remedial investigations (RIs), feasibility studies (FSs), and remedial design (RD). States shall be required to share 50 percent, or greater, in the cost of all Fund-financed response actions if the facility was publicly operated at the time of the disposal of hazardous substances. For other facilities, except federal facilities, the state shall be required to share 10 percent of the cost of the remedial action.

(2) CERCLA section 104(c)(5) provides that EPA shall grant a state credit for reasonable, documented, direct, out-of-pocket, non-federal expenditures subject to the limitations specified in CERCLA section 104(c)(5). For a state to apply credit toward its cost share, it must enter into a cooperative agreement or Superfund state contract. The

state must submit as soon as possible, but no later than at the time CERCLA section 104 assurances are provided for a remedial action, its accounting of eligible credit expenditures for EPA verification. Additional credit requirements are contained in 40 CFR part 35, subpart O.

(3) Credit may be applied to a state's future cost share requirements at NPL sites for response expenditures or obligations incurred by the state or a political subdivision from January 1, 1978 to December 11, 1980, and for the remedial action expenditures incurred only by the state after October 17, 1986.

(4) Credit that exceeds the required cost share at the site for which the credit is granted may be transferred to another site to offset a state's required remedial action cost share.

(c)(1) Prior to a Fund-financed remedial action, the state must also provide its assurance in accordance with CERCLA section 104(c)(3)(A) to assume responsibility for operation and maintenance of implemented remedial actions for the expected life of such actions. In addition, when appropriate, as part of the O&M assurance, the state must assure that any institutional controls implemented as part of the remedial action at a site are in place, reliable, and will remain in place after the initiation of O&M. The state and EPA shall consult on a plan for operation and maintenance prior to the initiation of a remedial action.

(2) After a joint EPA/State inspection of the implemented Fund-financed remedial action under § 300.515(g), EPA may share, for any extension period established in § 300.435(f)(2), in the cost of the operation of the remedy to ensure that the remedy is operational and functional. In the case of restoration of ground or surface water, EPA shall share in the cost of the State's operation of ground- or surface-water restoration remedial actions as specified in § 300.435(f)(3).

(d) In accordance with CERCLA sections 104 (c)(3)(B) and 121(d)(3), if the remedial action requires off-site storage, destruction, treatment, or disposal, the state must provide its assurance before the remedial action begins on the availability of a hazardous waste disposal facility that is in compliance with CERCLA section 121(d)(3) and is acceptable to EPA.

(e)(1) In accordance with CERCLA section 104(c)(9), EPA shall not provide any remedial action pursuant to CERCLA section 104 until the state in which the release occurs enters into a cooperative agreement or Superfund state contract with EPA providing assurances deemed adequate by EPA that the state will assure the availability of hazardous waste treatment or disposal facilities which:

(i) Have adequate capacity for the destruction, treatment, or secure disposition of all hazardous wastes that are reasonably expected to be generated within the state during the 20-year period following the date of such cooperative agreement or Superfund state contract and to be destroyed, treated, or disposed;

(ii) Are within the state, or outside the state in accordance with an interstate agreement or regional agreement or authority;

(iii) Are acceptable to EPA; and

(iv) Are in compliance with the requirements of Subtitle C of the Solid Waste Disposal Act.

(2) This rule does not address whether or not Indian tribes are states for purposes of this paragraph (e).

(f) EPA may determine that an interest in real property must be acquired in order to conduct a response action. However, as provided in CERCLA section 104(j)(2), EPA may acquire an interest in real estate in order to conduct a remedial action only if the State in which the interest to be acquired is located provides assurances, through a contract, cooperative agreement or otherwise, that the State will accept transfer of the interest upon completion of the remedial action. For purposes of this paragraph, "completion of the remedial action" is the point at which operation and maintenance (O&M) measures would be initiated pursuant to § 300.435(f). The State may accept a transfer of interest at an earlier point in time if agreed upon in writing by the State and EPA. Indian tribe assurances are to be provided as set out at 40 CFR part 35, subpart O, § 35.6110(b)(2).

[55 FR 8853, Mar. 8, 1990, as amended at 59 FR 35854, July 14, 1994]

§ 300.515 Requirements for state involvement in remedial and enforcement response.

(a) *General.* (1) States are encouraged to undertake actions authorized under subpart E. Section 104(d)(1) of CERCLA authorizes EPA to enter into cooperative agreements or contracts with a state, political subdivision, or a federally recognized Indian tribe to carry out Fund-financed response actions authorized under CERCLA, when EPA determines that the state, the political subdivision, or federally recognized Indian tribe has the capability to undertake such actions. EPA will use a cooperative agreement to transfer funds to those entities to undertake Fund-financed response activities. The requirements for states, political subdivisions, or Indian tribes to receive funds as a lead or support agency for response are addressed at 40 CFR part 35, subpart O.

(2) For EPA-lead Fund-financed remedial planning activities, including, but not limited to, remedial investigations, feasibility studies, and remedial designs, the state agency acceptance of the support agency role during an EPA-lead response shall be documented in a letter, SMOA, or cooperative agreement. Superfund state contracts are unnecessary for this purpose.

(3) Cooperative agreements and Superfund state contracts are only appropriate for non-Fund-financed response actions if a state intends to seek credit for remedial action expenses under § 300.510.

(b) *Indian tribe involvement during response.* To be afforded substantially the same treatment as states under section 104 of CERCLA, the governing body of the Indian tribe must:

(1) Be federally recognized; and

(2) Have a tribal governing body that is currently performing governmental functions to promote the health, safety, and welfare of the affected population or to protect the environment within a defined geographic area; and

(3) Have jurisdiction over a site at which Fund-financed response, including pre-remedial activities, is contemplated.

(c) *State involvement in PA/SI and National Priorities List process.* EPA shall ensure state involvement in the listing and deletion process by providing states opportunities for review, consultation, or concurrence specified in this section.

(1) EPA shall consult with states as appropriate on the information to be used in developing HRS scores for releases.

(2) EPA shall, to the extent feasible, provide the state 30 working days to review releases which were scored by EPA and which will be considered for placement on the National Priorities List (NPL).

(3) EPA shall provide the state 30 working days to review and concur on the Notice of Intent to Delete a release from the NPL. Section 300.425 describes the EPA/state consultation and concurrence process for deleting releases from the NPL.

(d) *State involvement in RI/FS process.* A key component of the EPA/state partnership shall be the communication of potential federal and state ARARs and, as appropriate, other pertinent advisories, criteria, or guidance to be considered (TBCs).

(1) In accordance with §§ 300.400(g) and 300.430, the lead and support agencies shall identify their respective potential ARARs and communicate them to each other in a timely manner, *i.e.*, no later than the early stages of the comparative analysis described in § 300.430(e)(9), such that sufficient time is available for the lead agency to consider and incorporate all potential ARARs without inordinate delays and duplication of effort. The lead and support agencies may also identify TBCs and communicate them in a timely manner.

(2) When a state and EPA have entered into a SMOA, the SMOA may specify a consultation process which requires the lead agency to solicit potential ARARs at specified points in the remedial planning and remedy selection processes. At a minimum, the SMOA shall include the points specified in § 300.515(h)(2). The SMOA shall specify timeframes for support agency response to lead agency requests to ensure that potential ARARs are identified and communicated in a timely manner. Such timeframes must also be documented in site-specific agreements. The SMOA may also discuss

identification and communication of TBCs.

(3) If EPA in its statement of a proposed plan intends to waive any state-identified ARARs, or does not agree with the state that a certain state standard is an ARAR, it shall formally notify the state when it submits the RI/FS report for state review or responds to the state's submission of the RI/FS report.

(4) EPA shall respond to state comments on waivers from or disagreements about state ARARs, as well as the preferred alternative when making the RI/FS report and proposed plan available for public comment.

(e) *State involvement in selection of remedy.* (1) Both EPA and the state shall be involved in preliminary discussions of the alternatives addressed in the FS prior to preparation of the proposed plan and ROD. At the conclusion of the RI/FS, the lead agency, in conjunction with the support agency, shall develop a proposed plan. The support agency shall have an opportunity to comment on the plan. The lead agency shall publish a notice of availability of the RI/FS report and a brief analysis of the proposed plan pursuant to §300.430(e) and (f). Included in the proposed plan shall be a statement that the lead and support agencies have reached agreement or, where this is not the case, a statement explaining the concerns of the support agency with the lead agency's proposed plan. The state may not publish a proposed plan that EPA has not approved. EPA may assume the lead from the state if agreement cannot be reached.

(2)(i) EPA and the state shall identify, at least annually, sites for which RODs will be prepared during the next fiscal year, in accordance with §300.515(h)(1). For all EPA-lead sites, EPA shall prepare the ROD and provide the state an opportunity to concur with the recommended remedy. For Fund-financed state-lead sites, EPA and the state shall designate sites, in a site-specific agreement, for which the state shall prepare the ROD and seek EPA's concurrence and adoption of the remedy specified therein, and sites for which EPA shall prepare the ROD and seek the state's concurrence. EPA and the state may designate sites for which the state shall prepare the ROD for non-Fund-financed state-lead enforcement response actions (*i.e.*, actions taken under state law) at an NPL site. The state may seek EPA's concurrence in the remedy specified therein. Either EPA or the state may choose not to designate a site as state-lead.

(ii) State concurrence on a ROD is not a prerequisite to EPA's selecting a remedy, *i.e.*, signing a ROD, nor is EPA's concurrence a prerequisite to a state's selecting a remedy at a non-Fund-financed state-lead enforcement site under state law. Unless EPA's Assistant Administrator for Solid Waste and Emergency Response or Regional Administrator concurs in writing with a state-prepared ROD, EPA shall not be deemed to have approved the state decision. A state may not proceed with a Fund-financed response action unless EPA has first concurred in and adopted the ROD. Section 300.510(a) specifies limitations on EPA's proceeding with a remedial action without state assurances.

(iii) The lead agency shall provide the support agency with a copy of the signed ROD for remedial actions to be conducted pursuant to CERCLA.

(iv) On state-lead sites identified for EPA concurrence, the state generally shall be expected to maintain its lead agency status through the completion of the remedial action.

(f) *Enhancement of remedy.* (1) A state may ask EPA to make changes in or expansions of a remedial action selected under subpart E.

(i) If EPA finds that the proposed change or expansion is necessary and appropriate to the EPA-selected remedial action, the remedy may be modified (consistent with §300.435(c)(2)) and any additional costs paid as part of the remedial action.

(ii) If EPA finds that the proposed change or expansion is not necessary to the selected remedial action, but would not conflict or be inconsistent with the EPA-selected remedy, EPA may agree to integrate the proposed change or expansion into the planned CERCLA remedial work if:

(A) The state agrees to fund the entire additional cost associated with the change or expansion; and

(B) The state agrees to assume the lead for supervising the state-funded component of the remedy or, if EPA determines that the state-funded component cannot be conducted as a separate phase or activity, for supervising the remedial design and construction of the entire remedy.

(2) Where a state does not concur in a remedial action secured by EPA under CERCLA section 106, and the state desires to have the remedial action conform to an ARAR that has been waived under § 300.430(f)(1)(ii)(C), a state may seek to have that remedial action so conform, in accordance with the procedures set out in CERCLA section 121(f)(2) .

(g) *State involvement in remedial design/remedial action.* The extent and nature of state involvement during remedial design and remedial action shall be specified in site-specific cooperative agreements or Superfund state contracts, consistent with 40 CFR part 35, subpart O. For Fund-financed remedial actions, the lead and support agencies shall conduct a joint inspection at the conclusion of construction of the remedial action to determine that the remedy has been constructed in accordance with the ROD and with the remedial design.

(h) *Requirements for state involvement in absence of SMOA.* In the absence of a SMOA, EPA and the state shall comply with the requirements in § 300.515(h). If the SMOA does not address all of the requirements specified in § 300.515(h), EPA and the state shall comply with any unaddressed requirements in that section.

(1) *Annual consultations.* EPA shall conduct consultations with states at least annually to establish priorities and identify and document in writing the lead for remedial and enforcement response for each NPL site within the state for the upcoming fiscal year. States shall be given the opportunity to participate in long-term planning efforts for remedial and enforcement response during these annual consultations.

(2) *Identification of ARARs and TBCs.* The lead and support agencies shall discuss potential ARARs during the scoping of the RI/FS. The lead agency shall request potential ARARs from the support agency no later than the time that the site characterization data are available. The support agency shall communicate in writing those potential ARARs to the lead agency within 30 working days of receipt of the lead agency request for these ARARs. The lead and support agencies may also discuss and communicate other pertinent advisories, criteria, or guidance to be considered (TBCs). After the initial screening of alternatives has been completed but prior to initiation of the comparative analysis conducted during the detailed analysis phase of the FS, the lead agency shall request that the support agency communicate any additional requirements that are applicable or relevant and appropriate to the alternatives contemplated within 30 working days of receipt of this request. The lead agency shall thereafter consult the support agency to ensure that identified ARARs and TBCs are updated as appropriate.

(3) *Support agency review of lead agency documents.* The lead agency shall provide the support agency an opportunity to review and comment on the RI/FS, proposed plan, ROD, and remedial design, and any proposed determinations on potential ARARs and TBCs. The support agency shall have a minimum of 10 working days and a maximum of 15 working days to provide comments to the lead agency on the RI/FS, ROD, ARAR/TBC determinations, and remedial design. The support agency shall have a minimum of five working days and a maximum of 10 working days to comment on the proposed plan.

(i) *Administrative record requirements.* The state, where it is the lead agency for a Fund-financed site, shall compile and maintain the administrative record for selection of a response action under subpart I of this part unless specified otherwise in the SMOA.

§ 300.520 State involvement in EPA-lead enforcement negotiations.

(a) EPA shall notify states of response action negotiations to be conducted by EPA with potentially responsible parties during each fiscal year.

(b) The state must notify EPA of such negotiations in which it intends to participate.

(c) The state is not foreclosed from signing a consent decree if it does not participate substantially in the negotiations.

§ 300.525 State involvement in removal actions.

(a) States may undertake Fund-financed removal actions pursuant to a cooperative agreement with EPA. State-lead removal actions taken pursuant to cooperative agreements must be conducted in accordance with § 300.415 on removal actions, and 40 CFR part 35, subpart O.

(b) States are not required under section 104(c)(3) of CERCLA to share in the cost of a Fund-financed removal action, unless the removal is conducted at an NPL site that was operated by a state or political subdivision at the time of disposal of hazardous substances therein and a Fund-financed remedial action is ultimately undertaken at the site. In this situation, states are required to share, 50 percent or greater, in the cost of all removal (including remedial planning) and remedial action costs at the time of the remedial action.

(c) States are encouraged to provide for post-removal site control as discussed in § 300.415(k) for all Fund-financed removal actions.

(d) States shall be responsible for identifying potential state ARARs for all Fund-financed removal actions and for providing such ARARs to EPA in a timely manner for all EPA-lead removal actions.

(e) EPA shall consult with a state on all removal actions to be conducted in that state.

Subpart G—Trustees for Natural Resources

SOURCE: 59 FR 47450, Sept. 15, 1994, unless otherwise noted.

§ 300.600 Designation of federal trustees.

(a) The President is required to designate in the NCP those federal officials who are to act on behalf of the public as trustees for natural resources. Federal officials so designated will act pursuant to section 107(f) of CERCLA, section 311(f)(5) of the CWA, and section 1006 of the OPA. Natural resources means land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled (hereinafter referred to as ‘‘managed or controlled’’) by the United States (including the resources of the exclusive economic zone).

(b) The following individuals shall be the designated trustee(s) for general categories of natural resources, including their supporting ecosystems. They are authorized to act pursuant to section 107(f) of CERCLA, section 311(f)(5) of the CWA, or section 1006 of the OPA when there is injury to, destruction of, loss of, or threat to natural resources, including their supporting ecosystems, as a result of a release of a hazardous substance or a discharge of oil. Notwithstanding the other designations in this section, the Secretaries of Commerce and the Interior shall act as trustees of those resources subject to their respective management or control.

(1) *Secretary of Commerce.* The Secretary of Commerce shall act as trustee for natural resources managed or controlled by DOC and for natural resources managed or controlled by other federal agencies and that are found in, under, or using waters navigable by deep draft vessels, tidally influenced waters, or waters of the contiguous zone, the exclusive economic zone, and the outer continental shelf. However, before the Secretary takes an action with respect to an affected resource under the management or control of another federal agency, he shall, whenever practicable, seek to obtain the concurrence of that other federal agency. Examples of the Secretary's trusteeship include the following natural resources and their supporting ecosystems: marine fishery resources; anadromous fish; endangered species and marine mammals; and the resources of National Marine Sanctuaries and National Estuarine Research Reserves.

(2) *Secretary of the Interior.* The Secretary of the Interior shall act as

trustee for natural resources managed or controlled by the DOI. Examples of the Secretary's trusteeship include the following natural resources and their supporting ecosystems: migratory birds; anadromous fish; endangered species and marine mammals; federally owned minerals; and certain federally managed water resources. The Secretary of the Interior shall also be trustee for those natural resources for which an Indian tribe would otherwise act as trustee in those cases where the United States acts on behalf of the Indian tribe.

(3) *Secretary for the land managing agency.* For natural resources located on, over, or under land administered by the United States, the trustee shall be the head of the department in which the land managing agency is found. The trustees for the principal federal land managing agencies are the Secretaries of DOI, USDA, DOD, and DOE.

(4) *Head of authorized agencies.* For natural resources located in the United States but not otherwise described in this section, the trustee shall be the head of the federal agency or agencies authorized to manage or control those resources.

(5) *Additional trustees for the Deepwater Horizon Oil Spill.* The Administrator of EPA and the Secretary of Agriculture shall act as trustees in connection with injury to, destruction of, loss of, or loss of use of natural resources, including their supporting ecosystems, resulting from the Deepwater Horizon Oil Spill.

[59 FR 47450, Sept. 15, 1994, as amended at 79 FR 36431, June 27, 2014]

§ 300.605 State trustees.

State trustees shall act on behalf of the public as trustees for natural resources, including their supporting ecosystems, within the boundary of a state or belonging to, managed by, controlled by, or appertaining to such state. For the purposes of subpart G of this part, the definition of the term *state* does not include Indian tribes. The governor of a state is encouraged to designate a state lead trustee to coordinate all state trustee responsibilities with other trustee agencies and with response activities of the RRT and OSC. The state's lead trustee would designate a representative to serve as contact with the OSC. This individual should have ready access to appropriate state officials with environmental protection, emergency response, and natural resource responsibilities. The EPA Administrator or USCG Commandant or their designees may appoint the state lead trustee as a member of the Area Committee. Response strategies should be coordinated between the state and other trustees and the OSC for specific natural resource locations in an inland or coastal zone and should be included in the Fish and Wildlife and Sensitive Environments Plan annex of the ACP.

§ 300.610 Indian tribes.

The tribal chairmen (or heads of the governing bodies) of Indian tribes, as defined in § 300.5, or a person designated by the tribal officials, shall act on behalf of the Indian tribes as trustees for the natural resources, including their supporting ecosystems, belonging to, managed by, controlled by, or appertaining to such Indian tribe, or held in trust for the benefit of such Indian tribe, or belonging to a member of such Indian tribe, if such resources are subject to a trust restriction on alienation. When the tribal chairman or head of the tribal governing body designates another person as trustee, the tribal chairman or head of the tribal governing body shall notify the President of such designation. Such officials are authorized to act when there is injury to, destruction of, loss of, or threat to natural resources, including their supporting ecosystems as a result of a release of a hazardous substance.

§ 300.612 Foreign trustees.

Pursuant to section 1006 of the OPA, foreign trustees shall act on behalf of the head of a foreign government as trustees for natural resources belonging to, managed by, controlled by, or appertaining to such foreign government.

§ 300.615 Responsibilities of trustees.

(a) Where there are multiple trustees, because of coexisting or contiguous natural resources or concurrent jurisdictions, they should coordinate and cooperate in carrying out these responsibilities.

(b) Trustees are responsible for designating to the RRTs and the Area Committees, for inclusion in the RCP and the ACP, appropriate contacts to receive notifications from the OSCs/RPMs of discharges or releases.

(c)(1) Upon notification or discovery of injury to, destruction of, loss of, or threat to natural resources, trustees may, pursuant to section 107(f) of CERCLA, or section 311(f)(5) of the CWA, take the following or other actions as appropriate:

(i) Conduct a preliminary survey of the area affected by the discharge or release to determine if trust resources under their jurisdiction are, or potentially may be, affected;

(ii) Cooperate with the OSC/RPM in coordinating assessments, investigations, and planning;

(iii) Carry out damage assessments; or

(iv) Devise and carry out a plan for restoration, rehabilitation, replacement, or acquisition of equivalent natural resources. In assessing damages to natural resources, the federal, state, and Indian tribe trustees have the option of following the procedures for natural resource damage assessments located at 43 CFR part 11.

(2) Upon notification or discovery of injury to, destruction of, loss of, or loss of use of, natural resources, or the potential for such, resulting from a discharge of oil occurring after August 18, 1990, the trustees, pursuant to section 1006 of the OPA, are to take the following actions:

(i) In accordance with OPA section 1006(c), determine the need for assessment of natural resource damages, collect data necessary for a potential damage assessment, and, where appropriate, assess damages to natural resources under their trusteeship; and

(ii) As appropriate, and subject to the public participation requirements of OPA section 1006(c), develop and implement a plan for the restoration, rehabilitation, replacement, or acquisition of the equivalent, of the natural resources under their trusteeship;

(3)(i) The trustees, consistent with procedures specified in the Fish and Wildlife and Sensitive Environments Plan Annex to the Area Contingency Plan, shall provide timely advice on recommended actions concerning trustee resources that are potentially affected by a discharge of oil. This may include providing assistance to the OSC in identifying/recommending pre-approved response techniques and in predesignating shoreline types and areas in ACPs.

(ii) The trustees shall assure, through the lead administrative trustee, that the OSC is informed of their activities regarding natural resource damage assessment that may affect response operations in order to assure coordination and minimize any interference with such operations. The trustees shall assure, through the lead administrative trustee, that all data from the natural resource damage assessment activities that may support more effective operational decisions are provided in a timely manner to the OSC.

(iii) When circumstances permit, the OSC shall share the use of federal response resources (including but not limited to aircraft, vessels, and booms to contain and remove discharged oil) with the trustees, providing trustee activities do not interfere with response actions. The lead administrative trustee facilitates effective and efficient communication between the OSC and the other trustees during response operations and is responsible for applying to the OSC for non-monetary federal response resources on behalf of all trustees. The lead administrative trustee is also responsible for applying to the NPFC for funding for initiation of damage assessment for injuries to natural resources.

(d) The authority of federal trustees includes, but is not limited to the following actions:

(1) Requesting that the Attorney General seek compensation from the responsible parties for the damages assessed and for the costs of an assessment and of restoration planning; and

(2) Participating in negotiations between the United States and potentially responsible parties to obtain PRP-financed or PRP-conducted assessments and restorations for injured resources or protection for threatened

resources and to agree to covenants not to sue, where appropriate.

(3) Requiring, in consultation with the lead agency, any person to comply with the requirements of CERCLA section 104(e) regarding information gathering and access.

(4) Initiating damage assessments, as provided in OPA section 6002.

(e) Actions which may be taken by any trustee pursuant to section 107(f) of CERCLA, section 311(f)(5) of the CWA, or section 1006 of the OPA include, but are not limited to, any of the following:

(1) Requesting that an authorized agency issue an administrative order or pursue injunctive relief against the parties responsible for the discharge or release; or

(2) Requesting that the lead agency remove, or arrange for the removal of, or provide for remedial action with respect to, any oil or hazardous substances from a contaminated medium pursuant to section 104 of CERCLA or section 311 of CWA.

Subpart H—Participation by Other Persons

SOURCE: 59 FR 47452, Sept. 15, 1994, unless otherwise noted.

§ 300.700 Activities by other persons.

(a) *General.* Except as provided (e.g., in CWA section 311(c)), any person may undertake a response action to reduce or eliminate a release of a hazardous substance, pollutant, or contaminant.

(b) *Summary of CERCLA authorities.* The mechanisms available to recover the costs of response actions under CERCLA are, in summary:

(1) Section 107(a), wherein any person may receive a court award of his or her response costs, plus interest, from the party or parties found to be liable;

(2) Section 111(a)(2), wherein a private party, a PRP pursuant to a settlement agreement, or certain foreign entities may file a claim against the Fund for reimbursement of response costs;

(3) Section 106(b), wherein any person who has complied with a section 106(a) order may petition the Fund for reimbursement of reasonable costs, plus interest; and

(4) Section 123, wherein a general purpose unit of local government may apply to the Fund under 40 CFR part 310 for reimbursement of the costs of temporary emergency measures that are necessary to prevent or mitigate injury to human health or the environment associated with a release.

(c) *Section 107(a) cost recovery actions.* (1) Responsible parties shall be liable for all response costs incurred by the United States government or a state or an Indian tribe not inconsistent with the NCP.

(2) Responsible parties shall be liable for necessary costs of response actions to releases of hazardous substances incurred by any other person consistent with the NCP.

(3) For the purpose of cost recovery under section 107(a)(4)(B) of CERCLA:

(i) A private party response action will be considered ''consistent with the NCP'' if the action, when evaluated as a whole, is in substantial compliance with the applicable requirements in paragraphs (5) and (6) of this section, and results in a CERCLA-quality cleanup; and

(ii) Any response action carried out in compliance with the terms of an order issued by EPA pursuant to section 106 of CERCLA, or a consent decree entered into pursuant to section 122 of CERCLA, will be considered ''consistent with the NCP.''

(4) Actions under § 300.700(c)(1) will not be considered ''inconsistent with the NCP,'' and actions under § 300.700(c)(2) will not be considered not ''consistent with the NCP,'' based on immaterial or insubstantial deviations from the provisions of 40 CFR part 300.

(5) The following provisions of this part are potentially applicable to private party response actions:

(i) Section 300.150 (on worker health and safety);

(ii) Section 300.160 (on documentation and cost recovery);

(iii) Section 300.400(c)(1), (4), (5), and (7) (on determining the need for a Fund-financed action); (e) (on permit requirements) except that the permit waiver does not apply to private party response actions; and (g) (on identification of ARARs) except that applicable requirements of federal or state law may not be waived by a private party;

(iv) Section 300.405(b), (c), and (d) (on reports of releases to the NRC);

(v) Section 300.410 (on removal site evaluation) except paragraphs (f)(5) and (6);

(vi) Section 300.415 (on removal actions) except paragraphs (a)(2), (b)(2)(vii), (b)(5), and (g); and including §300.415(j) with regard to meeting ARARs where practicable except that private party removal actions must always comply with the requirements of applicable law;

(vii) Section 300.420 (on remedial site evaluation);

(viii) Section 300.430 (on RI/FS and selection of remedy) except paragraph (f)(1)(ii)(C)(6) and that applicable requirements of federal or state law may not be waived by a private party; and

(ix) Section 300.435 (on RD/RA and operation and maintenance).

(6) Private parties undertaking response actions should provide an opportunity for public comment concerning the selection of the response action based on the provisions set out below, or based on substantially equivalent state and local requirements. The following provisions of this part regarding public participation are potentially applicable to private party response actions, with the exception of administrative record and information repository requirements stated therein:

(i) Section 300.155 (on public information and community relations);

(ii) Section 300.415(n) (on community relations during removal actions);

(iii) Section 300.430(c) (on community relations during RI/FS) except paragraph (c)(5);

(iv) Section 300.430(f)(2), (3), and (6) (on community relations during selection of remedy); and

(v) Section 300.435(c) (on community relations during RD/RA and operation and maintenance).

(7) When selecting the appropriate remedial action, the methods of remedying releases listed in appendix D of this part may also be appropriate to a private party response action.

(8) Except for actions taken pursuant to CERCLA sections 104 or 106 or response actions for which reimbursement from the Fund will be sought, any action to be taken by the lead agency listed in paragraphs (c)(5) through (c)(7) may be taken by the person carrying out the response action.

(d) *Section 111(a)(2) claims.* (1) Persons, other than those listed in paragraphs (d)(1)(i) through (iii) of this section, may be able to receive reimbursement of response costs by means of a claim against the Fund. The categories of persons excluded from pursuing this claims authority are:

(i) Federal government;

(ii) State governments, and their political subdivisions, unless they are potentially responsible parties covered by an order or consent decree pursuant to section 122 of CERCLA; and

(iii) Persons operating under a procurement contract or an assistance agreement with the United States with respect to matters covered by that contract or assistance agreement, unless specifically provided therein.

(2) In order to be reimbursed by the Fund, an eligible person must notify the Administrator of EPA or designee prior to taking a response action and receive prior approval, *i.e.*, ''preauthorization,'' for such action.

(3) Preauthorization is EPA's prior approval to submit a claim against the Fund for necessary response costs incurred as a result of carrying out the NCP. All applications for preauthorization will be reviewed to determine whether the request should receive priority for funding. EPA, in its discretion, may grant preauthorization of a claim. Preauthorization will be considered only for:

(i) Removal actions pursuant to §300.415;

(ii) CERCLA section 104(b) activities; and

(iii) Remedial actions at National Priorities List sites pursuant to §300.435.

(4) To receive EPA's prior approval, the eligible person must:

(i) Demonstrate technical and other capabilities to respond safely and effectively to releases of hazardous substances, pollutants, or contaminants; and

(ii) Establish that the action will be consistent with the NCP in accordance with the elements set forth in paragraphs (c)(5) through (8) of this section.

(5) EPA will grant preauthorization to a claim by a party it determines to

be potentially liable under section 107 of CERCLA only in accordance with an order issued pursuant to section 106 of CERCLA, or a settlement with the federal government in accordance with section 122 of CERCLA.

(6) Preauthorization does not establish an enforceable contractual relationship between EPA and the claimant.

(7) Preauthorization represents EPA's commitment that if funds are appropriated for response actions, the response action is conducted in accordance with the preauthorization decision document, and costs are reasonable and necessary, reimbursement will be made from the Superfund, up to the maximum amount provided in the preauthorization decision document.

(8) For a claim to be awarded under section 111 of CERCLA, EPA must certify that the costs were necessary and consistent with the preauthorization decision document.

(e) *Section 106(b) petition.* Subject to conditions specified in CERCLA section 106(b), any person who has complied with an order issued after October 16, 1986 pursuant to section 106(a) of CERCLA, may seek reimbursement for response costs incurred in complying with that order unless the person has waived that right.

(f) *Section 123 reimbursement to local governments.* Any general purpose unit of local government for a political subdivision that is affected by a release may receive reimbursement for the costs of temporary emergency measures necessary to prevent or mitigate injury to human health or the environment subject to the conditions set forth in 40 CFR part 310. Such reimbursement may not exceed $25,000 for a single response.

(g) *Release From Liability.* Implementation of response measures by potentially responsible parties or by any other person does not release those parties from liability under section 107(a) of CERCLA, except as provided in a settlement under section 122 of CERCLA or a federal court judgment.

(h) *Oil Pollution Act Claims.* Claims are authorized to be presented to the OSLTF under section 1013 of the OPA, for certain uncompensated removal costs or uncompensated damages resulting from the discharge, or substantial threat of discharge, of oil from a vessel or facility into or upon the navigable waters, adjoining shorelines, or exclusive economic zone of the United States. Anyone desiring to file a claim against the OSLTF may obtain general information on the procedure for filing a claim from the Director, National Pollution Funds Center, Suite 1000, 4200 Wilson Boulevard, Arlington, Virginia 22203–1804, (703) 235–4756.

Subpart I—Administrative Record for Selection of Response Action

SOURCE: 55 FR 8859, Mar. 8, 1990, unless otherwise noted.

§ 300.800 Establishment of an administrative record.

(a) *General requirement.* The lead agency shall establish an administrative record that contains the documents that form the basis for the selection of a response action. The lead agency shall compile and maintain the administrative record in accordance with this subpart.

(b) *Administrative records for federal facilities.* (1) If a federal agency other than EPA is the lead agency for a federal facility, the federal agency shall compile and maintain the administrative record for the selection of the response action for that facility in accordance with this subpart. EPA may furnish documents which the federal agency shall place in the administrative record file to ensure that the administrative record includes all documents that form the basis for the selection of the response action.

(2) EPA or the U.S. Coast Guard shall compile and maintain the administrative record when it is the lead agency for a federal facility.

(3) If EPA is involved in the selection of the response action at a federal facility on the NPL, the federal agency acting as the lead agency shall provide EPA with a copy of the index of documents included in the administrative record file, the RI/FS workplan, the RI/FS released for public comment, the proposed plan, any public comments received on the RI/FS and proposed plan, and any other documents EPA may request on a case-by-case basis.

(c) *Administrative record for state-lead sites.* If a state is the lead agency for a site, the state shall compile and maintain the administrative record for the selection of the response action for that site in accordance with this subpart. EPA may require the state to place additional documents in the administrative record file to ensure that the administrative record includes all documents which form the basis for the selection of the response action. The state shall provide EPA with a copy of the index of documents included in the administrative record file, the RI/FS workplan, the RI/FS released for public comment, the proposed plan, any public comments received on the RI/FS and proposed plan, and any other documents EPA may request on a case-by-case basis.

(d) *Applicability.* This subpart applies to all response actions taken under section 104 of CERCLA or sought, secured, or ordered administratively or judicially under section 106 of CERCLA, as follows:

(1) Remedial actions where the remedial investigation commenced after the promulgation of these regulations; and

(2) Removal actions where the action memorandum is signed after the promulgation of these regulations.

(e) For those response actions not included in paragraph (d) of this section, the lead agency shall comply with this subpart to the extent practicable.

§ 300.805 Location of the administrative record file.

(a) The lead agency shall establish a docket at an office of the lead agency or other central location at which documents included in the administrative record file shall be located and a copy of the documents included in the administrative record file shall also be made available for public inspection at or near the site at issue, except as provided below:

(1) Sampling and testing data, quality control and quality assurance documentation, and chain of custody forms, need not be located at or near the site at issue or at the central location, provided that the index to the administrative record file indicates the location and availability of this information.

(2) Guidance documents not generated specifically for the site at issue need not be located at or near the site at issue, provided that they are maintained at the central location and the index to the administrative record file indicates the location and availability of these guidance documents.

(3) Publicly available technical literature not generated for the site at issue, such as engineering textbooks, articles from technical journals, and toxicological profiles, need not be located at or near the site at issue or at the central location, provided that the literature is listed in the index to the administrative record file or the literature is cited in a document in the record.

(4) Documents included in the confidential portion of the administrative record file shall be located only in the central location.

(5) The administrative record for a removal action where the release or threat of release requires that on-site removal activities be initiated within hours of the lead agency's determination that a removal is appropriate and on-site removal activities cease within 30 days of initiation, need be available for public inspection only at the central location.

(b) Where documents are placed in the central location but not in the file located at or near the site, such documents shall be added to the file located at or near the site upon request, except for documents included in paragraph (a)(4) of this section.

(c) The lead agency may make the administrative record file available to the public in microform, computer telecommunications, or other electronic means.

[55 FR 8859, Mar. 8, 1990, as amended at 78 FR 16614, Mar. 18, 2013]

§ 300.810 Contents of the administrative record file.

(a) *Contents.* The administrative record file for selection of a response action typically, but not in all cases, will contain the following types of documents:

(1) Documents containing factual information, data and analysis of the factual information, and data that may

form a basis for the selection of a response action. Such documents may include verified sampling data, quality control and quality assurance documentation, chain of custody forms, site inspection reports, preliminary assessment and site evaluation reports, ATSDR health assessments, documents supporting the lead agency's determination of imminent and substantial endangerment, public health evaluations, and technical and engineering evaluations. In addition, for remedial actions, such documents may include approved workplans for the remedial investigation/feasibility study, state documentation of applicable or relevant and appropriate requirements, and the RI/FS;

(2) Guidance documents, technical literature, and site-specific policy memoranda that may form a basis for the selection of the response action. Such documents may include guidance on conducting remedial investigations and feasibility studies, guidance on determining applicable or relevant and appropriate requirements, guidance on risk/exposure assessments, engineering handbooks, articles from technical journals, memoranda on the application of a specific regulation to a site, and memoranda on off-site disposal capacity;

(3) Documents received, published, or made available to the public under § 300.815 for remedial actions, or § 300.820 for removal actions. Such documents may include notice of availability of the administrative record file, community relations plan, proposed plan for remedial action, notices of public comment periods, public comments and information received by the lead agency, and responses to significant comments;

(4) Decision documents. Such documents may include action memoranda and records of decision;

(5) Enforcement orders. Such documents may include administrative orders and consent decrees; and

(6) An index of the documents included in the administrative record file. If documents are customarily grouped together, as with sampling data chain of custody documents, they may be listed as a group in the index to the administrative record file.

(b) *Documents not included in the administrative record file.* The lead agency is not required to include documents in the administrative record file which do not form a basis for the selection of the response action. Such documents include but are not limited to draft documents, internal memoranda, and day-to-day notes of staff unless such documents contain information that forms the basis of selection of the response action and the information is not included in any other document in the administrative record file.

(c) *Privileged documents.* Privileged documents shall not be included in the record file except as provided in paragraph (d) of this section or where such privilege is waived. Privileged documents include but are not limited to documents subject to the attorney-client, attorney work product, deliberative process, or other applicable privilege.

(d) *Confidential file.* If information which forms the basis for the selection of a response action is included only in a document containing confidential or privileged information and is not otherwise available to the public, the information, to the extent feasible, shall be summarized in such a way as to make it disclosable and the summary shall be placed in the publicly available portion of the administrative record file. The confidential or privileged document itself shall be placed in the confidential portion of the administrative record file. If information, such as confidential business information, cannot be summarized in a disclosable manner, the information shall be placed only in the confidential portion of the administrative record file. All documents contained in the confidential portion of the administrative record file shall be listed in the index to the file.

§ 300.815 Administrative record file for a remedial action.

(a) The administrative record file for the selection of a remedial action shall be made available for public inspection at the commencement of the remedial investigation phase. At such time, the lead agency shall publish in a major local newspaper of general circulation a notice or use one or more other mechanisms to give adequate notice to a community of the availability of the administrative record file.

(b) The lead agency shall provide a public comment period as specified in § 300.430(f)(3) so that interested persons may submit comments on the selection of the remedial action for inclusion in the administrative record file. The lead agency is encouraged to consider and respond as appropriate to significant comments that were submitted prior to the public comment period. A written response to significant comments submitted during the public comment period shall be included in the administrative record file.

(c) The lead agency shall comply with the public participation procedures required in § 300.430(f)(3) and shall document such compliance in the administrative record.

(d) Documents generated or received after the record of decision is signed shall be added to the administrative record file only as provided in § 300.825.

[55 FR 8859, Mar. 8, 1990, as amended at 80 FR 17706, Apr. 2, 2015]

§ 300.820 Administrative record file for a removal action.

(a) If, based on the site evaluation, the lead agency determines that a removal action is appropriate and that a planning period of at least six months exists before on-site removal activities must be initiated:

(1) The administrative record file shall be made available for public inspection when the engineering evaluation/cost analysis (EE/CA) is made available for public comment. At such time, the lead agency shall publish in a major local newspaper of general circulation a notice or use one or more other mechanisms to give adequate notice to a community of the availability of the administrative record file.

(2) The lead agency shall provide a public comment period as specified in § 300.415 so that interested persons may submit comments on the selection of the removal action for inclusion in the administrative record file. The lead agency is encouraged to consider and respond, as appropriate, to significant comments that were submitted prior to the public comment period. A written response to significant comments submitted during the public comment period shall be included in the administrative record file.

(3) The lead agency shall comply with the public participation procedures of § 300.415(m) and shall document compliance with § 300.415(m)(3)(i) through (iii) in the administrative record file.

(4) Documents generated or received after the decision document is signed shall be added to the administrative record file only as provided in § 300.825.

(b) For all removal actions not included in paragraph (a) of this section:

(1) Documents included in the administrative record file shall be made available for public inspection no later than 60 days after initiation of on-site removal activity. At such time, the lead agency shall publish in a major local newspaper of general circulation a notice or use one or more other mechanisms to give adequate notice to a community of the availability of the administrative record file.

(2) The lead agency shall, as appropriate, provide a public comment period of not less than 30 days beginning at the time the administrative record file is made available to the public. The lead agency is encouraged to consider and respond, as appropriate, to significant comments that were submitted prior to the public comment period. A written response to significant comments submitted during the public comment period shall be included in the administrative record file.

(3) Documents generated or received after the decision document is signed shall be added to the administrative record file only as provided in § 300.825.

[55 FR 8859, Mar. 8, 1990, as amended at 80 FR 17706, Apr. 2, 2015]

§ 300.825 Record requirements after the decision document is signed.

(a) The lead agency may add documents to the administrative record file after the decision document selecting the response action has been signed if:

(1) The documents concern a portion of a response action decision that the decision document does not address or reserves to be decided at a later date; or

(2) An explanation of significant differences required by § 300.435(c), or an amended decision document is issued,

in which case, the explanation of significant differences or amended decision document and all documents that form the basis for the decision to modify the response action shall be added to the administrative record file.

(b) The lead agency may hold additional public comment periods or extend the time for the submission of public comment after a decision document has been signed on any issues concerning selection of the response action. Such comment shall be limited to the issues for which the lead agency has requested additional comment. All additional comments submitted during such comment periods that are responsive to the request, and any response to these comments, along with documents supporting the request and any final decision with respect to the issue, shall be placed in the administrative record file.

(c) The lead agency is required to consider comments submitted by interested persons after the close of the public comment period only to the extent that the comments contain significant information not contained elsewhere in the administrative record file which could not have been submitted during the public comment period and which substantially support the need to significantly alter the response action. All such comments and any responses thereto shall be placed in the administrative record file.

Subpart J—Use of Dispersants and Other Chemicals

EFFECTIVE DATE NOTE: At 88 FR 38333, June 12, 2023, the Subpart J heading was revised, effective Dec. 11, 2023. For the convenience of the user, the revised text is set forth as follows:

Subpart J—Use of Dispersants, and Other Chemical and Biological Agents

SOURCE: 59 FR 47453, Sept. 15, 1994, unless otherwise noted.

§ 300.900 General.

(a) Section 311(d)(2)(G) of the CWA requires that EPA prepare a schedule of dispersants, other chemicals, and other spill mitigating devices and substances, if any, that may be used in carrying out the NCP. This subpart makes provisions for such a schedule.

(b) This subpart applies to the navigable waters of the United States and adjoining shorelines, the waters of the contiguous zone, and the high seas beyond the contiguous zone in connection with activities under the Outer Continental Shelf Lands Act, activities under the Deepwater Port Act of 1974, or activities that may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States, including resources under the Magnuson Fishery Conservation and Management Act of 1976.

(c) This subpart applies to the use of any chemical agents or other additives as defined in subpart A of this part that may be used to remove or control oil discharges.

EFFECTIVE DATE NOTE: At 88 FR 38333, June 12, 2023, § 300.900 was amended by revising paragraphs (a) and (c), and by adding paragraph (d), effective Dec. 11, 2023. For the convenience of the user, the revised and added text is set forth as follows:

§ 300.900 General.

(a) Section 311(d)(2)(G) of the Clean Water Act (CWA) requires EPA to prepare a schedule identifying dispersants, other chemicals, other spill mitigating devices and substances, if any, that may be used in carrying out the NCP; and the waters and quantities in which they may be used safely. This subpart establishes a schedule that includes the NCP Product Schedule identifying chemical and biological agents, the Sorbents Product List, and the authorization of use procedures that, when taken together, identify the waters and quantities in which such dispersants, other chemicals, or other spill mitigating devices and substances may be used safely.

* * * * *

(c) This subpart applies to the use of chemical and biological agents as defined in Subpart A of this part, or other substances that may be used to remove, control, or otherwise mitigate oil discharges.

(d) [Reserved]

§ 300.905 NCP Product Schedule.

(a) *Oil Discharges.* (1) EPA shall maintain a schedule of dispersants and other chemical or bioremediation products that may be authorized for use on oil discharges in accordance with the procedures set forth in § 300.910. This schedule, called the NCP Product Schedule, may be obtained from the Emergency Response Division (5202–G), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460. The telephone number is 703–603–8760.

(2) Products may be added to the NCP Product Schedule by the process specified in § 300.920.

(b) *Hazardous Substance Releases.* [Reserved]

[59 FR 47453, Sept. 15, 1994, as amended at 65 FR 47325, Aug. 2, 2000]

EFFECTIVE DATE NOTE: At 88 FR 38333, June, 12, 2023, § 300.905 was removed, effective Dec. 11, 2023.

§ 300.910 Authorization of use.

(a) RRTs and Area Committees shall address, as part of their planning activities, the desirability of using appropriate dispersants, surface washing agents, surface collecting agents, bioremediation agents, or miscellaneous oil spill control agents listed on the NCP Product Schedule, and the desirability of using appropriate burning agents. RCPs and ACPs shall, as appropriate, include applicable preauthorization plans and address the specific contexts in which such products should and should not be used. In meeting the provisions of this paragraph, preauthorization plans may address factors such as the potential sources and types of oil that might be spilled, the existence and location of environmentally sensitive resources that might be impacted by spilled oil, available product and storage locations, available equipment and adequately trained operators, and the available means to monitor product application and effectiveness. The RRT representatives from EPA and the states with jurisdiction over the waters of the area to which a preauthorization plan applies and the DOC and DOI natural resource trustees shall review and either approve, disapprove, or approve with modification the preauthorization plans developed by Area Committees, as appropriate. Approved preauthorization plans shall be included in the appropriate RCPs and ACPs. If the RRT representatives from EPA and the states with jurisdiction over the waters of the area to which a preauthorization plan applies and the DOC and DOI natural resource trustees approve in advance the use of certain products under specified circumstances as described in the preauthorization plan, the OSC may authorize the use of the products without obtaining the specific concurrences described in paragraphs (b) and (c) of this section.

(b) For spill situations that are not addressed by the preauthorization plans developed pursuant to paragraph (a) of this section, the OSC, with the concurrence of the EPA representative to the RRT and, as appropriate, the concurrence of the RRT representatives from the states with jurisdiction over the navigable waters threatened by the release or discharge, and in consultation with the DOC and DOI natural resource trustees, when practicable, may authorize the use of dispersants, surface washing agents, surface collecting agents, bioremediation agents, or miscellaneous oil spill control agents on the oil discharge, provided that the products are listed on the NCP Product Schedule.

(c) The OSC, with the concurrence of the EPA representative to the RRT and, as appropriate, the concurrence of the RRT representatives from the states with jurisdiction over the navigable waters threatened by the release or discharge, and in consultation with the DOC and DOI natural resource trustees, when practicable, may authorize the use of burning agents on a case-by-case basis.

(d) The OSC may authorize the use of any dispersant, surface washing agent, surface collecting agent, other chemical agent, burning agent, bioremediation agent, or miscellaneous oil spill control agent, including products not listed on the NCP Product Schedule, without obtaining the concurrence of the EPA representative to the RRT and, as appropriate, the RRT representatives from the states with jurisdiction over the navigable waters threatened by the release or discharge, when, in the judgment of the OSC, the use of the product is necessary to prevent or substantially reduce a hazard to human life. Whenever the OSC authorizes the use of a product pursuant to this paragraph, the OSC is to inform the EPA RRT representative and, as appropriate, the RRT representatives from the affected states and, when practicable, the DOC/DOI natural resources trustees of the use of a product, including products not on the Schedule, as soon as possible. Once the threat to human life has subsided, the continued use of a product shall be in accordance with paragraphs (a), (b), and (c) of this section.

(e) Sinking agents shall not be authorized for application to oil discharges.

(f) When developing preauthorization plans, RRTs may require the performance of supplementary toxicity and effectiveness testing of products, in addition to the test methods specified in §300.915 and described in appendix C to part 300, due to existing site-specific or area-specific concerns.

EFFECTIVE DATE NOTE: At 88 FR 38333, June 12, 2023, §300.910 was revised, effective Dec. 11, 2023. For the convenience of the user, the revised text is set forth as follows:

§ 300.910 Authorization for agent use.

Use of chemical or biological agents in response to oil discharges must be authorized by the OSC in accordance with the provisions of this section.

(a) *Use of agents identified on the NCP Product Schedule or use of burning agents on oil discharges addressed by a preauthorization plan.* Area Committees and RRTs shall address, as part of their planning activities, whether preauthorization of the use of chemical and biological agents listed on the NCP Product Schedule or the use of burning agents on certain oil discharges is appropriate. Area Committees and RRTs shall, as appropriate, include applicable approved preauthorization plans in ACPs and RCPs. When a preauthorization plan is approved in advance for the use of certain agents under specified discharge situations, then the OSC may authorize the use of agents listed on the NCP Product Schedule, or the use of burning agents, for the purpose for which they were specifically listed without obtaining the incident-specific concurrences and without the natural resource trustees consultations described in paragraph (b) of this section.

(1) *Preauthorization plan development.* For discharge situations identified where such agents may be used, the preauthorization plan must, at a minimum, specify limits for the quantities and the duration of use, and use parameters for water depth, distance to shoreline, and proximity to populated areas. In meeting the provisions of this paragraph, preauthorization plans should document how regional factors are addressed including likely sources and types of oil that might be discharged, various potential discharge scenarios, the existence and location of environmentally sensitive resources or restricted areas that might be impacted by discharged oil, and logistical factors including inventory, storage locations and manufacturing capability of available agents, availability of equipment needed for agent use, availability of adequately trained operators, and means to monitor agent use in the environment. Preauthorization plans are to be developed by the Area Committees or the RRT in consultation with the Area Committee(s).

(2) *Preauthorization plan approval.* The EPA representative to the RRT, the Department of Commerce and the Department of the Interior natural resource trustees and, as appropriate the RRT representative from the state(s) with jurisdiction over waters and adjoining shorelines within the preauthorization plan area shall review and either approve, approve with modification, or disapprove the preauthorization plans. The Area Committees and RRTs shall address the withdrawal of approval from a preauthorization plan, and the RRT shall notify the NRT of the status of the preauthorization plan within 30 days from any such withdrawal.

(3) *Preauthorization plan reviews.* The RRT in consultation with the Area Committee(s) must review, and revise, as needed, approved preauthorization plans. These reviews must be conducted following a regular timeframe, established by the RRT and documented in the plan, to address changes that may impact the conditions under which the use of chemical and biological agents have been preauthorized. Reviews must also be conducted in any affected region, at a minimum, after a major discharge or after a Spill of National Significance (SONS) relevant to the preauthorization plan area; to address revisions of the NCP Product Schedule impacting chemical or biological agents that may be individually listed within a preauthorization plan; and to reflect new listings of threatened and/or endangered species applicable to the preauthorization plan area. The EPA RRT representative, the Department of Commerce and Department of the Interior natural resource trustees, and the RRT representative from the state(s) with jurisdiction over the waters of the area to which a preauthorization plan applies shall review and either approve, approve with modification, or disapprove any revisions to the preauthorization plans.

(b) *Use of agents identified on the NCP Product Schedule or use of burning agents on oil discharges not addressed by a preauthorization plan.* For discharge situations that are not addressed by a preauthorization plan developed pursuant to paragraph (a) of this section, the OSC may authorize the use of chemical or biological agents identified on the NCP Product Schedule on an oil discharge, or the use of burning agents, for the specific purpose for which they were listed with the concurrence of the EPA RRT representative and, as appropriate, the concurrence of the RRT representatives from the state(s) with jurisdiction over the waters and adjoining shorelines threatened by the release or discharge, and in consultation with the Department of Commerce and Department of the Interior natural resource trustees. In meeting the provisions of this paragraph, the OSC must consider and document for their authorization request to the RRT, at a minimum, the parameters for the use of agents including the quantities requested to be authorized, the duration of use, the depth of water, the distance to shoreline and proximity to populated areas, and should consider and document factors such as environmentally sensitive resources or restricted areas that might be impacted, agent inventory and storage locations, agent manufacturing capability, availability of equipment needed for agent use, availability of adequately trained operators and appropriate means to monitor agent use in the environment.

(c) [Reserved]

(d) *Temporary exception.* In circumstances to prevent or substantially reduce an imminent threat to human life that cannot be immediately addressed by other procedures or provisions of the NCP, the OSC may authorize the provisional use of any chemical or biological agent, whether it is identified or not on the NCP Product Schedule, without obtaining the concurrence of the EPA RRT representative and, as appropriate, the RRT representatives from the state(s) with jurisdiction over the waters and adjoining shorelines threatened by the release or discharge, and without consultation with the Department of Commerce and the Department of the Interior natural resource trustees. This exception shall not be used as a substitute for compliance with § 300.150 of this part, including the use of personal protective equipment, or when there is sufficient time to seek authorization in accordance with paragraphs (a) or (b) of this section. If an agent is authorized for use pursuant to this paragraph, the OSC shall notify as soon as possible the EPA RRT representative and as appropriate, the RRT representatives from the affected state(s) and the Department of Commerce and Department of the Interior natural resource trustees. The OSC shall document the circumstances and the reasons for use of the agent authorized pursuant to this paragraph. Agent use for individual circumstances under this exception shall be in accordance with paragraphs (a) or (b) of this section no later than 24 hours after initial application.

(e) *Prohibited agents or substances.* The OSC may not authorize the use of the following:

(1) Sinking agents, or any other chemical agent, biological agent, or any substance that is used to directly sink the oil to the bottom of a water body.

(2) [Reserved]

(f) *Storage and use of agents listed on the NCP Product Schedule.* (1) The OSC may authorize for use only products listed on the NCP Product Schedule that are documented and certified by the responsible party or its representative to have been stored under the conditions provided by the submitter under § 300.915(a)(6), and whose date of use does not exceed the expiration date listed on the container's label unless otherwise specified for expired products as provided in § 300.910(f)(2), at the time of the incident.

(2) The OSC may authorize for use products listed on the NCP Product Schedule that exceed their expiration date after the responsible party or its representative documents and certifies that the expired product has been stored under the conditions provided by the submitter under § 300.915(a)(6) and still meets the applicable efficacy and toxicity listing provisions under § 300.915, based on testing of representative samples within the previous 12 months.

(g) *Supplemental testing, monitoring, and information.* The RRT may require, for both planning and response, including authorization of use, supplemental toxicity and efficacy testing, or submission of available data and information that addresses site, area, and ecosystem-specific concerns relative to the use of any chemical or biological agent. The product manufacturer or responsible party shall provide, upon request of the RRT or OSC, additional monitoring or testing data and information to inform chemical or biological agent use decisions specific to a response.

(h) *Recovery of chemical agents and other substances from the environment.* The responsible party shall ensure that removal actions adequately contain, collect, store, and dispose of chemical agents and other substances that are to be recovered from the environment, unless otherwise directed by the OSC. Chemical agents and other substances to be recovered include solidifiers, surface washing agents, and sorbents. The OSC should, at a minimum, consider factors such as the safety of response personnel and harm to the environment in making determinations pursuant to this paragraph.

(i) *Reporting of agent use.* (1) The authorizing OSC shall provide the RRT the following information on chemical and biological agents used in response to an oil discharge: product name, product category, quantity and concentrations used, duration of use, location(s) of use, any available data collected, and any available analyses of efficacy and environmental effects. This information must be provided within 30 days of completion of agent use. This information may be submitted in accordance with the OSC reporting provisions under § 300.165 of this part, as applicable, subject to the 30-day timing requirement.

(2) In support of sections 300.135(n) and 300.155(a) and (b) of this part, the authorizing OSC shall provide for notification to the public, updated during a response as appropriate, the following information on chemical and biological agents used in response to an oil discharge: product name, product category, quantity and concentrations used, duration of use, and location(s) of use.

§ 300.913 Monitoring the use of dispersants.

The responsible party shall monitor any subsurface use of dispersant in response to an oil discharge, any surface use of dispersant for more than 96 hours after initial application in response to an oil discharge, and any surface use of dispersant in response to oil discharges of more than 100,000 U.S. gallons occurring within a 24-hour period, and shall submit a Dispersant Monitoring Quality Assurance Project Plan (DMQAPP) covering the collection of environmental data within this section to the OSC. When any dispersant is used subsurface in response to an oil discharge, the responsible party shall implement paragraphs (a) through (g) of this section for the entire duration of the subsurface dispersant use. When any dispersant is used on the surface in response to oil discharges of greater than 100,000 U.S. gallons occurring within a 24-hour period, the responsible party shall implement paragraphs (a) through (g) of this section as soon as possible for the entire or remaining duration of surface dispersant use, as applicable. When any dispersant is used on the surface in response to an oil discharge for more than 96 hours after initial application, the responsible party shall implement paragraphs (a) through (g) of this section for the remaining duration of surface dispersant use.

(a) Document:

(1) The characteristics of the source oil.

(2) The best estimate of the oil discharge volume or flow rate, periodically reevaluated as conditions dictate, including a description of the method, associated uncertainties, and materials.

(3) The dispersant used, rationale for dispersant choice(s) including the results of any efficacy and toxicity tests specific to area or site conditions, recommended dispersant-to-oil ratio (DOR).

(4) The application method(s) and procedures, including a description of the equipment to be used, hourly application rates, capacities, and total amount of dispersant.

(5) For subsurface discharges, the best estimate of the discharge flow rate of any associated volatile petroleum hydrocarbons, periodically reevaluated as conditions dictate, including a description of the method, associated uncertainties, and materials.

(b) Collect a representative set of ambient background water column samples in areas not affected by the discharge of oil, at the closest safe distance from the discharge as determined by the OSC, and in all directions of likely oil transport considering surface and subsurface currents. Collect a representative set of baseline water column samples absent dispersant application at such depths and locations affected by the oil discharge, considering surface and subsurface currents, oil properties, and other relevant discharge conditions. On a daily basis, collect dispersed oil plume water column samples at such depths and locations where dispersed oil is likely to be present, considering surface and subsurface currents, oil properties, and other relevant discharge conditions. Collect these ambient background, baseline, and dispersed oil plume water column samples following standard operating and quality assurance procedures. Analyze the collected ambient background, baseline, and dispersed oil plume water column samples for:

(1) In-situ oil droplet size distribution, including mass or volume mean diameter for droplet sizes ranging from 2.5 to 2,000 µm, with the majority of data collected between the 2.5 and 100 µm size.

(2) In-situ fluorometry and fluorescence signatures targeted to the type of oil discharged and referenced against the source oil.

(3) Dissolved oxygen (DO) (subsurface only).

(4) Total petroleum hydrocarbons, individual resolvable constituents including volatile organic compounds, aliphatic hydrocarbons, monocyclic, polycyclic, and other aromatic hydrocarbons including alkylated homologs, and hopane and sterane biomarker compounds.

(5) Methane, if present (subsurface only).

(6) Heavy metals, including nickel and vanadium.

(7) Turbidity.

(8) Water temperature.

(9) pH.

(10) Conductivity.

(c) Considering available technologies, characterize the dispersant effectiveness and oil distribution including trajectory, accounting for the condition of oil, dispersant, and dispersed oil components from the discharge location, and describing associated uncertainties.

(d) Characterize the ecological receptors (*e.g.*, aquatic species, wildlife, and/or other biological resources) and their habitats that may be present in the discharge area and their exposure pathways. The characterization shall include, but is not limited to, those species that may be in sensitive life stages, transient or migratory species, breeding or breeding-related activities (*e.g.*, embryo and larvae development), and threatened and/or endangered species that may be exposed to the oil that is not dispersed, the dispersed oil, and the dispersant alone. The responsible party shall also estimate an acute toxicity level of concern for the dispersed oil using available dose-response information relevant to potentially exposed species following a species sensitivity distribution.

(e) Immediately report to the OSC any:

(1) Deviation of more than 10 percent from the mean hourly dispersant use rate for subsurface application, based on the dispersant volume authorized for 24 hours use, and the reason for the deviation.

(2) Ecological receptors of environmental importance, and any other ecological receptors as identified by the OSC or the Natural Resource Trustees, including any threatened or endangered species that may be exposed based on dispersed plume trajectory modeling and level of concern information.

(f) Report daily to the OSC water sampling and data analyses collected in paragraph (b) of this section and include:

(1) For each application platform, the actual amount of dispersant used for each one-hour period and the total amount of dispersant used for the previous 24-hour reporting period.

(2) All collected data and analyses of those data within a time frame necessary to make operational decisions (*e.g.*, within 24 hours of collection), including documented observations, photographs, video, and any other information related to dispersant use, unless an alternate time frame is authorized by the OSC.

(3) For analyses that take more than 24 hours due to analytical methods, provide such data and results as available but no later than five days, unless an alternate time frame is authorized by the OSC.

(4) Estimates of the daily transport of dispersed oil, non-dispersed oil, the associated volatile petroleum hydrocarbons, and dispersants, using available technology as described in paragraph (c) of this section.

(g) Report all information provided to the OSC under paragraphs (e) and (f) of this section to the applicable RRT(s).

[86 FR 40263, July 27, 2021]

§ 300.915 Data requirements.

(a) *Dispersants.* (1) Name, brand, or trademark, if any, under which the dispersant is sold.

(2) Name, address, and telephone number of the manufacturer, importer, or vendor.

(3) Name, address, and telephone number of primary distributors or sales outlets.

(4) Special handling and worker precautions for storage and field application. Maximum and minimum storage temperatures, to include optimum ranges as well as temperatures that will cause phase separations, chemical changes, or other alterations to the effectiveness of the product.

(5) Shelf life.

(6) Recommended application procedures, concentrations, and conditions for use depending upon water salinity, water temperature, types and ages of the pollutants, and any other application restrictions.

(7) Effectiveness. Use the Swirling Flask effectiveness test methods described in appendix C to part 300. Manufacturers shall submit test results and supporting data, along with a certification signed by responsible corporate officials of the manufacturer and laboratory stating that the test was conducted on a representative product sample, the testing was conducted using generally accepted laboratory practices, and they believe the results to be accurate. A dispersant must attain an effectiveness value of 45 percent or greater to be added to the NCP Product Schedule. Manufacturers are encouraged to provide data on product performance under conditions other than those captured by these tests.

(8) *Dispersant Toxicity.* For those dispersants that meet the effectiveness threshold described in paragraph (a)(7) above, use the standard toxicity test methods described in appendix C to part 300. Manufacturers shall submit test results and supporting data, along with a certification signed by responsible corporate officials of the manufacturer and laboratory stating that the test was conducted on a representative product sample, the testing was conducted using generally accepted laboratory practices, and they believe the results to be accurate.

(9) The following data requirements incorporate by reference standards from the 1991 or 1992 Annual Books of ASTM Standards. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51.[1]

(i) Flash Point—Select appropriate method from the following:

(A) ASTM—D 56–87, ''Standard Test Method for Flash Point by Tag Closed Tester;''

(B) ASTM—D 92–90, ''Standard Test Method for Flash and Fire Points by Cleveland Open Cup;''

(C) ASTM—D 93–90, ''Standard Test Methods for Flash Point by Pensky-Martens Closed Tester;''

(D) ASTM—D 1310–86, ''Standard Test Method for Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus;'' or

(E) ASTM—D 3278–89, ''Standard Test Methods for Flash Point of Liquids by Setaflash Closed-Cup Apparatus.''

(ii) Pour Point—Use ASTM—D 97–87, ''Standard Test Method for Pour Point of Petroleum Oils.''

(iii) Viscosity—Use ASTM—D 445–88, ''Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity).''

(iv) Specific Gravity—Use ASTM—D 1298–85(90), ''Standard Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method.''

(v) pH—Use ASTM—D 1293–84(90), ''Standard Test Methods for pH of Water.''

(10) Dispersing Agent Components. Itemize by chemical name and percentage by weight each component of the total formulation. The percentages will include maximum, minimum, and average weights in order to reflect quality control variations in manufacture or formulation. In addition to the chemical information provided in response to the first two sentences, identify the major components in at least the following categories: surface active agents, solvents, and additives.

(11) Heavy Metals, Cyanide, and Chlorinated Hydrocarbons. Using standard test procedures, state the concentrations or upper limits of the following materials:

(i) Arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc,

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[1] Copies of these standards may be obtained from the publisher. Copies may be inspected at the U.S. Environmental Protection Agency Superfund Docket, located at 1235 Jefferson Davis Highway, First Floor, Arlington, VA 22202 or send mail to Mail Code 5305G, 1200 Pennsylvania Ave., NW., Washington, DC, or at the Office of the Federal Register, 1100 L Street, NW., Room 8401, Washington, DC 20408.

plus any other metals that may be reasonably expected to be in the sample. Atomic absorption methods should be used and the detailed analytical methods and sample preparation shall be fully described.

(ii) Cyanide. Standard calorimetric procedures should be used.

(iii) Chlorinated hydrocarbons. Gas chromatography should be used and the detailed analytical methods and sample preparation shall be fully described. At a minimum, the following test methods shall be used for chlorinated hydrocarbon analyses: EPA Method 601—Purgeable halocarbons (Standard Method 6230 B) and EPA Method 608—Organochlorine pesticides and PCBs (Standard Method 6630 C).[2]

(12) The technical product data submission shall include the identity of the laboratory that performed the required tests, the qualifications of the laboratory staff, including professional biographical information for individuals responsible for any tests, and laboratory experience with similar tests. Laboratories performing toxicity tests for dispersant toxicity must demonstrate previous toxicity test experience in order for their results to be accepted. It is the responsibility of the submitter to select competent analytical laboratories based on the guidelines contained herein. EPA reserves the right to refuse to accept a submission of technical product data because of lack of qualification of the analytical laboratory, significant variance between submitted data and any laboratory confirmation performed by EPA, or other circumstances that would result in inadequate or inaccurate information on the dispersing agent.

(b) *Surface washing agents.* (1) Name, brand, or trademark, if any, under which the surface washing agent is sold.

(2) Name, address, and telephone number of the manufacturer, importer, or vendor.

(3) Name, address, and telephone number of primary distributors or sales outlets.

(4) Special handling and worker precautions for storage and field application. Maximum and minimum storage temperatures, to include optimum ranges as well as temperatures that will cause phase separations, chemical changes, or other alterations to the effectiveness of the product.

(5) Shelf life.

(6) Recommended application procedures, concentrations, and conditions for use depending upon water salinity, water temperature, types and ages of the pollutants, and any other application restrictions.

(7) Toxicity. Use standard toxicity test methods described in appendix C to part 300.

(8) Follow the data requirement specifications in paragraph (a)(9) of this section.

(9) Surface Washing Agent Components. Itemize by chemical name and percentage by weight each component of the total formulation. The percentages will include maximum, minimum, and average weights in order to reflect quality control variations in manufacture or formulation. In addition to the chemical information provided in response to the first two sentences, identify the major components in at least the following categories: surface active agents, solvents, and additives.

(10) *Heavy Metals, Cyanide, and Chlorinated Hydrocarbons.* Follow specifications in paragraph (a)(11) of this section.

(11) Analytical Laboratory Requirements for Technical Product Data. Follow specifications in paragraph (a)(12) of this section.

(c) *Surface collecting agents.* (1) Name, brand, or trademark, if any, under which the product is sold.

(2) Name, address, and telephone number of the manufacturer, importer, or vendor.

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[2] These test methods may be obtained from: Standard Methods for the Examination of Water and Wastewater, 17th Edition, American Public Health Association, 1989; or Method 601—Purgeable halocarbons, 40 CFR part 136 and Method 608—Organochlorine pesticide and PCBs, 40 CFR part 136. Copies may be inspected at the U.S. Environmental Protection Agency Superfund Docket, located at 1235 Jefferson Davis Highway, First Floor, Arlington, VA 22202 or send mail to Mail Code 5305G, 1200 Pennsylvania Ave., NW., Washington, DC, or at the Office of the Federal Register, 1100 L Street, NW., Room 8401, Washington, DC 20408.

(3) Name, address, and telephone number of primary distributors or sales outlets.

(4) Special handling and worker precautions for storage and field application. Maximum and minimum storage temperatures, to include optimum ranges as well as temperatures that will cause phase separations, chemical changes, or other alterations to the effectiveness of the product.

(5) Shelf life.

(6) Recommended application procedures, concentrations, and conditions for use depending upon water salinity, water temperature, types and ages of the pollutants, and any other application restrictions.

(7) *Toxicity*. Use standard toxicity test methods described in appendix C to part 300.

(8) Follow the data requirement specifications in paragraph (a)(9) of this section.

(9) Test to Distinguish Between Surface Collecting Agents and Other Chemical Agents.

(i) Method Summary—Five milliliters of the chemical under test are mixed with 95 milliliters of distilled water and allowed to stand undisturbed for one hour. Then the volume of the upper phase is determined to the nearest one milliliter.

(ii) Apparatus.

(A) Mixing Cylinder: 100 milliliter subdivisions and fitted with a glass stopper.

(B) Pipettes: Volumetric pipette, 5.0 milliliter.

(C) Timers.

(iii) Procedure—Add 95 milliliters of distilled water at 22 °C, plus or minus 3 °C, to a 100 milliliter mixing cylinder. To the surface of the water in the mixing cylinder, add 5.0 milliliters of the chemical under test. Insert the stopper and invert the cylinder five times in ten seconds. Set upright for one hour at 22 °C, plus or minus 3 °C, and then measure the chemical layer at the surface of the water. If the major portion of the chemical added (75 percent) is at the water surface as a separate and easily distinguished layer, the product is a surface collecting agent.

(10) Surface Collecting Agent Components. Itemize by chemical name and percentage by weight each component of the total formulation. The percentages should include maximum, minimum, and average weights in order to reflect quality control variations in manufacture or formulation. In addition to the chemical information provided in response to the first two sentences, identify the major components in at least the following categories: surface action agents, solvents, and additives.

(11) Heavy Metals, Cyanide, and Chlorinated Hydrocarbons. Follow specifications in paragraph (a)(11) of this section.

(12) Analytical Laboratory Requirements for Technical Product Data. Follow specifications in paragraph (a)(12) of this section.

(d) *Bioremediation Agents*. (1) Name, brand, or trademark, if any, under which the agent is sold.

(2) Name, address, and telephone number of the manufacturer, importer, or vendor.

(3) Name, address, and telephone number of primary distributors or sales outlets.

(4) Special handling and worker precautions for storage and field application. Maximum and minimum storage temperatures.

(5) Shelf life.

(6) Recommended application procedures, concentrations, and conditions for use depending upon water salinity, water temperature, types and ages of the pollutants, and any other application restrictions.

(7) Bioremediation Agent Effectiveness. Use bioremediation agent effectiveness test methods described in appendix C to part 300.

(8) Bioremediation Agent Toxicity [Reserved].

(9) Biological additives.

(i) For microbiological cultures, furnish the following information:

(A) Listing of each component of the total formulation, other than microorganisms, by chemical name and percentage by weight.

(B) Listing of all microorganisms by species.

(C) Percentage of each species in the composition of the additive.

(D) Optimum pH, temperature, and salinity ranges for use of the additive, and maximum and minimum pH, temperature, and salinity levels above or below which the effectiveness of the additive is reduced to half its optimum capacity.

(E) Special nutrient requirements, if any.

(F) Separate listing of the following, and test methods for such determinations: Salmonella, fecal coliform, Shigella, Staphylococcus Coagulase positive, and Beta Hemolytic Streptococci.

(ii) For enzyme additives, furnish the following information:

(A) Listing of each component of the total formulation, other than enzymes, by chemical name and percentage by weight.

(B) Enzyme name(s).

(C) International Union of Biochemistry (I.U.B.) number(s).

(D) Source of the enzyme.

(E) Units.

(F) Specific Activity.

(G) Optimum pH, temperature, and salinity ranges for use of the additive, and maximum and minimum pH, temperature, and salinity levels above or below which the effectiveness of the additive is reduced to half its optimum capacity.

(H) Enzyme shelf life.

(I) Enzyme optimum storage conditions.

(10) For nutrient additives, furnish the following information:

(i) Listing of each component of the total formulation by chemical name and percentage by weight.

(ii) Nutrient additive optimum storage conditions.

(11) Analytical Laboratory Requirements for Technical Product Data. Follow specifications in paragraph (a)(12) of this section.

(e) *Burning Agents*. EPA does not require technical product data submissions for burning agents and does not include burning agents on the NCP Product Schedule.

(f) *Miscellaneous Oil Spill Control Agents*. (1) Name, brand, or trademark, if any, under which the miscellaneous oil spill control agent is sold.

(2) Name, address, and telephone number of the manufacturer, importer, or vendor.

(3) Name, address, and telephone number of primary distributors or sales outlets.

(4) Brief description of recommended uses of the product and how the product works.

(5) Special handling and worker precautions for storage and field application. Maximum and minimum storage temperatures, to include optimum ranges as well as temperatures that will cause phase separations, chemical changes, or other alternatives to the effectiveness of the product.

(6) Shelf life.

(7) Recommended application procedures, concentrations, and conditions for use depending upon water salinity, water temperature, types and ages of the pollutants, and any other application restrictions.

(8) Toxicity. Use standard toxicity test methods described in appendix C to part 300.

(9) Follow the data requirement specifications in paragraph (a)(9) of this section.

(10) Miscellaneous Oil Spill Control Agent Components. Itemize by chemical name and percentage by weight each component of the total formulation. The percentages should include maximum, minimum, and average weights in order to reflect quality control variations in manufacture or formulation. In addition to the chemical information provided in response to the first two sentences, identify the major components in at least the following categories: surface active agents, solvents, and additives.

(11) Heavy Metals, Cyanide, and Chlorinated Hydrocarbons. Follow specifications in paragraph (a)(11) of this section.

(12) For any miscellaneous oil spill control agent that contains microbiological cultures, enzyme additives, or nutrient additives, furnish the information specified in paragraphs (d)(9) and (d)(10) of this section, as appropriate.

(13) Analytical Laboratory Requirements for Technical Product Data. Follow specifications in paragraph (a)(12) of this section.

(g) *Sorbents*. (1) Sorbent material may consist of, but is not limited to, the following materials:

(i) Organic products—

(A) Peat moss or straw;

(B) Cellulose fibers or cork;

(C) Corn cobs;

(D) Chicken, duck, or other bird feathers.

(ii) Mineral compounds—

(A) Volcanic ash or perlite;

(B) Vermiculite or zeolite.

(iii) Synthetic products—

(A) Polypropylene;

(B) Polyethylene;

(C) Polyurethane;

(D) Polyester.

(2) EPA does not require technical product data submissions for sorbents and does not include sorbents on the NCP Product Schedule.

(3) Manufacturers that produce sorbent materials that consist of materials other than those listed in paragraph (g)(1) of this section shall submit to EPA the technical product data specified for miscellaneous oil spill control agents in paragraph (f) of this section and EPA will consider listing those products on the NCP Product Schedule under the miscellaneous oil spill control agent category. EPA will inform the submitter in writing, within 60 days of the receipt of technical product data, of its decision on adding the product to the Schedule.

(4) Certification. OSCs may request a written certification from manufacturers that produce sorbent materials that consist solely of the materials listed in paragraph (g)(1) of this section prior to making a decision on the use of a particular sorbent material. The certification at a minimum shall state that the sorbent consists solely of the materials listed in § 300.915(g)(1) of the NCP. The following statement, when completed, dated, and signed by a sorbent manufacturer, is sufficient to meet the written certification requirement:

> [SORBENT NAME] is a sorbent material and consists solely of the materials listed in § 300.915(g)(1) of the NCP.

(h) *Mixed products.* Manufacturers of products that consist of materials that meet the definitions of two or more of the product categories contained on the NCP Product Schedule shall submit to EPA the technical product data specified in this section for each of those product categories. After review of the submitted technical product data, and the performance of required dispersant effectiveness and toxicity tests, if appropriate, EPA will make a determination on whether and under which category the mixed product should be listed on the Schedule.

[59 FR 47453, Sept. 15, 1994, as amended at 65 FR 47325, Aug. 2, 2000]

EFFECTIVE DATE NOTE: At 88 FR 38334, June 12, 2023, § 300.915 was revised, effective Dec. 11, 2023. For the convenience of the user, the revised text is set forth as follows:

§ 300.915 Data and information requirements for listing on the NCP Product Schedule or Sorbent Product List.

If you are submitting an application for listing a product to the NCP Product Schedule or Sorbent Product List, you must provide EPA the information required under § 300.955. Technical product data submissions are not required for burning agents. Your submission for each product must contain:

(a) *General information for any product category.* (1) Your name, physical address, email, and telephone number;

(2) Your identity and documentation of that identity, as the manufacturer of the product, vendor, importer, distributor of the product, and/or a designated agent acting on behalf of the manufacturer.

(3) All name(s), brand(s), and/or trademark(s) under which the product is to be sold;

(4) Names, physical addresses, emails, and telephone numbers of the primary distributors, vendors, importers and/or designated agent acting on behalf of the manufacturer;

(5) The Safety Data Sheet (SDS) for the product;

(6) The maximum, minimum, and optimum temperature, humidity, and other relevant conditions for product storage and a brief description of the consequences to performance if the product is not stored within these limits;

(7) The anticipated shelf life of the product at the storage conditions noted in paragraph (a)(6) of this section and documentation for this determination;

(8) A sample product label for all name(s), brand(s), and/or trademark(s) under which the product is to be sold that includes manufacture and expiration dates, and conditions for storage. You may use an existing label provided it already contains the required dates and storage information;

(9) The chemical or biological agent category under which you want the product to be considered for listing on the NCP Product Schedule, including detailed information on the specific process(es) through which the product affects the oil, and the specific environment(s) on which it is intended to be used (*e.g.*, waters and/or adjoining shorelines). If

your product meets the definition of more than one chemical or biological agent category, you must identify all applicable categories and provide the test data to meet the listing criteria appropriate to each;

(10) Recommended product use procedures, including product concentrations, use ratios, types of application equipment, conditions for use, any application restrictions; and, as applicable, procedures for product and oil containment, collection, recovery, and disposal. These procedures must address, as appropriate, variables such as weather, water salinity, water temperature, types and weathering states of oils or other pollutants. The procedures must include supporting documentation and current applicable standard methods used to determine them;

(11) Available information on environmental fate, including any known measured data, methodologies, and supporting documentation, on the persistence, bioconcentration factor, bioaccumulation factor, and biodegradability of the product and all of its components in the environment;

(12) The physical and chemical properties of the product, as appropriate, and a citation for the current applicable standard methods used to determine them, including:

(i) Physical state and appearance;

(ii) Vapor pressure;

(iii) Flash point;

(iv) Pour point;

(v) Viscosity;

(vi) Specific gravity;

(vii) Particle size for solid components; and

(viii) pH;

(13) The identity and concentration of all components in the product, including each specific component name; corresponding Chemical Abstract Service (CAS) Registry Number; the maximum, minimum, and average weight percent of each component in the product; and the intended function of each component (*e.g.*, solvent, surfactant);

(14) For products that also contain microorganisms, enzymes, and/or nutrients, provide the following along with a citation or a description of the methodology used to determine:

(i) The name of all microorganisms by current genus and species, including any reclassifications, and any physical, chemical, or biological manipulation of the genetic composition and the weight percent of each genus in the product;

(ii) The name of all enzymes and their International Union of Biochemistry (I.U.B.) number(s); Enzyme Classification (EC) code numbers; the source of each enzyme; units; and specific oil-degrading activity;

(iii) The name(s), maximum, minimum, and average weight percent of the nutrients contained in the product; and

(iv) Data, methodology, and supporting documentation, for the levels of bacterial, fungal, or viral pathogens or opportunistic pathogens including, but not limited to: enteric bacteria such as *Salmonella*, fecal coliforms, *Shigella*, coagulase positive *Staphylococci*, and beta hemolytic *Streptococci* and enterococci;

(15) Data, methodology, and supporting documentation for the levels of the following:

(i) Arsenic, cadmium, chromium, copper, lead, mercury, nickel, vanadium, zinc, and any other heavy metal reasonably expected to be in the product;

(ii) Cyanide;

(iii) Chlorinated hydrocarbons;

(iv) Pesticides;

(v) Polychlorinated Biphenyls (PCBs); and

(vi) Polycyclic aromatic hydrocarbons (PAHs).

(16) Certification, including data, methodology, and supporting documentation, indicating that the product does not contain any of the prohibited agents or substances identified in §300.910(e);

(17) Information about the accredited laboratory that conducted the required tests, including:

(i) Name of the laboratory, address, contact name, email, and phone number; and

(ii) The national and/or international accreditations held by the laboratory that are applicable to the test(s) performed;

(18) All test data and calculations, including:

(i) Raw data and replicates, including positive controls;

(ii) Notes and observations collected during tests;

(iii) Calculated mean values and standard deviations;

(iv) Reports, including a summary of stock solution preparation;

(v) Source and preparation of test organisms;

(vi) Test conditions; and

(vii) Chain of custody forms;

(19) An estimate of the annual product production volume, the average and maximum amount that could be produced per day, and the time frame needed to reach that maximum production rate in days;

(20) Recognition received from EPA's Design for the Environment (DfE) or Safer Choice programs, as applicable; and

(21) International product testing or use data or certifications, if available, informing the performance capabilities or environmental impacts of the product.

(b) *Dispersant testing and listing requirements*—(1) *Dispersant efficacy test and listing criteria.* Test the dispersant product for efficacy using the Baffled Flask Test (BFT) method in Appendix C to part 300. To be listed on the NCP Product Schedule, the dispersant must demonstrate for each temperature a Dispersant Effectiveness (DE) at the 95%

lower confidence level (LCL_{95}) greater than or equal to:

(i) ≥70% for Strategic Petroleum Reserve Bryan Mound at 5 °C;

(ii) ≥75% for Strategic Petroleum Reserve Bryan Mound at 25 °C;

(2) *Dispersant toxicity tests and listing criteria.* Use the methods specified in Appendix C to part 300 to test the dispersant alone, and the dispersant mixed with Strategic Petroleum Reserve Bryan Mound for acute toxicity, using *Americamysis bahia* and *Menidia beryllina.* Use the methods specified in Appendix C to part 300 to test the dispersant alone for developmental toxicity using *Strongylocentrotus purpuratus* or *Arbacia punctulata* and for subchronic effects using *Americamysis bahia* and *Menidia beryllina.* To be listed on the NCP Product Schedule, the dispersant alone must demonstrate:

(i) A median lethal concentration (LC_{50}) at the lower 95% confidence interval greater than 10 ppm;

(ii) An inhibition concentration for 50% of the test species (IC_{50}) at the lower 95% confidence interval greater than 1 ppm; and

(iii) A subchronic No Observed Effect Concentration (NOEC) greater than 1 ppm.

(3) *Limitations.* A dispersant may only be listed on the NCP Product Schedule for use in saltwater environments for which it meets the efficacy and toxicity listing criteria.

(c) *Surface washing agent testing and listing requirements*—(1) *Surface washing agent efficacy test and listing criteria.* To be listed on the NCP Product Schedule, using an applicable standard methodology, the surface washing agent must meet an efficacy of greater than or equal to 30% in either freshwater or saltwater, or both, depending on the intended product use.

(2) *Surface washing agent toxicity test and listing criteria.* Using the toxicity test methodology in Appendix C to part 300, test the surface washing agent for acute toxicity against freshwater species *Ceriodaphnia dubia* and *Pimephales promelas*, or saltwater species *Americamysis bahia* and *Menidia beryllina*, or both, depending on the intended product use. To be listed on the NCP Product Schedule, the surface washing agent must demonstrate an LC_{50} at the lower 95% confidence interval greater than 10 ppm in either freshwater or saltwater for all tested species.

(3) *Limitations.* Surface washing agent listing would be for use only in freshwater and/or saltwater environments for which it was tested and for which it met the efficacy and toxicity listing criteria.

(d) *Bioremediation agent testing and listing requirements*—(1) *Bioremediation agent efficacy test and listing criteria.* To be listed on the NCP Product Schedule, a bioremediation agent must successfully degrade both alkanes and aromatics as determined by gas chromatography/mass spectrometry (GC/MS) in freshwater or saltwater, or both, depending on the intended product use, following the test method specified in Appendix C to part 300. The percentage reduction of total alkanes (aliphatic fraction) from the GC/MS analysis must be greater than or equal to 85% at day 28, based on the ninety-fifth (95th) percentile Upper Confidence Limit (UCL_{95}) for both freshwater and saltwater. The percentage reduction of total aromatics (aromatic fraction) must be greater than or equal to 35% at day 28 for both saltwater and freshwater based on the UCL95.

(2) *Bioremediation agent toxicity test and listing criteria.* The bioremediation agent must be tested for acute toxicity in freshwater or saltwater, or both, depending on the intended product use, following the method specified in Appendix C to part 300. To be listed on the NCP Product Schedule, the bioremediation agent must demonstrate an LC_{50} at the lower 95% confidence interval greater than 10 ppm in either freshwater or saltwater for all tested species.

(3) *Limitations.* Bioremediation agent listing would be for use only in the freshwater and/or saltwater environments for which it was tested and for which it met the efficacy and toxicity listing criteria.

(4) *Generic listing.* If the product consists solely of: ammonium nitrate, ammonium phosphate, ammonium sulfate, calcium ammonium nitrate, sodium nitrate, potassium nitrate, synthetically-derived urea, sodium triphosphate (or tripolyphosphate), sodium phosphate, potassium phosphate (mono- or dibasic), triple super phosphate, potassium sulphate, or any combination thereof, no technical product data are required. The product will be generically listed as non-proprietary nutrients on the NCP Product Schedule, and no further action is necessary.

(e) *Solidifier testing and listing requirements.* (1) Solidifiers must be tested for acute toxicity in freshwater or saltwater, or both, depending on the intended product use, following the method specified in Appendix C to part 300. To be listed on the NCP Product Schedule, the solidifier must demonstrate an LC_{50} at the lower 95% confidence interval greater than 10 ppm in either freshwater or saltwater for all tested species.

(2) *Limitations.* Solidifier listing would be for use only in the freshwater and/or saltwater environments for which it was tested and for which it met the toxicity listing criteria.

(f) *Herding agent testing and listing requirements.* (1) Herding agents must be tested for acute toxicity in freshwater or saltwater, or both, depending on the intended product use, following the method specified in Appendix C to part 300. To be listed on the NCP Product Schedule, the herding agent must demonstrate an LC_{50} at the lower 95% confidence interval greater than 10 ppm in either freshwater or saltwater for all tested species.

(2) *Limitations.* Herding agent listing would be for use only in freshwater and/or saltwater environments for which it was tested and for which it met the toxicity listing criteria.

(g) *Sorbent requirements.* Known sorbent materials and products will be identified on a publicly available Sorbent Product List for the use of such products when responding to an oil discharge as follows:

(1) For sorbent products that consist solely of the following materials, or any combination thereof, no technical data are required to be submitted for listing on the Sorbent Product List, and no further action is necessary for use as a sorbent:

(i) Feathers, cork, peat moss, and cellulose fibers such as bagasse, corncobs, and straw;

(ii) Volcanic ash, perlite, vermiculite, zeolite, and clay; and

(iii) Polypropylene, polyethylene, polyurethane, and polyester.

(2) If the product consists of one or more natural organic substances, inorganic/mineral compounds, and/or synthetic compounds not specifically identified in paragraph (g)(1) of this section but you believe the product meets the definition of a sorbent then, as applicable under §300.955(a) and (b), you must submit the following information for consideration for listing it as a sorbent on the Sorbent Product List:

(i) The information required under paragraphs (a)(1) through (a)(8), and paragraph (a)(13) through (a)(15) of this section;

(ii) The certification required under paragraph (a)(16) of this section; and

(iii) Information, including data, to support the claim your product meets the sorbent definition under §300.5.

§ 300.920 Addition of products to Schedule.

(a) *Dispersants.* (1) To add a dispersant to the NCP Product Schedule, submit the technical product data specified in §300.915(a) to the Emergency Response Division (5202–G), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460. A dispersant must attain an effectiveness value of 45 percent or greater in order to be added to the Schedule.

(2) EPA reserves the right to request further documentation of the manufacturers' test results. EPA also reserves the right to verify test results and consider the results of EPA's verification testing in determining whether the dispersant meets listing criteria. EPA will, within 60 days of receiving a complete application as specified in §300.915(a) of this part, notify the manufacturer of its decision to list the product on the Schedule, or request additional information and/or a sample of the product in order to review and/or conduct validation sampling. If EPA requests additional information and/or a product sample, within 60 days of receiving such additional information or sample, EPA will then notify the manufacturer in writing of its decision to list or not list the product.

(3) Request for review of decision. (i) A manufacturer whose product was determined to be ineligible for listing on the NCP Product Schedule may request EPA's Administrator to review the determination. The request must be made in writing within 30 days of receiving notification of EPA's decision to not list the dispersant on the Schedule. The request shall contain a clear and concise statement with supporting facts and technical analysis demonstrating that EPA's decision was incorrect.

(ii) The Administrator or his designee may request additional information from the manufacturer, or from any other person, and may provide for a conference between EPA and the manufacturer, if appropriate. The Administrator or his designee shall render a decision within 60 days of receiving the request, or within 60 days of receiving requested additional information, if appropriate, and shall notify the manufacturer of his decision in writing.

(b) *Surface washing agents, surface collecting agents, bioremediation agents, and miscellaneous oil spill control agents.* (1) To add a surface washing agent, surface collecting agent, bioremediation agent, or miscellaneous oil spill control agent to the NCP Product Schedule, the technical product data specified in §300.915 must be submitted to the Emergency Response Division (5202–G), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460. If EPA determines that the required data were submitted, EPA will add the product to the Schedule.

(2) EPA will inform the submitter in writing, within 60 days of the receipt of technical product data, of its decision on adding the product to the Schedule.

(c) The submitter may assert that certain information in the technical product data submissions, including technical product data submissions for sorbents pursuant to § 300.915(g)(3), is confidential business information. EPA will handle such claims pursuant to the provisions in 40 CFR part 2, subpart B. Such information must be submitted separately from non-confidential information, clearly identified, and clearly marked ''Confidential Business Information.'' If the submitter fails to make such a claim at the time of submittal, EPA may make the information available to the public without further notice.

(d) The submitter must notify EPA of any changes in the composition, formulation, or application of the dispersant, surface washing agent, surface collecting agent, bioremediation agent, or miscellaneous oil spill control agent. On the basis of this data, EPA may require retesting of the product if the change is likely to affect the effectiveness or toxicity of the product.

(e) The listing of a product on the NCP Product Schedule does not constitute approval of the product. To avoid possible misinterpretation or misrepresentation, any label, advertisement, or technical literature that refers to the placement of the product on the NCP Product Schedule must either reproduce in its entirety EPA's written statement that it will add the product to the NCP Product Schedule under § 300.920(a)(2) or (b)(2), or include the disclaimer shown below. If the disclaimer is used, it must be conspicuous and must be fully reproduced. Failure to comply with these restrictions or any other improper attempt to demonstrate the approval of the product by any NRT or other U.S. Government agency shall constitute grounds for removing the product from the NCP Product Schedule.

DISCLAIMER

[PRODUCT NAME] is on the U.S. Environmental Protection Agency's NCP Product Schedule. This listing does NOT mean that EPA approves, recommends, licenses, certifies, or authorizes the use of [PRODUCT NAME] on an oil discharge. This listing means only that data have been submitted to EPA as required by subpart J of the National Contingency Plan, § 300.915.

EFFECTIVE DATE NOTE: At 88 FR 38336, June 12, 2023, § 300.920 was removed, effective Dec. 11, 2023.

§ 300.950 Submission of Proprietary Business Information (PBI).

(a) Except as provided in paragraph (b) of this section, all product information submitted to EPA as required under § 300.915 and § 300.955 will be available for public disclosure upon submission, without further notice to the submitter.

(b) You may only claim as PBI the concentration; the maximum, minimum, and average weight percent; and the units of each component as identified in § 300.915(a)(13) and (14) and as applicable. EPA will handle such claims in accordance with 40 CFR part 2, subpart B Confidentiality of Business Information.

(1) You must make your PBI claim at the time you submit your information to EPA to be listed on the NCP Product Schedule or Sorbent Product List.

(2) You must separate the PBI from all other submitted information. Include all PBI separately with your submission package, marking it as ''Proprietary Business Information'' and placing it in a separate inner envelope labeled with ''PROPRIETARY BUSINESS INFORMATION—TO BE OPENED BY THE PRODUCT SCHEDULE MANAGER ONLY.''

EFFECTIVE DATE NOTE: At 88 FR 38336, June 12, 2023, § 300.950 was added, effective Dec. 11, 2023.

§ 300.955 Addition of a product to the NCP Product Schedule or Sorbent ProductLlist.

(a) *Submission.* Submit your complete package to: U.S. Environmental Protection Agency, 1200 Pennsylvania Ave. NW, Mail Code: 5104A, Room 1448, William J. Clinton North, Washington, DC 20460, Attention: Product Schedule Manager.

(b) *Package contents.* Your package shall include, as applicable, in this order:

(1) A cover letter on company letterhead signed and dated by you certifying that:

(i) All testing was conducted on representative product samples;

(ii) Testing was conducted at a nationally or internationally accredited laboratory in accordance with the methods specified in Appendix C to part 300, and other applicable methods as appropriate; and

(iii) All test results and product technical data and information are true and accurate.

(2) A page numbered Table of Contents showing the information and data submitted under § 300.915(a) through (g), as applicable;

(3) All required data and information arranged in the same order as specified in § 300.915(a) through (g); and

(4) A separate envelope containing and labeled Proprietary Business Information as specified in § 300.950(b), if applicable.

(c) *EPA Review.* EPA shall, within 90 days of receiving a submission package:

(1) Review the package for completeness and compliance with all data and information requirements in §§ 300.915, 300.950, and this section; verify information; and request clarification or additional information, including testing as necessary;

(2) Make a product listing determination based on a technical evaluation of all data and information submitted in accordance with the requirements for each product category, relevant information on impacts or potential impacts of the product or any of its components on human health or the environment, and the intended use of the product; and

(3) Notify you in writing of its decision to list the product on the NCP Product Schedule or the Sorbent Product List, or of its decision and supporting rationale to reject the submission. If your submission is rejected:

(i) You may revise and resubmit a complete package to address test results, data, or information deficiencies.

(ii) EPA's 90-day review will not start until a complete package is resubmitted.

(d) *Request for review of decision.* If your product is rejected for listing on the NCP Product Schedule or the Sorbent Product List, you may request that the EPA Administrator or designee review the determination. Your request must be in writing within 30 days of receipt of notification of EPA's decision not to list the product on the NCP Product Schedule or the Sorbent Product List. Your request must contain a clear and concise statement with supporting facts and technical analysis demonstrating why the product meets the listing requirements.

(1) The EPA Administrator or designee may request additional information from you and may offer an opportunity for you to meet with EPA.

(2) The EPA Administrator or designee will notify you in writing of the decision within 60 days of receipt of your request, or within 60 days of receipt of requested additional information.

(e) *Changes to a product listing*—(1) *Administrative change.* You must notify EPA in writing within 30 days of any changes to information submitted under § 300.915(a)(1) through (8) and § 300.915(a)(19) through (21) for a product on the NCP Product Schedule. In the notification, you must detail the specific changes, the reasons for such changes and supporting data and information. EPA may request additional information and clarification regarding these changes.

(2) *Reformulation.* If you change the components and/or concentrations, you must retest the reformulated product according to the requirements for the product category and submit a new complete package under a new, distinct name in accordance with § 300.955(b) for review and consideration for listing on the NCP Product Schedule or Sorbent Product List by EPA.

(f) *Transitioning Listed Products to the New NCP Product Schedule or Sorbent Product List.* All products on the current NCP Product Schedule as of December 11, 2023 will remain conditionally listed until December 12, 2025 at which time all products that have not been submitted and listed in the new NCP Product Schedule based on the amended test and listing criteria will be removed. Your product will be transitioned from the current NCP Product Schedule to the new NCP Product Schedule prior to December 12, 2025 after you submit a new complete package in accordance with § 300.955(b), and EPA makes a determination to list the product on the new NCP Product

Schedule. All products previously identified as sorbents by EPA will remain available for use until December 12, 2025, at which time all sorbent products must have submitted information as applicable under § 300.955(a) and (b) and be listed in the new Sorbent Product List.

EFFECTIVE DATE NOTE: At 88 FR 38337, June 12, 2023, § 300.955 was added, effective Dec. 11, 2023.

§ 300.965 Mandatory Product Disclaimer.

The listing of a product on the NCP Product Schedule does not constitute approval or recommendation of the product. To avoid possible misinterpretation or misrepresentation, any label, advertisement, or technical literature for products listed on the NCP Product Schedule must display in its entirety the disclaimer shown below. The disclaimer must be conspicuous and must be fully reproduced on all product literatures, labels, and electronic media including website pages.

Disclaimer

[PRODUCT NAME] is listed on the National Contingency Plan (NCP) Product Schedule. This listing does NOT mean that EPA approves, recommends, licenses, or certifies the use of [PRODUCT NAME] on an oil discharge. This listing means only that data have been submitted to EPA as required by Subpart J of the NCP. Only a Federal On-Scene Coordinator (OSC) may authorize use of this product in accordance with Subpart J of the NCP in response to an oil discharge.

EFFECTIVE DATE NOTE: At 88 FR 38337, June 12, 2022, § 300.965 was added, effective Dec. 11, 2023.

§ 300.970 Removal of a product from the NCP Product Schedule or Sorbent Product List.

(a) The EPA Administrator or designee may remove your product from the NCP Product Schedule or the Sorbent Product List for reasons including, but not limited to:

(1) Statements or information that are misleading, inaccurate, outdated, or incorrect regarding the composition or use of the product to remove or control oil discharges made to any person, or private or public entity, including on labels, advertisements, technical literature, electronic media, or within the product submission to EPA; or

(2) Alterations to the components, concentrations, or use conditions of the product without proper notification to EPA as required by § 300.955(e); or

(3) Failure to print the disclaimer provided in § 300.965 on all labels, advertisements, technical literature, or electronic media for products listed on the NCP Product Schedule; or

(4) New or relevant information not previously considered concerning the impacts or potential impacts of the product to human health or the environment.

(b) EPA will notify you in writing, at your address of record, of its reasons for deciding to remove the product from the NCP Product Schedule. If EPA receives no appeal from you in 30 days, the product will be removed from the NCP Product Schedule without further notice to you.

(c) You may appeal the decision to remove your product from the NCP Product Schedule within 30 days of receipt of EPA's notification. Your appeal must contain a clear and concise statement with supporting facts and technical analysis demonstrating why the product should not be removed. The EPA Administrator or designee will notify you in writing of the decision within 60 days of your appeal, or within 60 days of receipt of any requested additional information.

EFFECTIVE DATE NOTE: At 88 FR 38337, June 12, 2023, § 300.970 was added, effective Dec. 11, 2023.

Subpart K—Federal Facilities [Reserved]

Subpart L—National Oil and Hazardous Substances Pollution Contingency Plan; Involuntary Acquisition of Property by the Government

SOURCE: 62 FR 34602, June 26, 1997, unless otherwise noted.

§ 300.1105 Involuntary acquisition of property by the government.

(a) Governmental ownership or control of property by involuntary acquisitions or involuntary transfers within the meaning of CERCLA section 101(20)(D) or section 101(35)(A)(ii) includes, but is not limited to:

(1) Acquisitions by or transfers to the government in its capacity as a sovereign, including transfers or acquisitions pursuant to abandonment proceedings, or as the result of tax delinquency, or escheat, or other circumstances in which the government involuntarily obtains ownership or control of property by virtue of its function as sovereign;

(2) Acquisitions by or transfers to a government entity or its agent (including governmental lending and credit institutions, loan guarantors, loan insurers, and financial regulatory entities which acquire security interests or properties of failed private lending or depository institutions) acting as a conservator or receiver pursuant to a clear and direct statutory mandate or regulatory authority;

(3) Acquisitions or transfers of assets through foreclosure and its equivalents (as defined in 40 CFR 300.1100(d)(1)) or other means by a Federal, state, or local government entity in the course of administering a governmental loan or loan guarantee or loan insurance program; and

(4) Acquisitions by or transfers to a government entity pursuant to seizure or forfeiture authority.

(b) Nothing in this section or in CERCLA section 101(20)(D) or section 101(35)(A)(ii) affects the applicability of 40 CFR 300.1100 to any security interest, property, or asset acquired pursuant to an involuntary acquisition or transfer, as described in this section.

NOTE TO PARAGRAPHS (a)(3) AND (b OF THIS SECTION: Reference to 40 CFR 300.1100 is a reference to the provisions regarding secured creditors in CERCLA sections 101(20)(E)–(G), 42 U.S.C. 9601(20)(E)–(G). *See* Section 2504(a) of the Asset Conservation, Lender Liability, and Deposit Insurance Protection Act, Public Law, 104–208, 110 Stat. 3009–462, 3009–468 (1996).

APPENDIX A TO PART 300—THE HAZARD RANKING SYSTEM

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1.0 Introduction

The Hazard Ranking System (HRS) is the principal mechanism the U.S. Environmental Protection Agency (EPA) uses to place sites on the National Priorities List (NPL). The HRS serves as a screening device to evaluate the potential for releases of uncontrolled hazardous substances to cause human health or environmental damage. The HRS provides a measure of relative rather than absolute risk. It is designed so that it can be consistently applied to a wide variety of sites.

1.1 Definitions

Acute toxicity: Measure of toxicological responses that result from a single exposure to a substance or from multiple exposures within a short period of time (typically several days or less). Specific measures of acute toxicity used within the HRS include lethal dose$_{50}$ (LD$_{50}$) and lethal concentration$_{50}$ (LC$_{50}$), typically measured within a 24-hour to 96-hour period.

Ambient Aquatic Life Advisory Concentrations (AALACs): EPA's advisory concentration limit for acute or chronic toxicity to aquatic organisms as established under section 304(a)(1) of the Clean Water Act, as amended.

Ambient Water Quality Criteria (AWQC)/National Recommended Water Quality Criteria: EPA's maximum acute (Criteria Maximum Concentration or CMC) or chronic (Criterion Continuous Concentration or CCC) toxicity concentrations for protection of aquatic life and its uses as established under section 304(a)(1) of the Clean Water Act, as amended.

Bioconcentration factor (BCF): Measure of the tendency for a substance to accumulate in the tissue of an aquatic organism. BCF is determined by the extent of partitioning of a substance, at equilibrium, between the tissue of an aquatic organism and water. As the ratio of concentration of a substance in the organism divided by the concentration in water, higher BCF values reflect a tendency for substances to accumulate in the tissue of aquatic organisms. [unitless].

Biodegradation: Chemical reaction of a substance induced by enzymatic activity of microorganisms.

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (Pub. L. 96–510, as amended).

Channelized flow: Natural geological or manmade features such as karst, fractures, lava tubes, and utility conduits (*e.g.*, sewer lines), which allow ground water and/or soil gas to move through the subsurface environment more easily.

Chronic toxicity: Measure of toxicological responses that result from repeated exposure to a substance over an extended period of time (typically 3 months or longer). Such responses may persist beyond the exposure or may not appear until much later in time than the exposure. HRS measures of chronic toxicity include Reference Dose (RfD) and Reference Concentration (RfC) values.

Contract Laboratory Program (CLP): Analytical program developed for CERCLA waste site samples to fill the need for legally defensible analytical results supported by a high level of quality assurance and documentation.

Contract-Required Detection Limit (CRDL): Term equivalent to contract-required quantitation limit, but used primarily for inorganic substances.

Contract-Required Quantitation Limit (CRQL): Substance-specific level that a CLP laboratory must be able to routinely and reliably detect in specific sample matrices. It is not the lowest detectable level achievable, but rather the level that a CLP laboratory should reasonably quantify. The CRQL may or may not be equal to the quantitation limit of a given substance in a given sample. For HRS purposes, the term CRQL refers to both the contract-required quantitation limit and the contract-required detection limit.

Crawl space: The enclosed or semi-enclosed area between a regularly occupied structure's foundation (*e.g.*, pier and beam construction) and the ground surface. Crawl space samples are collected to determine the concentration of hazardous substances in the air beneath a regularly occupied structure.

Curie (Ci): Measure used to quantify the amount of radioactivity. One curie equals 37 billion nuclear transformations per second, and one picocurie (pCi) equals 10^{-12} Ci.

Decay product: Isotope formed by the radioactive decay of some other isotope. This newly formed isotope possesses physical and chemical properties that are different from those of its parent isotope, and may also be radioactive.

Detection Limit (DL): Lowest amount that can be distinguished from the normal random "noise" of an analytical instrument or method. For HRS purposes, the detection limit used is the method detection limit (MDL) or, for real-time field instruments, the detection limit of the instrument as used in the field.

Dilution weight: Parameter in the HRS surface water migration pathway that reduces the point value assigned to targets as the flow or depth of the relevant surface water body increases. [unitless].

Distance weight: Parameter in the HRS air migration pathway, ground water migration pathway, and the soil exposure component of the soil exposure and subsurface intrusion pathway that reduces the point value assigned to targets as their distance increases from the site. *[unitless].*

Distribution coefficient (K_d): Measure of the extent of partitioning of a substance between geologic materials (for example, soil, sediment, rock) and water (also called partition coefficient). The distribution coefficient is used in the HRS in evaluating the mobility of a substance for the ground water migration pathway. [ml/g].

ED_{10} (10 percent effective dose): Estimated dose associated with a 10 percent increase in response over control groups. For HRS purposes, the response considered is cancer. [milligrams toxicant per kilogram body weight per day (mg/kg-day)].

Food and Drug Administration Action Level (FDAAL): Under section 408 of the Federal Food, Drug and Cosmetic Act, as amended, concentration of a poisonous or deleterious substance in human food or animal feed at or above which FDA will take legal action to remove adulterated products from the market. Only FDAALs established for fish and shellfish apply in the HRS.

Half-life: Length of time required for an initial concentration of a substance to be halved as a result of loss through decay. The HRS considers five decay processes for assigning surface water persistence: Biodegradation, hydrolysis, photolysis, radioactive decay, and volatilization. The HRS considers two decay processes for assigning subsurface intrusion degradation: Biodegradation and hydrolysis.

Hazardous substance: CERCLA hazardous substances, pollutants, and contaminants as defined in CERCLA sections 101(14) and 101(33), except where otherwise specifically noted in the HRS.

Hazardous wastestream: Material containing CERCLA hazardous substances (as defined in CERCLA section 101[14]) that was deposited, stored, disposed, or placed in, or that otherwise migrated to, a source.

HRS *"factor":* Primary rating elements internal to the HRS.

HRS *"factor category":* Set of HRS factors (that is, likelihood of release [or exposure], waste characteristics, targets).

HRS *"migration pathways":* HRS ground water, surface water, and air migration pathways.

HRS *"pathway":* Set of HRS factor categories combined to produce a score to measure relative risks posed by a site in one of four environmental pathways (that is, ground water, surface water, soil exposure and subsurface intrusion, and air).

HRS *"site score":* Composite of the four HRS pathway scores.

Henry's law constant: Measure of the volatility of a substance in a dilute solution of water at equilibrium. It is the ratio of the vapor pressure exerted by a substance in the gas phase over a dilute aqueous solution of that substance to its concentration in the solution at a given temperature. For HRS purposes, use the value reported at or near 25 °C. [atmosphere-cubic meters per mole (atm-m^3/mol)].

Hydrolysis: Chemical reaction of a substance with water.

Indoor air: The air present within a structure.

Inhalation Unit Risk (IUR): The upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent (*i.e.*, hazardous substance) at a concentration of 1μg/m^3 in air.

Karst: Terrain with characteristics of relief and drainage arising from a high degree of rock solubility in natural waters. The majority of karst occurs in limestones, but karst may also form in dolomite, gypsum, and salt deposits. Features associated with karst terrains typically include irregular topography, sinkholes, vertical shafts, abrupt ridges, caverns, abundant springs, and/or disappearing streams. Karst aquifers are associated with karst terrain.

LC_{50} (lethal concentration, 50 percent): Concentration of a substance in air [typically micrograms per cubic meter (μg/m^3)] or water [typically micrograms per liter (μg/l)] that kills 50 percent of a group of exposed organisms. The LC_{50} is used in the HRS in assessing acute toxicity.

LD_{50} (lethal dose, 50 percent): Dose of a substance that kills 50 percent of a group of exposed organisms. The LD_{50} is used in the HRS in assessing acute toxicity [milligrams toxicant per kilogram body weight (mg/kg)].

Maximum Contaminant Level (MCL): Under section 1412 of the Safe Drinking Water Act, as amended, the maximum permissible concentration of a substance in water that is delivered to any user of a public water supply.

Maximum Contaminant Level Goal (MCLG): Under section 1412 of the Safe Drinking Water Act, as amended, a nonenforceable concentration for a substance in drinking water that is protective of adverse human health effects and allows an adequate margin of safety.

Method Detection Limit (MDL): Lowest concentration of analyte that a method can detect reliably in either a sample or blank.

Mixed radioactive and other hazardous substances: Material containing both radioactive hazardous substances and nonradioactive hazardous substances, regardless of whether these types of substances are physically separated, combined chemically, or simply mixed together.

National Ambient Air Quality Standards (NAAQS): Primary standards for air quality established under sections 108 and 109 of the Clean Air Act, as amended.

National Emission Standards for Hazardous Air Pollutants (NESHAPs): Standards established for substances listed under section 112 of the Clean Air Act, as amended. Only those NESHAPs promulgated in ambient concentration units apply in the HRS.

Non-Aqueous Phase Liquid (NAPL): Contaminants and substances that are water-immiscible liquids composed of constituents with varying degrees of water solubility.

Octanol-water partition coefficient (K_{ow} [or P]): Measure of the extent of partitioning of a substance between water and octanol at equilibrium. The K_{ow} is determined by the ratio between the concentration in octanol divided by the concentration in water at equilibrium. [unitless].

Organic carbon partition coefficient (K_{oc}): Measure of the extent of partitioning of a substance, at equilibrium, between organic carbon in geologic materials and water. The higher the K_{oc}, the more likely a substance is to bind to geologic materials than to remain in water. [ml/g].

Photolysis: Chemical reaction of a substance caused by direct absorption of solar energy (direct photolysis) or caused by other substances that absorb solar energy (indirect photolysis).

Preferential subsurface intrusion pathways: Subsurface features such as animal burrows, cracks in walls, spaces around utility lines, or drains through which a hazardous substance moves more easily into a regularly occupied structure.

Radiation: Particles (alpha, beta, neutrons) or photons (x- and gamma-rays) emitted by radionuclides.

Radioactive decay: Process of spontaneous nuclear transformation, whereby an isotope of one element is transformed into an isotope of another element, releasing excess energy in the form of radiation.

Radioactive half-life: Time required for one-half the atoms in a given quantity of a specific radionuclide to undergo radioactive decay.

Radioactive substance: Solid, liquid, or gas containing atoms of a single radionuclide or multiple radionuclides.

Radioactivity: Property of those isotopes of elements that exhibit radioactive decay and emit radiation.

Radionuclide/radioisotope: Isotope of an element exhibiting radioactivity. For HRS purposes, ''radionuclide'' and ''radioisotope'' are used synonymously.

Reference concentration (RfC): An estimate of a continuous inhalation exposure to the human population that is likely to be without an appreciable risk of deleterious effects during a lifetime.

Reference dose (RfD): An estimate of a daily oral exposure to the human population that is likely to be without an appreciable risk of deleterious effects during a lifetime.

Regularly occupied structures: Structures with enclosed air space, where people either reside, attend school or day care, or work on a regular basis, or that were previously occupied but vacated due to a site-related hazardous substance(s). This also includes resource structures (*e.g.*, library, church, tribal structure).

Removal action: Action that removes hazardous substances from the site for proper disposal or destruction in a facility permitted under the Resource Conservation and Recovery Act or the Toxic Substances Control Act or by the Nuclear Regulatory Commission.

Roentgen (R): Measure of external exposures to ionizing radiation. One roentgen equals that amount of x-ray or gamma radiation required to produce ions carrying a charge of 1 electrostatic unit (esu) in 1 cubic centimeter of dry air under standard conditions. One microroentgen (μR) equals 10^{-6} R.

Sample quantitation limit (SQL): Quantity of a substance that can be reasonably quantified given the limits of detection for the methods of analysis and sample characteristics that may affect quantitation (for example, dilution, concentration).

Screening concentration: Media-specific benchmark concentration for a hazardous substance that is used in the HRS for comparison with the concentration of that hazardous substance in a sample from that media. The screening concentration for a specific hazardous substance corresponds to its reference concentration for inhalation exposures or reference dose for oral exposures, as appropriate, and, if the substance is a human carcinogen with either a weight-of-evidence classification of A, B, or C, or a weight-of-evidence classification of carcinogenic to humans, likely to be carcinogenic to humans or suggestive evidence of carcinogenic potential, to that concentration that corresponds to its 10^{-6} individual lifetime excess cancer risk for inhalation exposures or for oral exposures, as appropriate.

Shallow ground water: The uppermost saturated zone, typically unconfined.

Site: Area(s) where a hazardous substance has been deposited, stored, disposed, or placed, or has otherwise come to be located. Such areas may include multiple sources and may include the area between sources.

Slope factor (also referred to as cancer potency factor): Estimate of the probability of response (for example, cancer) per unit intake of a substance over a lifetime. The slope factor is typically used to estimate upper-bound probability of an individual developing cancer as a result of exposure to a particular level of a human carcinogen with either a weight-of-evidence classification of A, B, or C, or a weight-of-evidence classification of carcinogenic to humans, likely to be carcinogenic to humans or having suggestive evidence of carcinogenic potential. [$(\text{mg/kg-day})^{-1}$ for non-radioactive substances and $(\text{pCi})^{-1}$ for radioactive substances].

Soil gas: The gaseous elements and compounds in the small spaces between particles of soil.

Soil porosity: The degree to which the total volume of soil is permeated with pores or cavities through which fluids (including air or gas) can move. It is typically calculated as the ratio of the pore spaces within the soil to the overall volume of the soil.

Source: Any area where a hazardous substance has been deposited, stored, disposed, or placed, plus those soils that have become contaminated from migration of a hazardous substance. Sources do not include those volumes of air, ground water, surface water, or surface water sediments that have become contaminated by migration, except: In the case of either a ground water plume with no identified source or contaminated surface water sediments with no identified source, the plume or contaminated sediments may be considered a source.

Subslab: The area immediately beneath a regularly occupied structure with a basement foundation or a slab-on-grade foundation. Subslab samples are collected to determine the concentration of hazardous substances in the soil gas beneath a home or building.

Subsurface intrusion: The migration of hazardous substances from the unsaturated zone and/or ground water into overlying structures.

Target distance limit: Maximum distance over which targets for the site are evaluated. The target distance limit varies by HRS pathway.

Unit risk: The upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent (*i.e.*, hazardous substance) at a concentration of 1 μg/L in water, or 1 $\mu g/m^3$ in air.

Unsaturated zone: The portion of subsurface between the land surface and the zone of saturation. It extends from the ground surface to the top of the shallowest ground water table (excluding localized or perched water).

Uranium Mill Tailings Radiation Control Act (UMTRCA) Standards: Standards for radionuclides established under sections 102, 104, and 108 of the Uranium Mill Tailings Radiation Control Act, as amended.

Vapor pressure: Pressure exerted by the vapor of a substance when it is in equilibrium with its solid or liquid form at a given temperature. For HRS purposes, use the value reported at or near 25 °C. [atmosphere or torr].

Volatilization: Physical transfer process through which a substance undergoes a change of state from a solid or liquid to a gas.

Water solubility: Maximum concentration of a substance in pure water at a given temperature. For HRS purposes, use the value reported at or near 25 °C. [milligrams per liter (mg/l)].

Weight-of-evidence: EPA classification system for characterizing the evidence supporting the designation of a substance as a human carcinogen. The EPA weight-of-evidence, depending on the date EPA updated the profile, includes either the groupings:

- Group A: Human carcinogen—sufficient evidence of carcinogenicity in humans.
- Group B1: Probable human carcinogen—limited evidence of carcinogenicity in humans.
- Group B2: Probable human carcinogen—sufficient evidence of carcinogenicity in animals.

- Group C: Possible human carcinogen—limited evidence of carcinogenicity in animals.
- Group D: Not classifiable as to human carcinogenicity—applicable when there is no animal evidence, or when human or animal evidence is inadequate.
- Group E: Evidence of noncarcinogenicity for humans.

Or the descriptors:

- Carcinogenic to humans.
- Likely to be carcinogenic to humans.
- Suggestive evidence of carcinogenic potential.
- Inadequate information to assess carcinogenic potential.
- Not likely to be carcinogenic to humans.

2.0 EVALUATIONS COMMON TO MULTIPLE PATHWAYS

2.1 *Overview.* The HRS site score (S) is the result of an evaluation of four pathways:

- Ground Water Migration (S_{gw}).
- Surface Water Migration (S_{sw}).
- Soil Exposure and Subsurface Intrusion (S_{sessi}).
- Air Migration (S_a).

The ground water and air migration pathways use single threat evaluations, while the surface water migration and soil exposure and subsurface intrusion pathways use multiple threat evaluations. Three threats are evaluated for the surface water migration pathway: Drinking water, human food chain, and environmental. These threats are evaluated for two separate migration components—overland/flood migration and ground water to surface water migration. Two components are evaluated for the soil exposure and subsurface intrusion pathway: Soil exposure and subsurface intrusion. The soil exposure component evaluates two threats: Resident population and nearby population, and the subsurface intrusion component is a single threat evaluation.

The HRS is structured to provide a parallel evaluation for each of these pathways, components, and threats. This section focuses on these parallel evaluations, starting with the calculation of the HRS site score and the individual pathway scores.

2.1.1 *Calculation of HRS site score.* Scores are first calculated for the individual pathways as specified in sections 2 through 7 and then are combined for the site using the following root-mean-square equation to determine the overall HRS site score, which ranges from 0 to 100:

$$S = \sqrt{\frac{S_{gw}^2 + S_{sw}^2 + S_{sessi}^2 + S_a^2}{4}}$$

2.1.2 *Calculation of pathway score.* Table 2–1, which is based on the air migration pathway, illustrates the basic parameters used to calculate a pathway score. As Table 2–1 shows, each pathway (component or threat) score is the product of three ''factor categories'': Likelihood of release, waste characteristics, and targets. (The soil exposure and subsurface intrusion pathway uses likelihood of exposure rather than likelihood of release.) Each of the three factor categories contains a set of factors that are assigned numerical values and combined as specified in sections 2 through 7. The factor values are rounded to the nearest integer, except where otherwise noted.

2.1.3 *Common evaluations.* Evaluations common to all four HRS pathways include:

- Characterizing sources.
  - —Identifying sources (and, for the soil exposure and subsurface intrusion pathway, areas of observed contamination, areas of observed exposure and/or areas of subsurface contamination [see sections 5.1.0 and 5.2.0]).
  - —Identifying hazardous substances associated with each source (or area of observed contamination, or observed exposure, or subsurface contamination).
  - —Identifying hazardous substances available to a pathway.

TABLE 2–1—SAMPLE PATHWAY SCORESHEET

Factor category	Maximum value	Value assigned
Likelihood of Release		
1. Observed Release	550	
2. Potential to Release	500	
3. Likelihood of Release (higher of lines 1 and 2)	550	

TABLE 2–1—SAMPLE PATHWAY SCORESHEET—Continued

Factor category	Maximum value	Value assigned
Waste Characteristics		
4. Toxicity/Mobility	([a])	
5. Hazardous Waste Quantity	([a])	
6. Waste Characteristics	100	
Targets		
7. Nearest Individual.		
7a. Level I	50	
7b. Level II	45	
7c. Potential Contamination	20	
7d. Nearest Individual (higher of lines 7a, 7b, or 7c)	50	
8. Population	([b])	
8a. Level I	([b])	
8b. Level II	([b])	
8c. Potential Contamination	([b])	
8d. Total Population (lines 8a+8b+8c).		
9. Resources	5	
10. Sensitive Environments	([b])	
10a. Actual Contamination	([b])	
10b. Potential Environments	([b])	
10c. Sensitive Environments (lines 10a+10b)	([b])	
11. Targets (lines 7d+8d+9+10c)	([b])	
12. Pathway Score is the product of Likelihood of Release, Waste Characteristics, and Targets, divided by 82,500. Pathway scores are limited to a maximum of 100 points.		

[a] Maximum value applies to waste characteristics category. The product of lines 4 and 5 is used in Table 2–7 to derive the value for the waste characteristics factor category.

[b] There is no limit to the human population or sensitive environments factor values. However, the pathway score based solely on sensitive environments is limited to a maximum of 60 points.

- Scoring likelihood of release (or likelihood of exposure) factor category.
  —Scoring observed release (or observed exposure or observed contamination).
  —Scoring potential to release when there is no observed release.
- Scoring waste characteristics factor category.
  —Evaluating toxicity.
  ■ Combining toxicity with mobility, persistence, degradation and/or bioaccumulation (or ecosystem bioaccumulation) potential, as appropriate to the pathway (component or threat).
  ■ Evaluating hazardous waste quantity.
  —Combining hazardous waste quantity with the other waste characteristics factors.
  ■ Determining waste characteristics factor category value.
- Scoring targets factor category.
  —Determining level of contamination for targets.

These evaluations are essentially identical for the three migration pathways (ground water, surface water, and air). However, the evaluations differ in certain respects for the soil exposure and subsurface intrusion pathway.

Section 7 specifies modifications that apply to each pathway when evaluating sites containing radioactive substances.

Section 2 focuses on evaluations common at the pathway, component, and threat levels. Note that for the ground water and surface water migration pathways, separate scores are calculated for each aquifer (see section 3.0) and each watershed (see sections 4.1.1.3 and 4.2.1.5) when determining the pathway scores for a site. Although the evaluations in section 2 do not vary when different aquifers or watersheds are scored at a site, the specific factor values (for example, observed release, hazardous waste quantity, toxicity/mobility) that result from these evaluations can vary by aquifer and by watershed at the site. This can occur through differences both in the specific sources and targets eligible to be evaluated for each aquifer and watershed and in whether observed releases can be established for each aquifer and watershed. Such differences in scoring at the aquifer and watershed level are addressed in sections 3 and 4, not section 2.

2.2 *Characterize sources.* Source characterization includes identification of the following:

- Sources (and areas of observed contamination, areas of observed exposure, or areas of subsurface contamination) at the site.
- Hazardous substances associated with these sources (or areas of observed contamination, areas of observed exposure, or areas of subsurface contamination).

- Pathways potentially threatened by these hazardous substances.

Table 2–2 presents a sample worksheet for source characterization.

2.2.1 *Identify sources.* For the three migration pathways, identify the sources at the site that contain hazardous substances. Identify the migration pathway(s) to which each source applies. For the soil exposure and subsurface intrusion pathway, identify areas of observed contamination, areas of observed exposure, and/or areas of subsurface contamination at the site (see sections 5.1.0 and 5.2.0).

TABLE 2–2—SAMPLE SOURCE CHARACTERIZATION WORKSHEET

Source: ____
A. Source dimensions and hazardous waste quantity.
Hazardous constituent quantity: ____
Hazardous wastestream quantity: ____
Volume: ____
Area: ____
Area of observed contamination: ____
Area of observed exposure: ____
Area of subsurface contamination: ____
B. Hazardous substances associated with the source.

Hazardous substance	Available to pathway								
	Air		Ground Water (GW)	Surface Water (SW)		Soil Exposure/Subsurface Intrusion (SESSI)			
						Soil exposure		Subsurface Intrusion	
	Gas	Particulate		Overland/ flood	GW to SW	Resident	Nearby	Area of observed exposure	Area of subsurface contamination

2.2.2 *Identify hazardous substances associated with a source.* For each of the three migration pathways, consider those hazardous substances documented in a source (for example, by sampling, labels, manifests, oral or written statements) to be associated with that source when evaluating each pathway. In some instances, a hazardous substance can be documented as being present at a site (for example, by labels, manifests, oral or written statements), but the specific source(s) containing that hazardous substance cannot be documented. For the three migration pathways, in those instances when the specific source(s) cannot be documented for a hazardous substance, consider the hazardous substance to be present in each source at the site, except sources for which definitive information indicates that the hazardous substance was not or could not be present.

For an area of observed contamination in the soil exposure component of the soil exposure and subsurface intrusion pathway, consider only those hazardous substances that meet the criteria for observed contamination for that area (see section 5.1.0) to be associated with that area when evaluating the pathway.

For an area of observed exposure or area of subsurface contamination (see section 5.2.0) in the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, consider only those hazardous substances that:

- Meet the criteria for observed exposure, or
- Meet the criteria for observed release in an area of subsurface contamination and have a vapor pressure greater than or equal to one torr or a Henry's constant greater than or equal to 10^{-5} atm-m^3/mol, or
- Meet the criteria for an observed release in a structure within, or in a sample from below, an area of observed exposure and have a vapor pressure greater than or equal to one torr or a Henry's constant greater than or equal to 10^{-5} atm-m^3/mol.

2.2.3 *Identify hazardous substances available to a pathway.* In evaluating each migration pathway, consider the following hazardous substances available to migrate from the sources at the site to the pathway:

- Ground water migration.
  - —Hazardous substances that meet the criteria for an observed release (see section 2.3) to ground water.
  - —All hazardous substances associated with a source with a ground water containment factor value greater than 0 (see section 3.1.2.1).
- Surface water migration—overland/flood component.
  - —Hazardous substances that meet the criteria for an observed release to surface water in the watershed being evaluated.
  - —All hazardous substances associated with a source with a surface water containment factor value greater than 0 for the watershed (see sections 4.1.2.1.2.1.1 and 4.1.2.1.2.2.1).
- Surface water migration—ground water to surface water component.
  - —Hazardous substances that meet the criteria for an observed release to ground water.
  - —All hazardous substances associated with a source with a ground water containment factor value greater than 0 (see sections 4.2.2.1.2 and 3.1.2.1).
- Air migration.
  - —Hazardous substances that meet the criteria for an observed release to the atmosphere.
  - —All gaseous hazardous substances associated with a source with a gas containment factor value greater than 0 (see section 6.1.2.1.1).
  - —All particulate hazardous substances associated with a source with a particulate containment factor value greater than 0 (see section 6.1.2.2.1).
- For each migration pathway, in those instances when the specific source(s) containing the hazardous substance cannot be documented, consider that hazardous substance to be available to migrate to the pathway when it can be associated (see section 2.2.2) with at least one source having a containment factor value greater than 0 for that pathway.

In evaluating the soil exposure and subsurface intrusion pathway, consider the following hazardous substances available to the pathway:

- Soil exposure component—resident population threat.
  - —All hazardous substances that meet the criteria for observed contamination at the site (see section 5.1.0).
- Soil exposure component—nearby population threat.
  - —All hazardous substances that meet the criteria for observed contamination at areas with an attractiveness/accessibility factor value greater than 0 (see section 5.1.2.1.1).
- Subsurface intrusion component.
  - —All hazardous substances that meet the criteria for observed exposure at the site (see section 5.2.0).
  - —All hazardous substances with a vapor pressure greater than or equal to one torr or a Henry's constant greater than or equal to 10^{-5} atm-m^3/mol that meet the criteria for an observed release in an area of subsurface contamination (see section 5.2.0).
  - —All hazardous substances that meet the criteria for an observed release in a structure within, or in a sample from

below, an area of observed exposure (see section 5.2.0).

2.3 *Likelihood of release.* Likelihood of release is a measure of the likelihood that a waste has been or will be released to the environment. The likelihood of release factor category is assigned the maximum value of 550 for a migration pathway whenever the criteria for an observed release are met for that pathway. If the criteria for an observed release are met, do not evaluate potential to release for that pathway. When the criteria for an observed release are not met, evaluate potential to release for that pathway, with a maximum value of 500. The evaluation of potential to release varies by migration pathway (see sections 3, 4 and 6).

Establish an observed release either by direct observation of the release of a hazardous substance into the media being evaluated (for example, surface water) or by chemical analysis of samples appropriate to the pathway being evaluated (see sections 3, 4 and 6). The minimum standard to establish an observed release by chemical analysis is analytical evidence of a hazardous substance in the media significantly above the background level. Further, some portion of the release must be attributable to the site. Use the criteria in Table 2–3 as the standard for determining analytical significance. (The criteria in Table 2–3 are also used in establishing observed contamination for the soil exposure component and for establishing areas of observed exposure and areas of subsurface contamination in the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, see section 5.1.0 and section 5.2.0). Separate criteria apply to radionuclides (see section 7.1.1).

TABLE 2–3—OBSERVED RELEASE CRITERIA FOR CHEMICAL ANALYSIS

Sample Measurement < Sample Quantitation Limit.[a]
No observed release is established.
Sample Measurement ≥ Sample Quantitation Limit.[a]
An observed release is established as follows:

- If the background concentration is not detected (or is less than the detection limit), an observed release is established when the sample measurement equals or exceeds the sample quantitation limit.[a]
- If the background concentration equals or exceeds the detection limit, an observed release is established when the sample measurement is 3 times or more above the background concentration.

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[a] If the sample quantitation limit (SQL) cannot be established, determine if there is an observed release as follows:
—If the sample analysis was performed under the EPA Contract Laboratory Program, use the EPA contract-required quantitation limit (CRQL) in place of the SQL.
—If the sample analysis is not performed under the EPA Contract Laboratory Program, use the detection limit (DL) in place of the SQL.

2.4 *Waste characteristics.* The waste characteristics factor category includes the following factors: Hazardous waste quantity, toxicity, and as appropriate to the pathway or threat being evaluated, mobility, persistence, degradation, and/or bioaccumulation (or ecosystem bioaccumulation) potential.

2.4.1 *Selection of substance potentially posing greatest hazard.* For all pathways (components and threats), select the hazardous substance potentially posing the greatest hazard for the pathway (component or threat) and use that substance in evaluating the waste characteristics category of the pathway (component or threat). For the three migration pathways (and threats), base the selection of this hazardous substance on the toxicity factor value for the substance, combined with its mobility, persistence, and/or bioaccumulation (or ecosystem bioaccumulation) potential factor values, as applicable to the migration pathway (or threat). For the soil exposure component of the soil exposure and subsurface intrusion pathway, base the selection on the toxicity factor alone. For the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, base the selection on the toxicity factor value for the substance, combined with its degradation factor value. Evaluation of the toxicity factor is specified in section 2.4.1.1. Use and evaluation of the mobility, persistence, degradation, and/or bioaccumulation (or ecosystem bioaccumulation) potential factors vary by pathway (component or threat) and are specified under the appropriate pathway (component or threat) section. Section 2.4.1.2 identifies the specific factors that are combined with toxicity in evaluating each pathway (component or threat).

2.4.1.1 *Toxicity factor.* Evaluate toxicity for those hazardous substances at the site that are available to the pathway being scored. For all pathways and threats, except the surface water environmental threat, evaluate human toxicity as specified below. For the surface water environmental threat, evaluate ecosystem toxicity as specified in section 4.1.4.2.1.1.

Establish human toxicity factor values based on quantitative dose-response parameters for the following three types of toxicity:

- Cancer—Use slope factors (also referred to as cancer potency factors) combined with weight-of-evidence ratings for carcinogenicity for all exposure routes except inhalation. Use inhalation unit risk (IUR) for inhalation exposure. If an inhalation unit risk or a slope factor is not available for a substance, use its ED_{10} value to estimate a slope factor as follows:

$$\text{Slope factor} = \frac{1}{6\,(\mathrm{ED}_{10})}$$

- Noncancer toxicological responses of chronic exposure—use reference dose (RfD) or reference concentration (RfC) values as applicable.
- Noncancer toxicological responses of acute exposure—use acute toxicity parameters, such as the LD_{50}.

Assign human toxicity factor values to a hazardous substance using Table 2–4, as follows:

- If RfD/RfC and slope factor/inhalation unit risk values are available for the hazardous substance, assign the substance a value from Table 2–4 for each. Select the higher of the two values assigned and use it as the overall toxicity factor value for the hazardous substance.
- If either an RfD/RfC or slope factor/inhalation unit risk value is available, but not both, assign the hazardous substance an overall toxicity factor value from Table 2–4 based solely on the available value (RfD/RfC or slope factor/inhalation unit risk).
- If neither an RfD/RfC nor slope factor/inhalation unit risk value is available, assign the hazardous substance an overall toxicity factor value from Table 2–4 based solely on acute toxicity. That is, consider acute toxicity in Table 2–4 only when both RfD/RfC and slope factor/IUR values are not available.
- If neither an RfD/RfC, nor slope factor/inhalation unit risk, nor acute toxicity value is available, assign the hazardous substance an overall toxicity factor value of 0 and use other hazardous substances for which information is available in evaluating the pathway.

TABLE 2–4—TOXICITY FACTOR EVALUATION

	Assigned value
Chronic Toxicity (Human)	
Reference dose (RfD) (mg/kg-day):	
$RfD < 0.0005$	10,000
$0.0005 \le RfD < 0.005$	1,000
$0.005 \le RfD < 0.05$	100
$0.05 \le RfD < 0.5$	10
$0.5 \le RfD$	1
RfD not available	0
Reference concentration (RfC) (mg/m^3):	
$RfC < 0.0001$	10,000
$0.0001 \le RfC < 0.006$	1,000
$0.006 \le RfC < 0.2$	100
$0.2 \le RfC < 2.0$	10
$2.0 \le RfC$	1
RfC not available	0

Carcinogenicity (human)			
A or Carcinogenic to humans	B or Likely to be carcinogenic to humans	C or Suggestive evidence of carcinogenic potential	Assigned value
Weight-of-evidence[a]/Slope factor (mg/kg-day)$^{-1}$			
$0.5 \le SF$[b]	$5 \le SF$	$50 \le SF$	10,000
$0.05 \le SF < 0.5$	$0.5 \le SF < 5$	$5 \le SF < 50$	1,000
$SF < 0.05$	$0.05 \le SF < 0.5$	$0.5 \le SF < 5$	100
	$SF < 0.05$	$SF < 0.5$	10
Slope factor not available	Slope factor not available	Slope factor not available	0
Weight-of-evidence[a]/Inhalation unit risk (μg/m^3)			
$0.00004 \le IUR$[c]	$0.0004 \le IUR$	$0.004 \le IUR$	10,000
$0.00001 \le IUR < 0.00004$	$0.0001 \le IUR < 0.0004$	$0.001 \le IUR < 0.004$	1,000
$IUR < 0.00001$	$0.00001 \le IUR < 0.0001$	$0.0001 \le IUR < 0.001$	100
	< 0.00001	$IUR < 0.0001$	10
Inhalation unit risk not available	Inhalation unit risk not available	Inhalation unit risk not available	0

[a] A, B, and C, as well as Carcinogenic to humans, Likely to be carcinogenic to humans, and Suggestive evidence of carcinogenic potential refer to weight-of-evidence categories. Assign substances with a weight-of-evidence category of D (inadequate evidence of carcinogenicity) or E (evidence of lack of carcinogenicity), as well as inadequate information to assess carcinogenic potential and not likely to be carcinogenic to humans a value of 0 for carcinogenicity.

[b] SF = Slope factor.

[c] IUR = Inhalation Unit Risk.

Acute Toxicity (human)				
Oral LD_{50} (mg/kg)	Dermal LD_{50} (mg/kg)	Dust or mist LC_{50} (mg/l)	Gas or vapor LC_{50} (ppm)	Assigned value
$LD_{50} < 5$	$LD_{50} < 2$	$LC_{50} < 0.2$	$LC_{50} < 20$	1,000
$5 \leq LD_{50} < 50$	$2 \leq LD_{50} < 20$	$0.2 \leq LC_{50} < 2$	$20 \leq LC_{50} <200$	100
$50 \leq LD_{50} < 500$	$20 \leq LD_{50} < 200$	$2 \leq LC_{50} <20$	$200 \leq LC_{50} <2{,}000$	10
$500 \leq LD_{50}$	$200 \leq LD_{50}$	$20 \leq LC_{50}$	$2{,}000 \leq LC_{50}$	1
LD_{50} not available	LD_{50} not available	LC_{50} not available	LC_{50} not available	0

If a toxicity factor value of 0 is assigned to all hazardous substances available to a particular pathway (that is, insufficient toxicity data are available for evaluating all the substances), use a default value of 100 as the overall human toxicity factor value for all hazardous substances available to the pathway. For hazardous substances having usable toxicity data for multiple exposure routes (for example, inhalation and ingestion), consider all exposure routes and use the highest assigned value, regardless of exposure route, as the toxicity factor value. For HRS purposes, assign both asbestos and lead (and its compounds) a human toxicity factor value of 10,000.

Separate criteria apply for assigning factor values for human toxicity and ecosystem toxicity for radionuclides (see sections 7.2.1 and 7.2.2).

2.4.1.2 *Hazardous substance selection.* For each hazardous substance evaluated for a migration pathway (or threat), combine the human toxicity factor value (or ecosystem toxicity factor value) for the hazardous substance with a mobility, persistence, and/or bioaccumulation (or ecosystem bioaccumulation) potential factor value as follows:

- Ground water migration.
  - —Determine a combined human toxicity/mobility factor value for the hazardous substance (see section 3.2.1).
- Surface water migration—overland/flood migration component.
  - —Determine a combined human toxicity/persistence factor value for the hazardous substance for the drinking water threat (see section 4.1.2.2.1).
  - —Determine a combined human toxicity/persistence/bioaccumulation factor value for the hazardous substance for the human food chain threat (see section 4.1.3.2.1).
  - —Determine a combined ecosystem toxicity/persistence/bioaccumulation factor value for the hazardous substance for the environmental threat (see section 4.1.4.2.1).
- Surface water migration—ground water to surface water migration component.
  - —Determine a combined human toxicity/mobility/persistence factor value for the hazardous substance for the drinking water threat (see section 4.2.2.2.1).
  - —Determine a combined human toxicity/mobility/persistence/bioaccumulation factor value for the hazardous substance for the human food chain threat (see section 4.2.3.2.1).
  - —Determine a combined ecosystem toxicity/mobility/persistence/bioaccumulation factor value for the hazardous substance for the environmental threat (see section 4.2.4.2.1).
- Air migration.
  - —Determine a combined human toxicity/mobility factor value for the hazardous substance (see section 6.2.1).

Determine each combined factor value for a hazardous substance by multiplying the individual factor values appropriate to the pathway (or threat). For each migration pathway (or threat) being evaluated, select the hazardous substance with the highest combined factor value and use that substance in evaluating the waste characteristics factor category of the pathway (or threat).

For the soil exposure and subsurface intrusion pathway, determine toxicity and toxicity/degradation factor values as follows:

- Soil exposure and subsurface intrusion—soil exposure component.
  - —Select the hazardous substance with the highest human toxicity factor value from among the substances that meet the criteria for observed contamination for the threat evaluated and use that substance in evaluating the waste characteristics factor category (see section 5.1.1.2.1).
- Soil exposure and subsurface intrusion—subsurface intrusion component.
  - —Determine a combined human toxicity/degradation factor value for each hazardous substance being evaluated that:
    - ■ Meets the criteria for observed exposure, or
    - ■ Meets the criteria for observed release in an area of subsurface contamination and has a vapor pressure greater than or equal to one torr or a Henry's constant greater than or equal to 10^{-5} atm-m^3/mol, or
    - ■ Meets the criteria for an observed release in a structure within, or in a sample from below, an area of observed exposure and has a vapor pressure greater than or equal to one torr or a Henry's

constant greater than or equal to 10^{-5} atm-m^3/mol.

—Select the hazardous substance with the highest combined factor value and use that substance in evaluating the waste characteristics factor category (see sections 5.2.1.2.1 and 5.2.1.2).

2.4.2 *Hazardous waste quantity.* Evaluate the hazardous waste quantity factor by first assigning each source (or area of observed contamination, area of observed exposure, or area of subsurface contamination) a source hazardous waste quantity value as specified below. Sum these values to obtain the hazardous waste quantity factor value for the pathway being evaluated.

In evaluating the hazardous waste quantity factor for the three migration pathways, allocate hazardous substances and hazardous wastestreams to specific sources in the manner specified in section 2.2.2, except: Consider hazardous substances and hazardous wastestreams that cannot be allocated to any specific source to constitute a separate “unallocated source” for purposes of evaluating only this factor for the three migration pathways. Do not, however, include a hazardous substance or hazardous wastestream in the unallocated source for a migration pathway if there is definitive information indicating that the substance or wastestream could only have been placed in sources with a containment factor value of 0 for that migration pathway.

In evaluating the hazardous waste quantity factor for the soil exposure component of the soil exposure and subsurface intrusion pathway, allocate to each area of observed contamination only those hazardous substances that meet the criteria for observed contamination for that area of observed contamination and only those hazardous wastestreams that contain hazardous substances that meet the criteria for observed contamination for that area of observed contamination. Do not consider other hazardous substances or hazardous wastestreams at the site in evaluating this factor for the soil exposure component of the soil exposure and subsurface intrusion pathway.

In evaluating the hazardous waste quantity factor for the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, allocate to each area of observed exposure or area of subsurface contamination only those hazardous substances and hazardous wastestreams that contain hazardous substances that:

- Meet the criteria for observed exposure, or
- Meet the criteria for observed release in an area of subsurface contamination and have a vapor pressure greater than or equal to one torr or a Henry's constant greater than or equal to 10^{-5} atm-m^3/mol, or
- Meet the criteria for an observed release in a structure within, or in a sample from below, an area of observed exposure and have a vapor pressure greater than or equal to one torr or a Henry's constant greater than or equal to 10^{-5} atm-m^3/mol.

Do not consider other hazardous substances or hazardous wastestreams at the site in evaluating this factor for the subsurface intrusion component of the soil exposure and subsurface intrusion pathway. When determining the hazardous waste quantity for multi-subunit structures, use the procedures identified in section 5.2.1.2.2.

2.4.2.1 *Source hazardous waste quantity.* For each of the three migration pathways, assign a source hazardous waste quantity value to each source (including the unallocated source) having a containment factor value greater than 0 for the pathway being evaluated. Consider the unallocated source to have a containment factor value greater than 0 for each migration pathway.

For the soil exposure component of the soil exposure and subsurface intrusion pathway, assign a source hazardous waste quantity value to each area of observed contamination, as applicable to the threat being evaluated.

For the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, assign a source hazardous waste quantity value to each regularly occupied structure within an area of observed exposure or an area of subsurface contamination that has a structure containment factor value greater than 0. If sufficient data is available and state of the science shows there is no unacceptable risk due to subsurface intrusion into a regularly occupied structure located within an area of subsurface contamination, that structure can be excluded from the area of subsurface contamination.

For determining all hazardous waste quantity calculations except for an unallocated source or an area of subsurface contamination, evaluate using the following four measures in the following hierarchy:

- Hazardous constituent quantity.
- Hazardous wastestream quantity.
- Volume.
- Area.

For the unallocated source, use only the first two measures. For an area of subsurface contamination, evaluate non-radioactive hazardous substances using only the last two measures and evaluate radioactive hazardous substances using hazardous wastestream quantity only. See also section 7.0 regarding the evaluation of radioactive substances.

Separate criteria apply for assigning a source hazardous waste quantity value for radionuclides (see section 7.2.5).

2.4.2.1.1 *Hazardous constituent quantity.* Evaluate hazardous constituent quantity for the source (or area of observed contamination) based solely on the mass of CERCLA hazardous substances (as defined in CERCLA section 101(14), as amended) allocated to the source (or area of observed contamination), except:

- For a hazardous waste listed pursuant to section 3001 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 (RCRA), 42 U.S.C. 6901 *et seq.*, determine its mass for the evaluation of this measure as follows:

—If the hazardous waste is listed solely for Hazard Code T (toxic waste), include only the mass of constituents in the hazardous waste that are CERCLA hazardous substances and not the mass of the entire hazardous waste.

—If the hazardous waste is listed for any other Hazard Code (including T plus any other Hazard Code), include the mass of the entire hazardous waste.

- For a RCRA hazardous waste that exhibits the characteristics identified under section 3001 of RCRA, as amended, determine its mass for the evaluation of this measure as follows:

—If the hazardous waste exhibits only the characteristic of toxicity (or only the characteristic of EP toxicity), include only the mass of constituents in the hazardous waste that are CERCLA hazardous substances and not the mass of the entire hazardous waste.

—If the hazardous waste exhibits any other characteristic identified under section 3001 (including any other characteristic plus the characteristic of toxicity [or the characteristic of EP toxicity]), include the mass of the entire hazardous waste.

Based on this mass, designated as C, assign a value for hazardous constituent quantity as follows:

- For the migration pathways, assign the source a value for hazardous constituent quantity using the Tier A equation of Table 2–5.
- For the soil exposure and subsurface intrusion pathway—soil exposure component, assign the area of observed contamination a value using the Tier A equation of Table 5–2 (section 5.1.1.2.2).
- For the soil exposure and subsurface intrusion pathway—subsurface intrusion component, assign the area of observed exposure a value using the Tier A equation of Table 5–19 (section 5.2.1.2.2).

If the hazardous constituent quantity for the source (or area of observed contamination or area of observed exposure) is adequately determined (that is, the total mass of all CERCLA hazardous substances in the source and releases from the source [or in the area of observed contamination or area of observed exposure] is known or is estimated with reasonable confidence), do not evaluate the other three measures discussed below. Instead assign these other three measures a value of 0 for the source (or area of observed contamination or area of observed exposure) and proceed to section 2.4.2.1.5.

If the hazardous constituent quantity is not adequately determined, assign the source (or area of observed contamination or area of observed exposure) a value for hazardous constituent quantity based on the available data and proceed to section 2.4.2.1.2.

TABLE 2–5—HAZARDOUS WASTE QUANTITY EVALUATION EQUATIONS

Tier	Measure	Units	Equation for assigning value [a]
A	Hazardous constituent quantity (C)	lb	C.
B [b]	Hazardous wastestream quantity (W)	lb	W/5,000.
C [b]	Volume (V).		
	Landfill	yd^3	V/2,500.
	Surface impoundment	yd^3	V/2.5.
	Surface impoundment (buried/backfilled)	yd^3	V/2.5.
	Drums [c]	gallon	V/500.
	Tanks and containers other than drums	yd^3	V/2.5.
	Contaminated soil	yd^3	V/2,500.
	Pile	yd^3	V/2.5.
	Other	yd^3	V/2.5.
D [b]	Area (A).		
	Landfill	ft^2	A/3,400.
	Surface impoundment	ft^2	A/13.
	Surface impoundment (buried/backfilled)	ft^2	A/13.
	Land treatment	ft^2	A/270.
	Pile [d]	ft^2	A/13.
	Contaminated soil	ft^2	A/34,000.

[a] Do not round to nearest integer.

[b] Convert volume to mass when necessary: 1 ton = 2,000 pounds = 1 cubic yard = 4 drums = 200 gallons.

[c] If actual volume of drums is unavailable, assume 1 drum=50 gallons.

[d] Use land surface area under pile, not surface area of pile.

2.4.2.1.2 *Hazardous wastestream quantity*. Evaluate hazardous wastestream quantity for the source (or area of observed contamination or area of observed exposure) based on the mass of hazardous wastestreams plus the mass of any additional CERCLA pollutants and contaminants (as defined in CERCLA section 101[33], as amended) that are allocated to the source (or area of observed contamination or area of observed exposure). For a wastestream that consists solely of a hazardous waste listed pursuant to section 3001 of RCRA, as amended or that consists solely of a RCRA hazardous waste that exhibits the characteristics identified under section 3001 of RCRA, as amended, include the mass of that entire hazardous waste in the evaluation of this measure.

Based on this mass, designated as W, assign a value for hazardous wastestream quantity as follows:

- For the migration pathways, assign the source a value for hazardous wastestream quantity using the Tier B equation of Table 2–5.
- For the soil exposure and subsurface intrusion pathway—soil exposure component, assign the area of observed contamination a value using the Tier B equation of Table 5–2 (section 5.1.1.2.2).
- For the soil exposure and subsurface intrusion pathway—subsurface intrusion component, assign the area of observed exposure a value using the Tier B equation of Table 5–19 (section 5.2.1.2.2).

Do not evaluate the volume and area measures described below if the source is the unallocated source or if the following condition applies:

- The hazardous wastestream quantity for the source (or area of observed contamination or area of observed exposure) is adequately determined—that is, total mass of all hazardous wastestreams and CERCLA pollutants and contaminants for the source and releases from the source (or for the area of observed contamination) is known or is estimated with reasonable confidence.

If the source is the unallocated source or if this condition applies, assign the volume and area measures a value of 0 for the source (or area of observed contamination) and proceed to section 2.4.2.1.5. Otherwise, assign the source (or area of observed contamination) a value for hazardous wastestream quantity based on the available data and proceed to section 2.4.2.1.3.

2.4.2.1.3 *Volume*. Evaluate the volume measure using the volume of the source (or the volume of the area of observed contamination, area of observed exposure, or area of subsurface contamination). For the soil exposure and subsurface intrusion pathway, restrict the use of the volume measure to those areas of observed contamination, areas of observed exposure, or areas of subsurface contamination as specified in sections 5.1.1.2.2 and 5.2.1.2.2.

Based on the volume, designated as V, assign a value to the volume measure as follows:

- For the migration pathways, assign the source a value for volume using the appropriate Tier C equation of Table 2–5.
- For the soil exposure and subsurface intrusion pathway—soil exposure component, assign the area of observed contamination a value for volume using the appropriate Tier C equation of Table 5–2 (section 5.1.1.2.2).
- For the soil exposure and subsurface intrusion pathway—subsurface intrusion component, assign the value based on the volume of the regularly occupied structures within the area of observed exposure or area of subsurface contamination using the Tier C equation of Table 5–19 (section 5.2.1.2.2).

If the volume of the source (or volume of the area of observed contamination, area of observed exposure, or area of subsurface contamination, if applicable) can be determined, do not evaluate the area measure. Instead, assign the area measure a value of 0 and proceed to section 2.4.2.1.5. If the volume cannot be determined (or is not applicable for the soil exposure and subsurface intrusion pathway), assign the source (or area of observed contamination, area of observed exposure, or area of subsurface contamination) a value of 0 for the volume measure and proceed to section 2.4.2.1.4.

2.4.2.1.4 *Area*. Evaluate the area measure using the area of the source (or the area of the area of observed contamination, area of observed exposure, or area of subsurface contamination). Based on this area, designated as A, assign a value to the area measure as follows:

- For the migration pathways, assign the source a value for area using the appropriate Tier D equation of Table 2–5.
- For the soil exposure and subsurface intrusion pathway—soil exposure component, assign the area of observed contamination a value for area using the appropriate Tier D equation of Table 5–2 (section 5.1.1.2.2).
- For the soil exposure and subsurface intrusion pathway—subsurface intrusion component, assign a value based on the area of regularly occupied structures within the area of observed exposure or area of subsurface contamination using the Tier D equation of Table 5–19 (section 5.2.1.2.2).

2.4.2.1.5 *Calculation of source hazardous waste quantity value*. Select the highest of the values assigned to the source (or areas of observed contamination, areas of observed exposure, or areas of subsurface contamination) for the hazardous constituent quantity, hazardous wastestream quantity, volume, and area measures. Assign this value as the source hazardous waste quantity value. Do not round to the nearest integer.

2.4.2.2 *Calculation of hazardous waste quantity factor value.* Sum the source hazardous waste quantity values assigned to all sources (including the unallocated source) or areas of observed contamination, areas of observed exposure, or areas of subsurface contamination for the pathway being evaluated and round this sum to the nearest integer, except: If the sum is greater than 0, but less than 1, round it to 1. Based on this value, select a hazardous waste quantity factor value for the pathway from Table 2–6.

TABLE 2–6—HAZARDOUS WASTE QUANTITY FACTOR VALUES

Hazardous waste quantity value	Assigned value
0	0
1 [a] to 100	[b] 1
Greater than 100 to 10,000	100
Greater than 10,000 to 1,000,000	10,000
Greater than 1,000,000	1,000,000

[a] If the hazardous waste quantity value is greater than 0, but less than 1, round it to 1 as specified in text.

[b] For the pathway, if hazardous constituent quantity is not adequately determined, assign a value as specified in the text; do not assign the value of 1.

For a migration pathway, if the hazardous constituent quantity is adequately determined (see section 2.4.2.1.1) for all sources (or all portions of sources and releases remaining after a removal action), assign the value from Table 2–6 as the hazardous waste quantity factor value for the pathway. If the hazardous constituent quantity is not adequately determined for one or more sources (or one or more portions of sources or releases remaining after a removal action) assign a factor value as follows:

- If any target for that migration pathway is subject to Level I or Level II concentrations (see section 2.5), assign either the value from Table 2–6 or a value of 100, whichever is greater, as the hazardous waste quantity factor value for that pathway.
- If none of the targets for that pathway is subject to Level I or Level II concentrations, assign a factor value as follows:

—If there has been no removal action, assign either the value from Table 2–6 or a value of 10, whichever is greater, as the hazardous waste quantity factor value for that pathway.

—If there has been a removal action:

■ Determine values from Table 2–6 with and without consideration of the removal action.

■ If the value that would be assigned from Table 2–6 without consideration of the removal action would be 100 or greater, assign either the value from Table 2–6 with consideration of the removal action or a value of 100, whichever is greater, as the hazardous waste quantity factor value for the pathway.

■ If the value that would be assigned from Table 2–6 without consideration of the removal action would be less than 100, assign a value of 10 as the hazardous waste quantity factor value for the pathway.

For the soil exposure component of the soil exposure and subsurface intrusion pathway, if the hazardous constituent quantity is adequately determined for all areas of observed contamination, assign the value from Table 2–6 as the hazardous waste quantity factor value. If the hazardous constituent quantity is not adequately determined for one or more areas of observed contamination, assign either the value from Table 2–6 or a value of 10, whichever is greater, as the hazardous waste quantity factor value.

For the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, if the hazardous constituent quantity is adequately determined for all areas of observed exposure, assign the value from Table 2–6 as the hazardous waste quantity factor value. If the hazardous constituent quantity is not adequately determined for one or more areas of observed exposure, assign either the value from Table 2–6 or assign a factor value as follows:

- If any target for the subsurface intrusion component is subject to Level I or Level II concentrations (see section 2.5), assign either the value from Table 2–6 or a value of 100, whichever is greater, as the hazardous waste quantity factor value for this component.
- If none of the targets for the subsurface intrusion component is subject to Level I or Level II concentrations and if there has been a removal or other temporary response action that does not permanently interrupt target exposure form subsurface intrusion, assign a factor value as follows:

—Determine the values from Table 2–6 with and without consideration of the removal or other temporary response action.

—If the value that would be assigned from Table 2–6 without consideration of the removal or other temporary response action would be 100 or greater, assign either the value from Table 2–6 with consideration of the removal action or a value of 100, whichever is greater, as the hazardous waste quantity factor value for the component.

—If the value that would be assigned from Table 2–6 without consideration of the removal or other temporary response action would be less than 100, assign a value of 10 as the hazardous waste quantity factor value for the component.

- Otherwise, if none of the targets for the subsurface intrusion component is subject to Level I or Level II concentrations and there has not been a removal action, assign a value from Table 2–6 or a value of 10, whichever is greater.

2.4.3 *Waste characteristics factor category value.* Determine the waste characteristics factor category value as specified in section 2.4.3.1 for all pathways and threats, except the surface water-human food chain threat and the surface water-environmental threat. Determine the waste characteristics factor category value for these latter two threats as specified in section 2.4.3.2.

2.4.3.1 *Factor category value.* For the pathway (component or threat) being evaluated, multiply the toxicity or combined factor value, as appropriate, from section 2.4.1.2 and the hazardous waste quantity factor value from section 2.4.2.2, subject to a maximum product of $1x10^8$. Based on this waste characteristics product, assign a waste characteristics factor category value to the pathway (component or threat) from Table 2–7.

TABLE 2–7—WASTE CHARACTERISTICS FACTOR CATEGORY VALUES

Waste characteristics product	Assigned value
0	0
Greater than 0 to less than 10	1
10 to less than $1x10^2$	2
$1x10^2$ to less than $1x10^3$	3
$1x10^3$ to less than $1x10^4$	6
$1x10^4$ to less than $1x10^5$	10
$1x10^5$ to less than $1x10^6$	18
$1x10^6$ to less than $1x10^7$	32
$1x10^7$ to less than $1x10^8$	56
$1x10^8$ to less than $1x10^9$	100
$1x10^9$ to less than $1x10^{10}$	180
$1x10^{10}$ to less than $1x10^{11}$	320
$1x10^{11}$ to less than $1x10^{12}$	560
$1x10^{12}$	1,000

2.4.3.2 *Factor category value, considering bioaccumulation potential.* For the surface water-human food chain threat and the surface water-environmental threat, multiply the toxicity or combined factor value, as appropriate, from section 2.4.1.2 and the hazardous waste quantity factor value from section 2.4.2.2, subject to:

- A maximum product of $1x10^{12}$, *and*
- A maximum product exclusive of the bioaccumulation (or ecosystem bioaccumulation) potential factor of $1x10^8$.

Based on the total waste characteristics product, assign a waste characteristics factor category value to these threats from Table 2–7.

2.5 *Targets.* The types of targets evaluated include the following:

- Individual (factor name varies by pathway, component, and threat).
- Human population.
- Resources (these vary by pathway, component, and threat).
- Sensitive environments (included for the surface water migration pathway, air migration pathway, and soil exposure component of the soil exposure and subsurface intrusion pathway).

The factor values that may be assigned to each type of target have the same range for each pathway for which that type of target is evaluated. The factor value for most types of targets depends on whether the target is subject to actual or potential contamination for the pathway and whether the actual contamination is Level I or Level II:

- Actual contamination: Target is associated either with a sampling location that meets the criteria for an observed release (or observed contamination or observed exposure) for the pathway or with an observed release based on direct observation for the pathway (additional criteria apply for establishing actual contamination for the human food chain threat in the surface water migration pathway, see sections 4.1.3.3 and 4.2.3.3). Sections 3 through 6 specify how to determine the targets associated with a sampling location or with an observed release based on direct observation. Determine whether the actual contamination is Level I or Level II as follows:

—Level I:

- ■ Media-specific concentrations for the target meet the criteria for an observed release (or observed contamination or observed exposure) for the pathway and are at or above media-specific benchmark values. These benchmark values (see section 2.5.2) include both screening concentrations and concentrations specified in regulatory limits (such as Maximum Contaminant Level (MCL) values), or
- ■ For the human food chain threat in the surface water migration pathway, concentrations in tissue samples from aquatic human food chain organisms are at or above benchmark values. Such tissue samples may be used in addition to media-specific concentrations only as specified in sections 4.1.3.3 and 4.2.3.3.

—Level II:

- ■ Media-specific concentrations for the target meet the criteria for an observed release (or observed contamination or observed exposure) for the pathway, but are less than media-specific benchmarks. If none of the hazardous substances eligible to be evaluated for the sampling location has an applicable benchmark, assign Level II to the actual contamination at the sampling location, or
- ■ For observed releases or observed exposures based on direct observation, assign Level II to targets as specified in sections 3, 4, 5, and 6, or
- ■ For the human food chain threat in the surface water migration pathway, concentrations in tissue samples from aquatic human food chain organisms, when applicable, are below benchmark values.

—If a target is subject to both Level I and Level II concentrations for a pathway (component or threat), evaluate the target using Level I concentrations for that pathway (component or threat).

- Potential contamination: Target is subject to a potential release (that is, target is not associated with actual contamination for that pathway or threat).

Assign a factor value for individual risk as follows (select the highest value that applies to the pathway, component or threat):

- 50 points if any individual is exposed to Level I concentrations.
- 45 points if any individual is exposed to Level II concentrations.
- Maximum of 20 points if any individual is subject to potential contamination. The value assigned is 20 unless reduced by a distance or dilution weight appropriate to the pathway. Assign factor values for population and sensitive environments as follows:
- Sum Level I targets and multiply by 10. (Level I is not used for sensitive environments in the soil exposure component of the soil exposure and subsurface intrusion and air migration pathways.)
- Sum Level II targets.
- Multiply potential targets in all but the soil exposure and subsurface intrusion pathway by distance or dilution weights appropriate to the pathway, sum, and divide by 10. Distance or dilution weighting accounts for diminishing exposure with increasing distance or dilution within the different pathways. For targets within an area of subsurface contamination in the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, multiply by a weighting factor as directed in section 5.2.1.3.2.3.
- Sum the values for the three levels.

In addition, resource value points are assigned within all pathways for welfare-related impacts (for example, impacts to agricultural land), but do not depend on whether there is actual or potential contamination.

2.5.1 *Determination of level of actual contamination at a sampling location.* Determine whether Level I concentrations or Level II concentrations apply at a sampling location (and thus to the associated targets) as follows:

- Select the benchmarks applicable to the pathway (component or threat) being evaluated.
- Compare the concentrations of hazardous substances in the sample (or comparable samples) to their benchmark concentrations for the pathway (component or threat), as specified in section 2.5.2.
- Determine which level applies based on this comparison.
- If none of the hazardous substances eligible to be evaluated for the sampling location has an applicable benchmark, assign Level II to the actual contamination at that sampling location for the pathway (component or threat).

In making the comparison, consider only those samples, and only those hazardous substances in the sample, that meet the criteria for an observed release (or observed contamination or observed exposure) for the pathway, except: Tissue samples from aquatic human food chain organisms may also be used as specified in sections 4.1.3.3 and 4.2.3.3 of the surface water-human food chain threat. If any hazardous substance is present in more than one comparable sample for the sampling location, use the highest concentration of that hazardous substance from any of the comparable samples in making the comparisons.

Treat sets of samples that are not comparable separately and make a separate comparison for each such set.

2.5.2 *Comparison to benchmarks.* Use the following media-specific benchmarks for making the comparisons for the indicated pathway (or threat):

- Maximum Contaminant Level Goals (MCLGs)—ground water migration pathway and drinking water threat in surface water migration pathway. Use only MCLG values greater than 0.
- Maximum Contaminant Levels (MCLs)—ground water migration pathway and drinking water threat in surface water migration pathway.
- Food and Drug Administration Action Level (FDAAL) for fish or shellfish—human food chain threat in surface water migration pathway.
- EPA Ambient Water Quality Criteria (AWQC/National Recommended Water Quality Criteria) for protection of aquatic life—environmental threat in surface water migration pathway.
- EPA Ambient Aquatic Life Advisory Concentrations (AALAC)—environmental threat in surface water migration pathway.
- National Ambient Air Quality Standards (NAAQS)—air migration pathway.
- National Emission Standards for Hazardous Air Pollutants (NESHAPs)—air migration pathway. Use only those NESHAPs promulgated in ambient concentration units.
- Screening concentration for cancer corresponding to that concentration that corresponds to the 10^{-6} individual cancer risk for inhalation exposures (air migration pathway or subsurface intrusion component of the soil exposure and subsurface intrusion pathway) or for oral exposures (ground water migration pathway; drinking water and human food chain threats in surface water migration pathway; and soil exposure and subsurface intrusion pathway).
- Screening concentration for noncancer toxicological responses corresponding to the RfC for inhalation exposures (air migration pathway and subsurface intrusion component of the soil exposure and subsurface intrusion pathway) or RfD for oral exposures (ground water migration pathway; drinking

water and human food chain threats in surface water migration pathway; and soil exposure and subsurface intrusion pathway).

Select the benchmark(s) applicable to the pathway (component or threat) being evaluated as specified in sections 3 through 6. Compare the concentration of each hazardous substance from the sampling location to its benchmark concentration(s) for that pathway (component or threat). Use only those samples and only those hazardous substances in the sample that meet the criteria for an observed release (or observed contamination or observed exposure) for the pathway, except: Tissue samples from aquatic human food chain organisms may be used as specified in sections 4.1.3.3 and 4.2.3.3. If the concentration of any applicable hazardous substance from any sample equals or exceeds its benchmark concentration, consider the sampling location to be subject to Level I concentrations for that pathway (or threat). If more than one benchmark applies to the hazardous substance, assign Level I if the concentration of the hazardous substance equals or exceeds the lowest applicable benchmark concentration.

If no hazardous substance individually equals or exceeds its benchmark concentration, but more than one hazardous substance either meets the criteria for an observed release (or observed contamination or observed exposure) for the sample (or comparable samples) or is eligible to be evaluated for a tissue sample (see sections 4.1.3.3 and 4.2.3.3), calculate the indices I and J specified below based on these hazardous substances.

For those hazardous substances that are carcinogens (that is, those having either a carcinogen weight-of-evidence classification of A, B, or C or a weight-of-evidence classification of carcinogenic to humans, likely to be carcinogenic to humans, or suggestive evidence of carcinogenic potential), calculate an index I for the sample location as follows:

$$I = \sum_{i=1}^{n} \frac{C_i}{SC_i}$$

Where:

C_i = Concentration of hazardous substance i in sample (or highest concentration of hazardous substance i from among comparable samples).

SC_i = Screening concentration for cancer corresponding to that concentration that corresponds to its 10^{-6} individual cancer risk for applicable exposure (inhalation or oral) for hazardous substance i.

n = Number of applicable hazardous substances in sample (or comparable samples) that are carcinogens and for which an SC_i is available.

For those hazardous substances for which an RfD or RfC is available, calculate an index J for the sample location as follows:

$$I = \sum_{j=1}^{m} \frac{C_j}{CR_j}$$

Where:

C_j = Concentration of hazardous substance j in sample (or highest concentration of hazardous substance j from among comparable samples).

CR_j = Screening concentration for noncancer toxicological responses corresponding to RfD or RfC for applicable exposure (inhalation or oral) for hazardous substance j.

m = Number of applicable hazardous substances in sample (or comparable samples) for which a CR_j is available.

If either I or J equals or exceeds 1, consider the sampling location to be subject to Level I concentrations for that pathway (component or threat). If both I and J are less than 1, consider the sampling location to be subject to Level II concentrations for that pathway (component or threat). If, for the sampling location, there are sets of samples that are not comparable, calculate I and J separately for each such set, and use the highest calculated values of I and J to assign Level I and Level II.

See sections 7.3.1 and 7.3.2 for criteria for determining the level of contamination for radioactive substances.

3.0 Ground Water Migration Pathway

Evaluate the ground water migration pathway based on three factor categories: likelihood of release, waste characteristics, and targets. Figure 3–1 indicates the factors included within each factor category.

Determine the ground water migration pathway score (S_{gw}) in terms of the factor category values as follows:

$$S_{gw} = \frac{(LR)(WC)(T)}{SF}$$

where:

LR = Likelihood of release factor category value.
WC = Waste characteristics factor category value.
T = Targets factor category value.
SF = Scaling factor.

Table 3–1 outlines the specific calculation procedure.

Calculate a separate ground water migration pathway score for each aquifer, using the factor category values for that aquifer for likelihood of release, waste characteristics, and targets. In doing so, include both the targets using water from that aquifer and the targets using water from all overlying aquifers through which the hazardous substances would migrate to reach the aquifer being evaluated. Assign the highest ground water migration pathway score that results for any aquifer as the ground water migration pathway score for the site.

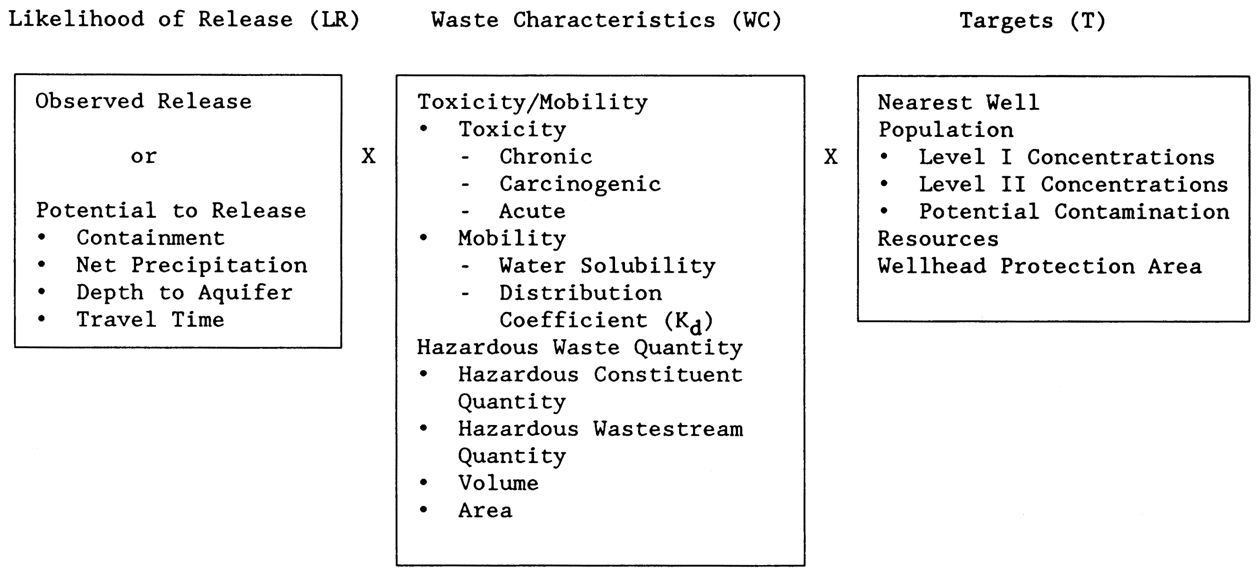


FIGURE 3-1
OVERVIEW OF GROUND WATER MIGRATION PATHWAY

TABLE 3–1—GROUND WATER MIGRATION PATHWAY SCORESHEET

Factor categories and factors	Maximum value	Value assigned
Likelihood of Release to an Aquifer:		
1. Observed Release	550	
2. Potential to Release:		
2a. Containment	10	
2b. Net Precipitation	10	
2c. Depth to Aquifer	5	
2d. Travel Time	35	
2e. Potential to Release [lines 2a(2b + 2c + 2d)]	500	
3. Likelihood of Release (higher of lines 1 and 2e)	550	
Waste Characteristics:		
4. Toxicity/Mobility	(a)	
5. Hazardous Waste Quantity	(a)	
6. Waste Characteristics	100	
Targets:		
7. Nearest Well	50	
8. Population:		
8a. Level I Concentrations	(b)	
8b. Level II Concentrations	(b)	
8c. Potential Contamination	(b)	
8d. Population (lines 8a + 8b + 8c)	(b)	
9. Resources	5	
10. Wellhead Protection Area	20	
11. Targets (lines 7 + 8d + 9 + 10)	(b)	
Ground Water Migration Score for an Aquifer:		
12. Aquifer Score [(lines 3 × 6 × 11) / 82,500][c]	100	
Ground Water Migration Pathway Score:		
13. Pathway Score (S_{gw}), (highest value from line 12 for all aquifers evaluated)[c]	100	

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] Do not round to nearest integer.

3.0.1 *General considerations*

3.0.1.1 *Ground water target distance limit.* The target distance limit defines the maximum distance from the sources at the site over which targets are evaluated. Use a target distance limit of 4 miles for the ground water migration pathway, except when aquifer discontinuities apply (see section 3.0.1.2.2). Furthermore, consider any well with an observed release from a source at the site (see section 3.1.1) to lie within the target distance limit of the site, regardless of the well's distance from the sources at the site.

For sites that consist solely of a contaminated ground water plume with no identified source, begin measuring the 4-mile target distance limit at the center of the area of observed ground water contamination. Determine the area of observed ground water contamination based on available samples that meet the criteria for an observed release.

3.0.1.2 *Aquifer boundaries.* Combine multiple aquifers into a single hydrologic unit for scoring purposes if aquifer interconnections can be established for these aquifers. In contrast, restrict aquifer boundaries if aquifer discontinuities can be established.

3.0.1.2.1 *Aquifer interconnections.* Evaluate whether aquifer interconnections occur within 2 miles of the sources at the site. If they occur within this 2-mile distance, combine the aquifers having interconnections in scoring the site. In addition, if observed ground water contamination attributable to the sources at the site extends beyond 2 miles from the sources, use any locations within the limits of this observed ground water contamination in evaluating aquifer interconnections. If data are not adequate to establish aquifer interconnections, evaluate the aquifers as separate aquifers.

3.0.1.2.2 *Aquifer discontinuities.* Evaluate whether aquifer discontinuities occur within the 4-mile target distance limit. An aquifer discontinuity occurs for scoring purposes only when a geologic, topographic, or other structure or feature entirely transects an aquifer within the 4-mile target distance limit, thereby creating a continuous boundary to ground water flow within this limit. If two or more aquifers can be combined into a single hydrologic unit for scoring purposes, an aquifer discontinuity occurs only when the structure or feature entirely transects the boundaries of this single hydrologic unit.

When an aquifer discontinuity is established within the 4-mile target distance limit, exclude that portion of the aquifer beyond the discontinuity in evaluating the ground water migration pathway. However, if hazardous substances have migrated across an apparent discontinuity within the 4-mile target distance limit, do not consider this to be a discontinuity in scoring the site.

3.0.1.3 *Karst aquifer.* Give a karst aquifer that underlies any portion of the sources at the site special consideration in the evaluation of two potential to release factors (depth to aquifer in section 3.1.2.3 and travel time in section 3.1.2.4), one waste characteristics factor (mobility in section 3.2.1.2), and two targets factors (nearest well in section 3.3.1 and potential contamination in section 3.3.2.4).

3.1 *Likelihood of release*. For an aquifer, evaluate the likelihood of release factor category in terms of an observed release factor or a potential to release factor.

3.1.1 *Observed release*. Establish an observed release to an aquifer by demonstrating that the site has released a hazardous substance to the aquifer. Base this demonstration on either:

- Direct observation—a material that contains one or more hazardous substances has been deposited into or has been observed entering the aquifer.
- Chemical analysis—an analysis of ground water samples from the aquifer indicates that the concentration of hazardous substance(s) has increased significantly above the background concentration for the site (see section 2.3). Some portion of the significant increase must be attributable to the site to establish the observed release, except: when the source itself consists of a ground water plume with no identified source, no separate attribution is required.

If an observed release can be established for the aquifer, assign the aquifer an observed release factor value of 550, enter this value in table 3–1, and proceed to section 3.1.3. If an observed release cannot be established for the aquifer, assign an observed release factor value of 0, enter this value in table 3–1, and proceed to section 3.1.2.

3.1.2 *Potential to release*. Evaluate potential to release only if an observed release cannot be established for the aquifer. Evaluate potential to release based on four factors: containment, net precipitation, depth to aquifer, and travel time. For sources overlying karst terrain, give any karst aquifer that underlies any portion of the sources at the site special consideration in evaluating depth to aquifer and travel time, as specified in sections 3.1.2.3 and 3.1.2.4.

3.1.2.1 *Containment*. Assign a containment factor value from table 3–2 to each source at the site. Select the highest containment factor value assigned to those sources with a source hazardous waste quantity value of 0.5 or more (see section 2.4.2.1.5). (Do not include this minimum size requirement in evaluating any other factor of this pathway.) Assign this highest value as the containment factor value for the aquifer being evaluated. Enter this value in Table 3–1.

If no source at the site meets the minimum size requirement, then select the highest value assigned to the sources at the site and assign it as the containment factor value for the aquifer being evaluated. Enter this value in table 3–1.

3.1.2.2 *Net precipitation*. Assign a net precipitation factor value to the site. Figure 3–2 provides computed net precipitation factor values, based on site location. Where necessary, determine the net precipitation factor value as follows:

- Determine monthly precipitation and monthly evapotranspiration:
  - –Use local measured monthly averages.
  - –When local data are not available, use monthly averages from the nearest National Oceanographic and Atmospheric Administration weather station that is in a similar geographic setting.

TABLE 3–2—CONTAINMENT FACTOR VALUES FOR GROUND WATER MIGRATION PATHWAY

Source	Assigned value
All Sources (Except Surface Impoundments, Land Treatment, Containers, and Tanks)	
Evidence of hazardous substance migration from source area (*i.e.*, source area includes source and any associated containment structures).	10
No liner	10
No evidence of hazardous substance migration from source area, a liner, *and:*	
(a) None of the following present: (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system, or (3) functioning leachate collection and removal system immediately above liner.	10
(b) Any one of the three items in (a) present	9
(c) Any two of the items in (a) present	7
(d) All three items in (a) present plus a functioning ground water monitoring system	5
(e) All items in (d) present, plus no bulk or non-containerized liquids nor materials containing free liquids deposited in source area.	3
No evidence of hazardous substance migration from source area, double liner with functioning leachate collection and removal system above and between liners, functioning ground water monitoring system, *and:*	
(f) Only one of the following deficiencies present in containment: (1) bulk or noncontainerized liquids or materials containing free liquids deposited in source area, or (2) no or nonfunctioning or nonmaintained run-on control system and runoff management system, or (3) no or nonmaintained engineered cover.	3
(g) None of the deficiencies in (f) present	0
Source area inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate is generated, liquids or materials containing free liquids not deposited in source area, and functioning and maintained run-on control present.	0

TABLE 3–2—CONTAINMENT FACTOR VALUES FOR GROUND WATER MIGRATION PATHWAY—Continued

Source	Assigned value
Surface Impoundment	
Evidence of hazardous substance migration from surface impoundment	10
No liner	10
Free liquids present with either no diking, unsound diking, or diking that is not regularly inspected and maintained.	10
No evidence of hazardous substance migration from surface impoundment, free liquids present, sound diking that is regularly inspected and maintained, adequate freeboard, *and:*	
(a) Liner	9
(b) Liner with functioning leachate collection and removal system below liner, and functioning ground water monitoring system.	5
(c) Double liner with functioning leachate collection and removal system between liners, and functioning ground water monitoring system.	3
No evidence of hazardous substance migration from surface impoundment and all free liquids eliminated at closure (either by removal of liquids or solidification of remaining wastes and waste residues).	Evaluate using **All sources** criteria (with no bulk or free liquid deposited).
Land Treatment	
Evidence of hazardous substance migration from land treatment zone	10
No functioning, maintained, run-on control and runoff management system	10
No evidence of hazardous substance migration from land treatment zone *and:*	
(a) Functioning and maintained run-on control and runoff management system	7
(b) Functioning and maintained run-on control and runoff management system, and vegetative cover established over entire land treatment area.	5
(c) Land treatment area maintained in compliance with 40 CFR 264.280	0
Containers	
All containers buried	Evaluate using **All sources** criteria.
Evidence of hazardous substance migration from container area (*i.e.*, container area includes containers and any associated containment structures).	10
No liner (or no essentially impervious base) under container area.	10
No diking (or no similar structure) surrounding container area	10
Diking surrounding container area unsound or not regularly inspected and maintained	10
No evidence of hazardous substance migration from container area, container area surrounded by sound diking that is regularly inspected and maintained, *and:*	
(a) Liner (or essentially impervious base) under container area	9
(b) Essentially impervious base under container area with liquids collection and removal system	7
(c) Containment system includes essentially impervious base, liquids collection system, sufficient capacity to contain 10 percent of volume of all containers, and functioning and maintained run-on control; plus functioning ground water monitoring system, and spilled or leaked hazardous substances and accumulated precipitation removed in timely manner to prevent overflow of collection system, at least weekly inspection of containers, hazardous substances in leaking or deteriorating containers transferred to containers in good condition, and containers sealed except when waste is added or removed.	5
(d) Free liquids present, containment system has sufficient capacity to hold total volume of all containers and to provide adequate freeboard, single liner under container area with functioning leachate collection and removal system below liner, and functioning ground water monitoring system.	5
(e) Same as (d) except: double liner under container area with functioning leachate collection and removal system between liners.	3
Containers inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate would be generated from any unsealed or ruptured containers, liquids or materials containing free liquids not deposited in any container, and functioning and maintained run-off control present.	0
No evidence of hazardous substance migration from container area, containers leaking, and all free liquids eliminated at closure (either by removal of liquid or solidification of remaining wastes and waste residues).	Evaluate using **All sources** criteria (with no bulk or free liquid deposited).
Tank	
Below-ground tank	Evaluate using **All sources** criteria.
Evidence of hazardous substance migration from tank area (*i.e.*, tank area includes tank, ancillary equipment such as piping, and any associated containment structures).	10
Tank and ancillary equipment not provided with secondary containment (e.g., liner under tank area, vault system, double wall).	10
No diking (or no similar structure) surrounding tank and ancillary equipment	10
Diking surrounding tank and ancillary equipment unsound or not regularly inspected and maintained	10

TABLE 3–2—CONTAINMENT FACTOR VALUES FOR GROUND WATER MIGRATION PATHWAY—Continued

Source	Assigned value
No evidence of hazardous substance migration from tank area, tank and ancillary equipment surrounded by sound diking that is regularly inspected and maintained, *and:*	
(a) Tank and ancillary equipment provided with secondary containment	9
(b) Tank and ancillary equipment provided with secondary containment with leak detection and collection system.	7
(c) Tank and ancillary equipment provided with secondary containment system that detects and collects spilled or leaked hazardous substances and accumulated precipitation and has sufficient capacity to contain 110 percent of volume of largest tank within containment area, spilled or leaked hazardous substances and accumulated precipitation removed in timely manner, at least weekly inspection of tank and secondary containment system, all leaking or unfit-for-use tank systems promptly responded to, and functioning ground water monitoring system.	5
(d) Containment system has sufficient capacity to hold volume of all tanks within tank containment area and to provide adequate freeboard, single liner under that containment area with functioning leachate collection and removal system below liner, and functioning ground water monitoring system.	5
(e) Same as (d) except: double liner under tank containment area with functioning leachate collection and removal system between liners.	3
Tank is above ground, and inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate would be generated from any material released from tank, liquids or materials containing free liquids not deposited in any tank, and functioning and maintained run-on control present.	0

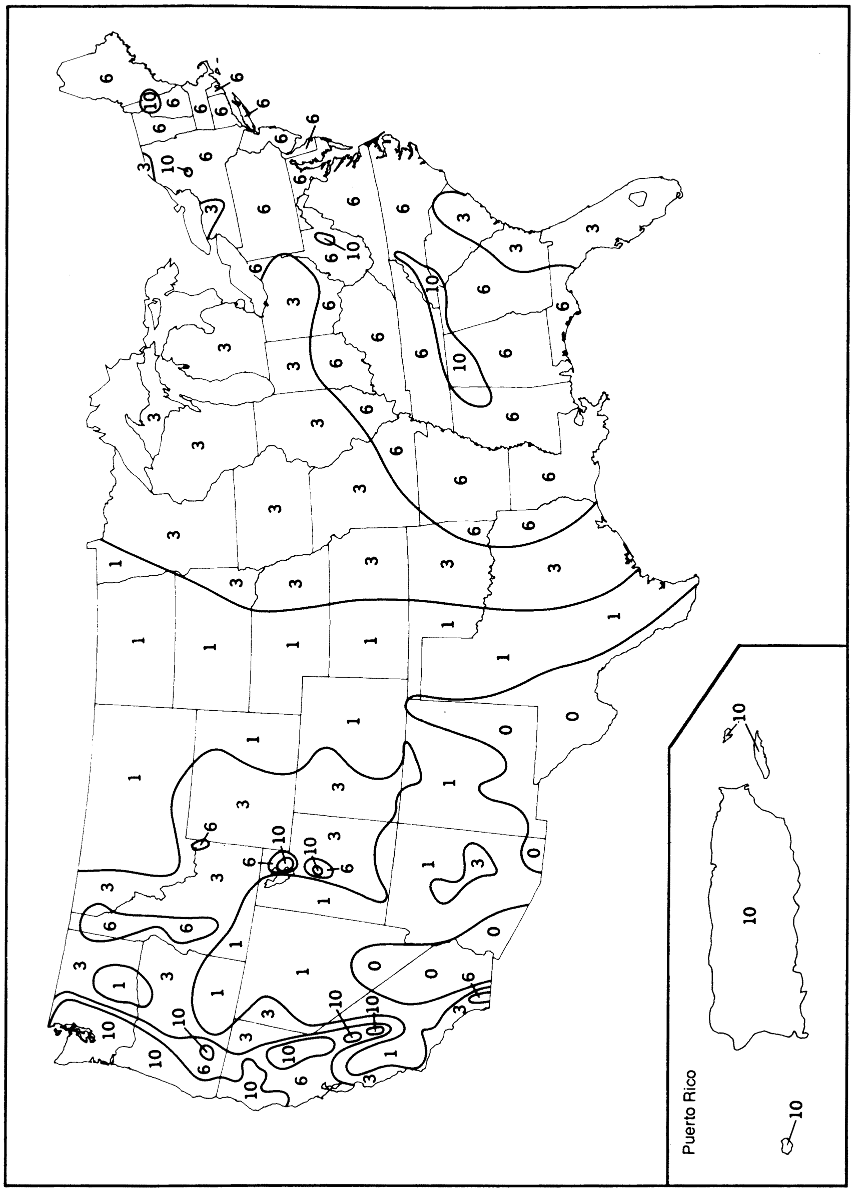


FIGURE 3-2
NET PRECIPITATION FACTOR VALUES

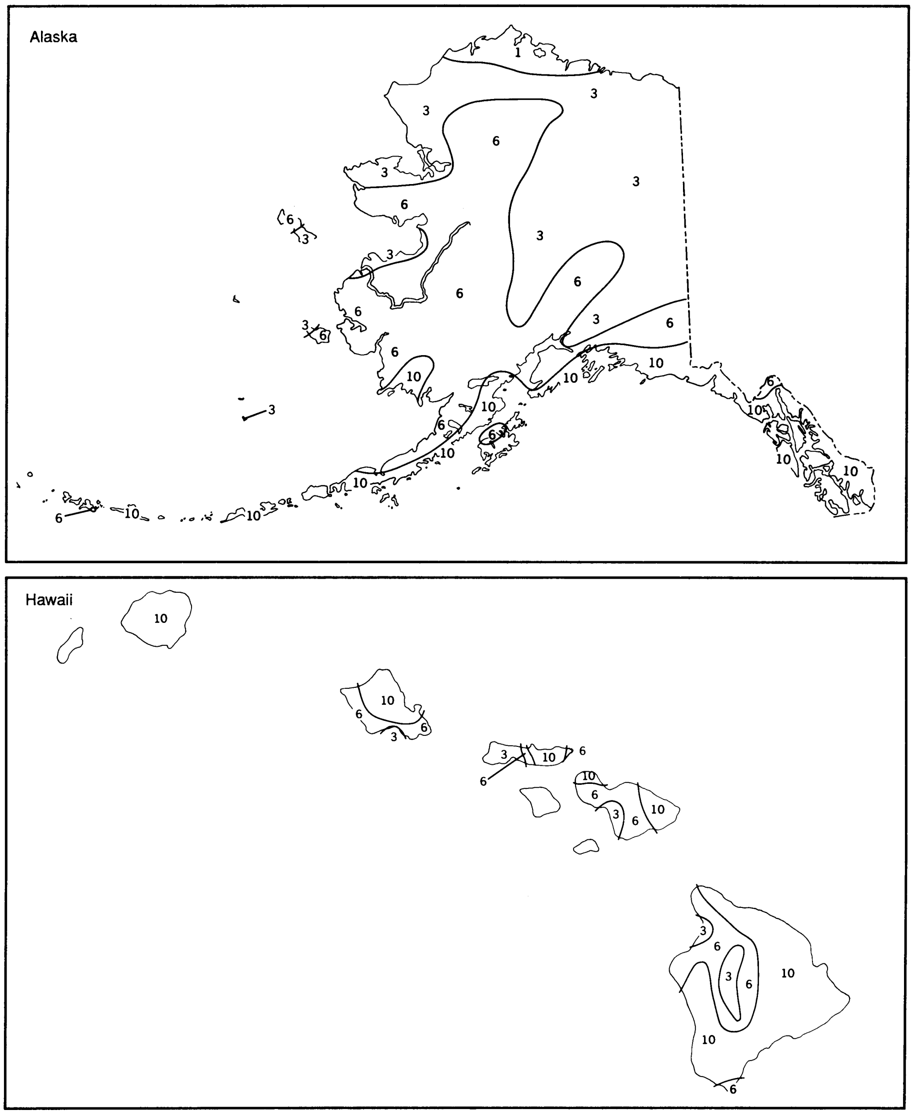


FIGURE 3-2
NET PRECIPITATION FACTOR VALUES
(CONCLUDED)

–When measured monthly evapotranspiration is not available, calculate monthly potential evapotranspiration (E_i) as follows:

$E_i = 0.6 F_i (10 T_i/I)^a$

where:

E_i = Monthly potential evapotranspiration (inches) for month i.

F_i = Monthly latitude adjusting value for month i.

T_i = Mean monthly temperature (°C) for month i.

$$I = \sum_{i=1}^{12} \left(T_i/5\right)^{1.514}$$

$$a = 6.75 \times 10^{-7}\, I^3 - 7.71 \times 10^{-5}\, I^2 + 1.79 \times 10^{-2}\, I + 0.49239$$

Select the latitude adjusting value for each month from table 3–3. For latitudes lower than 50° North or 20° South, determine the monthly latitude adjusting value by interpolation.

- Calculate monthly net precipitation by subtracting monthly evapotranspiration (or monthly potential evapotranspiration) from monthly precipitation. If evapotranspiration (or potential evapotranspiration) exceeds precipitation for a month, assign that month a net precipitation value of 0.
- Calculate the annual net precipitation by summing the monthly net precipitation values.
- Based on the annual net precipitation, assign a net precipitation factor value from table 3–4.

Enter the value assigned from Figure 3–2 or from table 3–4, as appropriate, in table 3–1.

TABLE 3–3—MONTHLY LATITUDE ADJUSTING VALUES [a]

Latitude [b] (degrees)	Month											
	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
≥50 N	0.74	0.78	1.02	1.15	1.33	1.36	1.37	1.25	1.06	0.92	0.76	0.70
45 N	0.80	0.81	1.02	1.13	1.28	1.29	1.31	1.21	1.04	0.94	0.79	0.75
40 N	0.84	0.83	1.03	1.11	1.24	1.25	1.27	1.18	1.04	0.96	0.83	0.81
35 N	0.87	0.85	1.03	1.09	1.21	1.21	1.23	1.16	1.03	0.97	0.89	0.85
30 N	0.90	0.87	1.03	1.08	1.18	1.17	1.20	1.14	1.03	0.98	0.89	0.88
20 N	0.95	0.90	1.03	1.05	1.13	1.11	1.14	1.11	1.02	1.00	0.93	0.94
10 N	1.00	0.91	1.03	1.03	1.08	1.06	1.08	1.07	1.02	1.02	0.98	0.99
0	1.04	0.94	1.04	1.01	1.04	1.01	1.04	1.04	1.01	1.04	1.01	1.04
10 S	1.08	0.97	1.05	0.99	1.00	0.96	1.00	1.02	1.00	1.06	1.05	1.09
20 S	1.14	0.99	1.05	0.97	0.96	0.91	0.95	0.99	1.00	1.08	1.09	1.15

[a] Do not round to nearest integer.

[b] For unlisted latitudes lower than 50° North or 20° South, determine the latitude adjusting value by interpolation.

TABLE 3–4—NET PRECIPITATION FACTOR VALUES

Net precipitation (inches)	Assigned value
0	0
Greater than 0 to 5	1
Greater than 5 to 15	3
Greater than 15 to 30	6
Greater than 30	10

3.1.2.3 *Depth to aquifer*. Evaluate depth to aquifer by determining the depth from the lowest known point of hazardous substances at a site to the top of the aquifer being evaluated, considering all layers in that interval. Measure the depth to an aquifer as the distance from the surface to the top of the aquifer minus the distance from the surface to the lowest known point of hazardous substances eligible to be evaluated for that aquifer. In evaluating depth to aquifer in karst terrain, assign a thickness of 0 feet to a karst aquifer that underlies any portion of the sources at the site. Based on the calculated depth, assign a value from table 3–5 to the depth to aquifer factor.

Determine the depth to aquifer only at locations within 2 miles of the sources at the site, except: if observed ground water contamination attributable to sources at the site extends more than 2 miles beyond these sources, use any location within the limits of this observed ground water contamination when evaluating the depth to aquifer factor for any aquifer that does not have an observed release. If the necessary geologic information is available at multiple locations, calculate the depth to aquifer at each location. Use the location having the smallest depth to assign the factor value. Enter this value in table 3–1.

TABLE 3–5—DEPTH TO AQUIFER FACTOR VALUES

Depth to aquifer [a] (feet)	Assigned value
Less than or equal to 25	5
Greater than 25 to 250	3
Greater than 250	1

[a] Use depth of all layers between the hazardous substances and aquifer. Assign a thickness of 0 feet to any karst aquifer that underlies any portion of the sources at the site.

3.1.2.4 *Travel time*. Evaluate the travel time factor based on the geologic materials in the interval between the lowest known point of hazardous substances at the site and the top of the aquifer being evaluated. Assign a value to the travel time factor as follows:

- If the depth to aquifer (see section 3.1.2.3) is 10 feet or less, assign a value of 35.
- If, for the interval being evaluated, all layers that underlie a portion of the sources at the site are karst, assign a value of 35.
- Otherwise:
  - –Select the lowest hydraulic conductivity layer(s) from within the above interval.

Consider only layers at least 3 feet thick. However, do not consider layers or portions of layers within the first 10 feet of the depth to the aquifer.

–Determine hydraulic conductivities for individual layers from table 3–6 or from in-situ or laboratory tests. Use representative, measured, hydraulic conductivity values whenever available.

–If more than one layer has the same lowest hydraulic conductivity, include all such layers and sum their thicknesses. Assign a thickness of 0 feet to a karst layer that underlies any portion of the sources at the site.

–Assign a value from table 3–7 to the travel time factor, based on the thickness and hydraulic conductivity of the lowest hydraulic conductivity layer(s).

TABLE 3–6—HYDRAULIC CONDUCTIVITY OF GEOLOGIC MATERIALS

Type of material	Assigned hydraulic conductivity[a] (cm/sec)
Clay; low permeability till (compact unfractured till); shale; unfractured metamorphic and igneous rocks	10^{-8}
Silt; loesses; silty clays; sediments that are predominantly silts; moderately permeable till (fine-grained, unconsolidated till, or compact till with some fractures); low permeability limestones and dolomites (no karst); low permeability sandstone; low permeability fractured igneous and metamorphic rocks	10^{-6}
Sands; sandy silts; sediments that are predominantly sand; highly permeable till (coarse-grained, unconsolidated or compact and highly fractured); peat; moderately permeable limestones and dolomites (no karst); moderately permeable sandstone; moderately permeable fractured igneous and metamorphic rocks	10^{-4}
Gravel; clean sand; highly permeable fractured igneous and metamorphic rocks; permeable basalt; karst limestones and dolomites	10^{-2}

[a] Do not round to nearest integer.

TABLE 3–7—TRAVEL TIME FACTOR VALUES[a]

Hydraulic conductivity (cm/sec)	Thickness of lowest hydraulic conductivity layer(s)[b] (feet)			
	Greater than 3 to 5	Greater than 5 to 100	Greater than 100 to 500	Greater than 500
Greater than or equal to 10^{-3}	35	35	35	25
Less than 10^{-3} to 10^{-5}	35	25	15	15
Less than 10^{-5} to 10^{-7}	15	15	5	5
Less than 10^{-7}	5	5	1	1

[a] If depth to aquifer is 10 feet or less or if, for the interval being evaluated, all layers that underlie a portion of the sources at the site are karst, assign a value of 35.

[b] Consider only layers at least 3 feet thick. Do not consider layers or portions of layers within the first 10 feet of the depth to the aquifer.

Determine travel time only at locations within 2 miles of the sources at the site, except: if observed ground water contamination attributable to sources at the site extends more than 2 miles beyond these sources, use any location within the limits of this observed ground water contamination when evaluating the travel time factor for any aquifer that does not have an observed release. If the necessary subsurface geologic information is available at multiple locations, evaluate the travel time factor at each location. Use the location having the highest travel time factor value to assign the factor value for the aquifer. Enter this value in table 3–1.

3.1.2.5 *Calculation of potential to release factor value.* Sum the factor values for net precipitation, depth to aquifer, and travel time, and multiply this sum by the factor value for containment. Assign this product as the potential to release factor value for the aquifer. Enter this value in table 3–1.

3.1.3 *Calculation of likelihood of release factor category value.* If an observed release is established for an aquifer, assign the observed release factor value of 550 as the likelihood of release factor category value for that aquifer. Otherwise, assign the potential to release factor value for that aquifer as the likelihood of release value. Enter the value assigned in table 3–1.

3.2 *Waste characteristics.* Evaluate the waste characteristics factor category for an aquifer based on two factors: toxicity/mobility and hazardous waste quantity. Evaluate only those hazardous substances available to migrate from the sources at the site to ground water. Such hazardous substances include:

- Hazardous substances that meet the criteria for an observed release to ground water.
- All hazardous substances associated with a source that has a ground water containment factor value greater than 0 (see sections 2.2.2, 2.2.3, and 3.1.2.1).

3.2.1 *Toxicity/mobility*. For each hazardous substance, assign a toxicity factor value, a mobility factor value, and a combined toxicity/mobility factor value as specified in the following sections. Select the toxicity/mobility factor value for the aquifer being evaluated as specified in section 3.2.1.3.

3.2.1.1 *Toxicity*. Assign a toxicity factor value to each hazardous substance as specified in Section 2.4.1.1.

3.2.1.2 *Mobility*. Assign a mobility factor value to each hazardous substance for the aquifer being evaluated as follows:

- For any hazardous substance that meets the criteria for an observed release by chemical analysis to one or more aquifers underlying the sources at the site, regardless of the aquifer being evaluated, assign a mobility factor value of 1.
- For any hazardous substance that does not meet the criteria for an observed release by chemical analysis to at least one of the aquifers, assign that hazardous substance a mobility factor value from table 3–8 for the aquifer being evaluated, based on its water solubility and distribution coefficient (K_d).
- If the hazardous substance cannot be assigned a mobility factor value because data on its water solubility or distribution coefficient are not available, use other hazardous substances for which information is available in evaluating the pathway.

TABLE 3–8—GROUND WATER MOBILITY FACTOR VALUES[a]

Water solubility (mg/l)	Distribution coefficient (K_d) (ml/g)			
	Karst[c]	≤10	>10 to 1,000	>1,000
Present as liquid[b]	1	1	0.01	0.0001
Greater than 100	1	1	0.01	0.0001
Greater than 1 to 100	0.2	0.2	0.002	2×10^{-5}
Greater than 0.01 to 1	0.002	0.002	2×10^{-5}	2×10^{-7}
Less than or equal to 0.01	2×10^{-5}	2×10^{-5}	2×10^{-7}	2×10^{-9}

[a] Do not round to nearest integer.

[b] Use if the hazardous substance is present or deposited as a liquid.

[c] Use if the entire interval from the source to the aquifer being evaluated is karst.

- If none of the hazardous substances eligible to be evaluated can be assigned a mobility factor value, use a default value of 0.002 as the mobility factor value for all these hazardous substances.

Determine the water solubility to be used in table 3–8 for the hazardous substance as follows (use this same water solubility for all aquifers):

- For any hazardous substance that does not meet the criteria for an observed release by chemical analysis, if the hazardous substance is present or deposited as a liquid, use the water solubility category ‘‘Present as Liquid’’ in table 3–8 to assign the mobility factor value to that hazardous substance.
- Otherwise:
  - –For any hazardous substance that is a metal (or metalloid) and that does not meet the criteria for an observed release by chemical analysis, establish a water solubility for the hazardous substance as follows:
    - –Determine the overall range of water solubilities for compounds of this hazardous substance (consider all compounds for which adequate water solubility information is available, not just compounds identified as present at the site).
    - –Calculate the geometric mean of the highest and the lowest water solubility in this range.
    - –Use this geometric mean as the water solubility in assigning the hazardous substance a mobility factor value from table 3–8.
  - –For any other hazardous substance (either organic or inorganic) that does not meet the criteria for an observed release by chemical analysis, use the water solubility of that hazardous substance to assign a mobility factor value from table 3–8 to the hazardous substance.

For the aquifer being evaluated, determine the distribution coefficient to be used in table 3–8 for the hazardous substance as follows:

- For any hazardous substance that does not meet the criteria for an observed release by chemical analysis, if the entire interval from a source at the site to the aquifer being evaluated is karst, use the distribution coefficient category ‘‘Karst’’ in table 3–8 in assigning the mobility factor value for that hazardous substance for that aquifer.
- Otherwise:
  - –For any hazardous substance that is a metal (or metalloid) and that does not meet the criteria for an observed release by chemical analysis, use the distribution coefficient for the metal or (metalloid) to assign a mobility factor value from table 3–8 for that hazardous substance.
  - –For any other inorganic hazardous substance that does not meet the criteria for an observed release by chemical analysis,

use the distribution coefficient for that inorganic hazardous substance, if available, to assign a mobility factor value from table 3–8. If the distribution coefficient is not available, use a default value of ''less than 10'' as the distribution coefficient, except: for asbestos use a default value of ''greater than 1,000'' as the distribution coefficient.

–For any hazardous substance that is organic and that does not meet the criteria for an observed release by chemical analysis, establish a distribution coefficient for that hazardous substance as follows:

–Estimate the K_d range for the hazardous substance using the following equation:

$K_d = (K_{oc})(f_s)$

where:

K_{oc} = Soil-water partition coefficient for organic carbon for the hazardous substance.

f_s = Sorbent content (fraction of clays plus organic carbon) in the subsurface.

–Use f_s values of 0.03 and 0.77 in the above equation to establish the upper and lower values of the K_d range for the hazardous substance.

–Calculate the geometric mean of the upper and lower K_d range values. Use this geometric mean as the distribution coefficient in assigning the hazardous substance a mobility factor value from table 3–8.

3.2.1.3 *Calculation of toxicity/mobility factor value*. Assign each hazardous substance a toxicity/mobility factor value from table 3–9, based on the values assigned to the hazardous substance for the toxicity and mobility factors. Use the hazardous substance with the highest toxicity/mobility factor value for the aquifer being evaluated to assign the value to the toxicity/mobility factor for that aquifer. Enter this value in table 3–1.

TABLE 3–9—TOXICITY/MOBILITY FACTOR VALUES [a]

Mobility factor value	Toxicity factor value					
	10,000	1,000	100	10	1	0
1.0	10,000	1,000	100	10	1	0
0.2	2,000	200	20	2	0.2	0
0.01	100	10	1	0.1	0.01	0
0.002	20	2	0.2	0.02	0.002	0
0.0001	1	0.1	0.01	0.001	1×10^{-4}	0
2×10^{-5}	0.2	0.02	0.002	2×10^{-4}	2×10^{-5}	0
2×10^{-7}	0.002	2×10^{-4}	2×10^{-5}	2×10^{-6}	2×10^{-7}	0
2×10^{-9}	2×10^{-5}	2×10^{-6}	2×10^{-7}	2×10^{-8}	2×10^{-9}	0

[a] Do not round to nearest integer.

3.2.2 *Hazardous waste quantity*. Assign a hazardous waste quantity factor value for the ground water pathway (or aquifer) as specified in section 2.4.2. Enter this value in table 3–1.

3.2.3 *Calculation of waste characteristics factor category value*. Multiply the toxicity/mobility and hazardous waste quantity factor values, subject to a maximum product of 1×10^8. Based on this product, assign a value from table 2–7 (section 2.4.3.1) to the waste characteristics factor category. Enter this value in table 3–1.

3.3 *Targets*. Evaluate the targets factor category for an aquifer based on four factors: nearest well, population, resources, and Wellhead Protection Area. Evaluate these four factors based on targets within the target distance limit specified in section 3.0.1.1 and the aquifer boundaries specified in section 3.0.1.2. Determine the targets to be included in evaluating these factors for an aquifer as specified in section 3.0.

3.3.1 *Nearest well*. In evaluating the nearest well factor, include both the drinking water wells drawing from the aquifer being evaluated and those drawing from overlying aquifers as specified in section 3.0. Include standby wells in evaluating this factor only if they are used for drinking water supply at least once every year.

If there is an observed release by direct observation for a drinking water well within the target distance limit, assign Level II concentrations to that well. However, if one or more samples meet the criteria for an observed release for that well, determine if that well is subject to Level I or Level II concentrations as specified in sections 2.5.1 and 2.5.2. Use the health-based benchmarks from table 3–10 in determining the level of contamination.

Assign a value for the nearest well factor as follows:

- If one or more drinking water wells is subject to Level I concentrations, assign a value of 50.
- If not, but if one or more drinking water wells is subject to Level II concentrations, assign a value of 45.
- If none of the drinking water wells is subject to Level I or Level II concentrations, assign a value as follows:

–If one of the target aquifers is a karst aquifer that underlies any portion of the sources at the site and any well draws drinking water from this karst aquifer within the target distance limit, assign a value of 20.

–If not, determine the shortest distance to any drinking water well, as measured from any source at the site with a ground water containment factor value greater than 0. Select a value from table 3–11 based on this distance. Assign it as the value for the nearest well factor.

Enter the value assigned to the nearest well factor in table 3–1.

TABLE 3–10—HEALTH-BASED BENCHMARKS FOR HAZARDOUS SUBSTANCES IN DRINKING WATER

- Concentration corresponding to Maximum Contaminant Level (MCL).
- Concentration corresponding to a nonzero Maximum Contaminant Level Goal (MCLG).
- Screening concentration for cancer corresponding to that concentration that corresponds to the 10^{-6} individual cancer risk for oral exposures.
- Screening concentration for noncancer toxicological responses corresponding to the Reference Dose (RfD) for oral exposures.

TABLE 3–11—NEAREST WELL FACTOR VALUES

Distance from source (miles)	Assigned value
Level I concentrations [a]	50
Level II concentrations [a]	45
0 to ¼	20
Greater than ¼ to ½	18
Greater than ½ to 1	9
Greater than 1 to 2	5
Greater than 2 to 3	3
Greater than 3 to 4	2
Greater than 4	0

[a] Distance does not apply.

3.3.2 *Population.* In evaluating the population factor, include those persons served by drinking water wells within the target distance limit specified in section 3.0.1.1. For the aquifer being evaluated, count those persons served by wells in that aquifer and those persons served by wells in overlying aquifers as specified in section 3.0. Include residents, students, and workers who regularly use the water. Exclude transient populations such as customers and travelers passing through the area. Evaluate the population based on the location of the water supply wells, not on the location of residences, work places, etc. When a standby well is maintained on a regular basis so that water can be withdrawn, include it in evaluating the population factor.

In estimating residential population, when the estimate is based on the number of residences, multiply each residence by the average number of persons per residence for the county in which the residence is located.

In determining the population served by a well, if the water from the well is blended with other water (for example, water from other ground water wells or surface water intakes), apportion the total population regularly served by the blended system to the well based on the well's relative contribution to the total blended system. In estimating the well's relative contribution, assume each well and intake contributes equally and apportion the population accordingly, except: if the relative contribution of any one well or intake exceeds 40 percent based on average annual pumpage or capacity, estimate the relative contribution of the wells and intakes considering the following data, if available:

- Average annual pumpage from the ground water wells and surface water intakes in the blended system.
- Capacities of the wells and intakes in the blended system.

For systems with standby ground water wells or standby surface water intakes, apportion the total population regularly served by the blended system as described above, except:

- Exclude standby surface water intakes in apportioning the population.
- When using pumpage data for a standby ground water well, use average pumpage for the period during which the standby well is used rather than average annual pumpage.
- For that portion of the total population that could be apportioned to a standby ground water well, assign that portion of the population either to that standby well or to the other ground water well(s) and surface water intake(s) that serve that population; do not assign that portion of the population both to the standby well and to the other well(s) and intake(s) in the blended system. Use the apportioning that results in the highest population factor value. (Either include all standby well(s) or exclude some or all of the standby well(s) as appropriate to obtain this highest value.) Note that the specific standby well(s) included or excluded and, thus, the specific apportioning may vary in evaluating different aquifers and in evaluating the surface water pathway.

3.3.2.1 *Level of contamination.* Evaluate the population served by water from a point of withdrawal based on the level of contamination for that point of withdrawal. Use the applicable factor: Level I concentrations, Level II concentrations, or potential contamination.

If no samples meet the criteria for an observed release for a point of withdrawal and there is no observed release by direct observation for that point of withdrawal, evaluate that point of withdrawal using the potential contamination factor in section 3.3.2.4. If there is an observed release by direct observation, use Level II concentrations for that point of withdrawal. However, if one or more samples meet the criteria for an observed release for the point of withdrawal, determine which factor (Level I or Level II concentrations) applies to that point of withdrawal as specified in sections 2.5.1 and 2.5.2. Use the health-based benchmarks from table 3–10 in determining the level of contamination. Evaluate the point of withdrawal using the Level I concentrations factor in section 3.3.2.2 or the Level II concentrations factor in section 3.3.2.3, as appropriate.

For the potential contamination factor, use population ranges in evaluating the factor as specified in section 3.3.2.4. For the Level I and Level II concentrations factors, use the population estimate, not population ranges, in evaluating both factors.

3.3.2.2 *Level I concentrations.* Sum the number of people served by drinking water from points of withdrawal subject to Level I concentrations. Multiply this sum by 10. Assign this product as the value for this factor. Enter this value in table 3–1.

3.3.2.3 *Level II concentrations.* Sum the number of people served by drinking water from points of withdrawal subject to Level II concentrations. Do not include those people already counted under the Level I concentrations factor. Assign this sum as the value for this factor. Enter this value in table 3–1.

3.3.2.4 *Potential contamination.* Determine the number of people served by drinking water from points of withdrawal subject to potential contamination. Do not include those people already counted under the Level I and Level II concentrations factors.

Assign distance-weighted population values from table 3–12 to this population as follows:

- Use the ''Karst'' portion of table 3–12 to assign values only for that portion of the population served by points of withdrawal that draw drinking water from a karst aquifer that underlies any portion of the sources at the site.
  - –For this portion of the population, determine the number of people included within each ''Karst'' distance category in table 3–12.
  - –Assign a distance-weighted population value for each distance category based on the number of people included within the distance category.

TABLE 3–12—DISTANCE-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FACTOR FOR GROUND WATER MIGRATION PATHWAY [a]

Distance category (miles)	Number of people within the distance category												
	0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,001 to 3,000,000
Other Than Karst [b]:													
0 to ¼	0	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455
Greater than ¼ to ½	0	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122
Greater than ½ to 1	0	1	5	17	52	167	523	1,669	5,224	16,684	52,239	166,835	522,385
Greater than 1 to 2	0	0.7	3	10	30	94	294	939	2,939	9,385	29,384	93,845	293,842
Greater than 2 to 3	0	0.5	2	7	21	68	212	678	2,122	6,778	21,222	67,777	212,219
Greater than 3 to 4	0	0.3	1	4	13	42	131	417	1,306	4,171	13,060	41,709	130,596
Karst [c]:													
0 to ¼	0	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455
Greater than ¼ to ½	0	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122
Greater than ½ to 1	0	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227
Greater than 1 to 2	0	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227
Greater than 2 to 3	0	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227
Greater than 3 to 4	0	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227

[a] Round the number of people present within a distance category to nearest integer. Do not round the assigned distance-weighted population value to nearest integer.

[b] Use for all aquifers, except karst aquifers underlying any portion of the sources at the site.

[c] Use only for karst aquifers underlying any portion of the sources at the site.

- Use the ''Other Than Karst'' portion of table 3–12 for the remainder of the population served by points of withdrawal subject to potential contamination.
  - –For this portion of the population, determine the number of people included within each ''Other Than Karst'' distance category in table 3–12.
  - –Assign a distance-weighted population value for each distance category based on the number of people included within the distance category.

Calculate the value for the potential contamination factor (PC) as follows:

$$PC = \frac{1}{10}\sum_{i=1}^{n}\left(W_i + K_i\right)$$

where:

W_i = Distance-weighted population from ''Other Than Karst'' portion of table 3–12 for distance category i.

K_i = Distance-weighted population from ''Karst'' portion of table 3–12 for distance category i.

n = Number of distance categories.

If PC is less than 1, do not round it to the nearest integer; if PC is 1 or more, round to the nearest integer. Enter this value in table 3–1.

3.3.2.5 *Calculation of population factor value.* Sum the factor values for Level I concentrations, Level II concentrations, and potential contamination. Do not round this sum to the nearest integer. Assign this sum as the population factor value for the aquifer. Enter this value in table 3–1.

3.3.3 *Resources.* To evaluate the resources factor, select the highest value specified below that applies for the aquifer being evaluated. Assign this value as the resources factor value for the aquifer. Enter this value in table 3–1.

Assign a resources value of 5 if water drawn from any target well for the aquifer being evaluated or overlying aquifers (as specified in section 3.0) is used for one or more of the following purposes:

- Irrigation (5-acre minimum) of commercial food crops or commercial forage crops.
- Watering of commercial livestock.
- Ingredient in commercial food preparation.
- Supply for commercial aquaculture.
- Supply for a major or designated water recreation area, excluding drinking water use.

Assign a resources value of 5 if no drinking water wells are within the target distance limit, but the water in the aquifer being evaluated or any overlying aquifers (as specified in section 3.0) is usable for drinking water purposes.

Assign a resources value of 0 if none of the above applies.

3.3.4 *Wellhead Protection Area.* Evaluate the Wellhead Protection Area factor based on Wellhead Protection Areas designated according to section 1428 of the Safe Drinking Water Act, as amended. Consider only those Wellhead Protection Areas applicable to the aquifer being evaluated or overlying aquifers (as specified in section 3.0). Select the highest value below that applies. Assign it as the value for the Wellhead Protection Area factor for the aquifer being evaluated. Enter this value in table 3–1.

Assign a value of 20 if either of the following criteria applies for the aquifer being evaluated or overlying aquifers:

- A source with a ground water containment factor value greater than 0 lies, either partially or fully, within or above the designated Wellhead Protection Area.
- Observed ground water contamination attributable to the sources at the site lies, either partially or fully, within the designated Wellhead Protection Area.

If neither criterion applies, assign a value of 5, if, within the target distance limit, there is a designated Wellhead Protection Area applicable to the aquifer being evaluated or overlying aquifers.

Assign a value of 0 if none of the above applies.

3.3.5 *Calculation of targets factor category value.* Sum the factor values for nearest well, population, resources, and Wellhead Protection Area. Do not round this sum to the nearest integer. Use this sum as the targets factor category value for the aquifer. Enter this value in table 3–1.

3.4 *Ground water migration score for an aquifer.* For the aquifer being evaluated, multiply the factor category values for likelihood of release, waste characteristics, and targets, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum value of 100, as the ground water migration pathway score for the aquifer. Enter this score in table 3–1.

3.5 *Calculation of ground water migration pathway score.* Calculate a ground water migration score for each aquifer underlying the sources at the site, as appropriate. Assign the highest ground water migration score for an aquifer as the ground water migration pathway score (S_{gw}) for the site. Enter this score in table 3–1.

4.0 Surface Water Migration Pathway

4.0.1 *Migration components.* Evaluate the surface water migration pathway based on two migration components:

- Overland/flood migration to surface water (see section 4.1).
- Ground water to surface water migration (see section 4.2).

Evaluate each component based on the same three threats: drinking water threat, human food chain threat, and environmental threat.

Score one or both components, considering their relative importance. If only one component is scored, assign its score as the surface water migration pathway score. If both components are scored, select the higher of the two scores and assign it as the surface water migration pathway score.

4.0.2 *Surface water categories.* For HRS purposes, classify surface water into four categories: rivers, lakes, oceans, and coastal tidal waters.

Rivers include:

- Perennially flowing waters from point of origin to the ocean or to coastal tidal waters, whichever comes first, and wetlands contiguous to these flowing waters.
- Aboveground portions of disappearing rivers.
- Man-made ditches only insofar as they perennially flow into other surface water.
- Intermittently flowing waters and contiguous intermittently flowing ditches only in arid or semiarid areas with less than 20 inches of mean annual precipitation.

Lakes include:

- Natural and man-made lakes (including impoundments) that lie along rivers, but excluding the Great Lakes.
- Isolated, but perennial, lakes, ponds, and wetlands.
- Static water channels or oxbow lakes contiguous to rivers.
- Small rivers, without diking, that merge into surrounding perennially inundated wetlands.
- Wetlands contiguous to water bodies defined here as lakes.

Ocean and ocean-like water bodies include:

- Ocean areas seaward from the baseline of the Territorial Sea. (This baseline represents the generalized coastline of the United States. It is parallel to the seaward limit of the Territorial Sea and other maritime limits such as the inner boundary of Federal fisheries jurisdiction and the limit of States jurisdiction under the Submerged Lands Act, as amended.)
- The Great Lakes.
- Wetlands contiguous to the Great Lakes.

Coastal tidal waters include:

- Embayments, harbors, sounds, estuaries, back bays, lagoons, wetlands, etc. seaward from mouths of rivers and landward from the baseline of the Territorial Sea.

4.1 *Overland/flood migration component.* Use the overland/flood migration component to evaluate surface water threats that result from overland migration of hazardous substances from a source at the site to surface water. Evaluate three types of threats for this component: drinking water threat, human food chain threat, and environmental threat.

4.1.1 *General considerations.*

4.1.1.1 *Definition of hazardous substance migration path for overland/flood migration component.* The hazardous substance migration path includes both the overland segment and the in-water segment that hazardous substances would take as they migrate away from sources at the site:

- Begin the overland segment at a source and proceed downgradient to the probable point of entry to surface water.
- Begin the in-water segment at this probable point of entry.
  - –For rivers, continue the in-water segment in the direction of flow (including any tidal flows) for the distance established by the target distance limit (see section 4.1.1.2).
  - –For lakes, oceans, coastal tidal waters, or Great Lakes, do not consider flow direction. Instead apply the target distance limit as an arc.
  - –If the in-water segment includes both rivers and lakes (or oceans, coastal tidal waters, or Great Lakes), apply the target distance limit to their combined in-water segments.

For sites that consist of contaminated sediments with no identified source, the hazardous substance migration path consists solely of the in-water segment specified in section 4.1.1.2.

Consider a site to be in two or more watersheds for this component if two or more hazardous substance migration paths from the sources at the site do not reach a common point within the target distance limit. If the site is in more than one watershed, define a separate hazardous substance migration path for each watershed. Evaluate the overland/flood migration component for each watershed separately as specified in section 4.1.1.3.

4.1.1.2 *Target distance limit.* The target distance limit defines the maximum distance over which targets are considered in evaluating the site. Determine a separate target distance limit for each watershed as follows:

- If there is no observed release to surface water in the watershed or if there is an observed release only by direct observation (see section 4.1.2.1.1), begin measuring the target distance limit for the watershed at the probable point of entry to surface water and extend it for 15 miles along the surface water from that point.
- If there is an observed release from the site to the surface water in the watershed that is based on sampling, begin measuring the target distance limit for the watershed at the probable point of entry; extend the target distance limit either for 15 miles along the surface water or to the most distant sample point that meets the criteria for an observed release to that watershed, whichever is greater.

In evaluating the site, include only surface water targets (for example, intakes, fisheries, sensitive environments) that are within or contiguous to the hazardous substance migration path and located, partially or wholly, at or between the probable point of entry and the target distance limit applicable to the watershed:

- If flow within the hazardous substance migration path is reversed by tides, evaluate upstream targets only if there is documentation that the tidal run could carry substances from the site as far as those upstream targets.
- Determine whether targets within or contiguous to the hazardous substance migration path are subject to actual or potential contamination as follows:
  - –If a target is located, partially or wholly, either at or between the probable point of entry and any sampling point that meets the criteria for an observed release to the watershed or at a point that meets the criteria for an observed release by direct observation, evaluate that target as subject to actual contamination, except as otherwise specified for fisheries in section 4.1.3.3 and for wetlands in section 4.1.4.3.1.1. If the actual contamination is based on direct observation, assign Level II to the actual contamination. However, if the actual contamination is based on samples, determine whether the actual contamination is at Level I or Level II concentrations as specified in sections 4.1.2.3, 4.1.3.3, and 4.1.4.3.1.
  - –If a target is located, partially or wholly, within the target distance limit for the watershed, but not at or between the probable point of entry and any sampling point that meets the criteria for an observed release to the watershed, nor at a point that meets the criteria for an observed release by direct observation, evaluate it as subject to potential contamination.

For sites consisting solely of contaminated sediments with no identified source, determine the target distance limit as follows:

- If there is a clearly defined direction of flow for the surface water body (or bodies) containing the contaminated sediments, begin measuring the target distance limit at the point of observed sediment contamination that is farthest upstream (that is, at the location of the farthest available upstream sediment sample that meets the criteria for an observed release); extend the target distance limit either for 15 miles along the surface water or to the most distant downstream sample point that meets the criteria for an observed release to that watershed, whichever is greater.
- If there is no clearly defined direction of flow, begin measuring the target distance limit at the center of the area of observed sediment contamination. Extend the target distance limit as an arc either for 15 miles along the surface water or to the most distant sample point that meets the criteria for an observed release to that watershed, whichever is greater. Determine the area of observed sediment contamination based on available samples that meet the criteria for an observed release.

Note that the hazardous substance migration path for these contaminated sediment sites consists solely of the in-water segment defined by the target distance limit; there is no overland segment.

For these contaminated sediment sites, include only those targets (for example, intakes, fisheries, sensitive environments) that are within or contiguous to the hazardous substance migration path and located, wholly or partially, within the target distance limit for the site. Determine whether these targets are subject to actual or potential contamination as follows:

- If a target is located, partially or wholly, within the area of observed sediment contamination, evaluate it as subject to actual contamination, except as otherwise specified for fisheries in section 4.1.3.3 and wetlands in section 4.1.4.3.1.1.
  - –If a drinking water target is subject to actual contamination, evaluate it using Level II concentrations.
  - –If a human food chain target or environmental target is subject to actual contamination, evaluate it using Level I or Level II concentrations, as appropriate (see sections 4.1.3.3 and 4.1.4.3.1).
- If a target is located, partially or wholly, within the target distance limit for the watershed, but not within the area of observed sediment contamination, evaluate it as subject to potential contamination.

4.1.1.3 *Evaluation of overland/flood migration component.* Evaluate the drinking water threat, human food chain threat, and environmental threat for each watershed for this component based on three factor categories: likelihood of release, waste characteristics, and targets. Figure 4–1 indicates the factors included within each factor category for each type of threat.

Determine the overland/flood migration component score (S_{of}) for a watershed in terms of the factor category values as follows:

$$S_{of} = \sum_{i=1}^{3} \frac{(LR_i)(WC_i)(T_i)}{SF}$$

where:

LR_i = Likelihood of release factor category value for threat i (that is, drinking water, human food chain, or environmental threat).

WC_i = Waste characteristics factor category value for threat i.

T_i = Targets factor category value for threat i.

SF = Scaling factor.

Table 4–1 outlines the specific calculation procedure.

If the site is in only one watershed, assign the overland/flood migration score for that watershed as the overland/flood migration component score for the site.

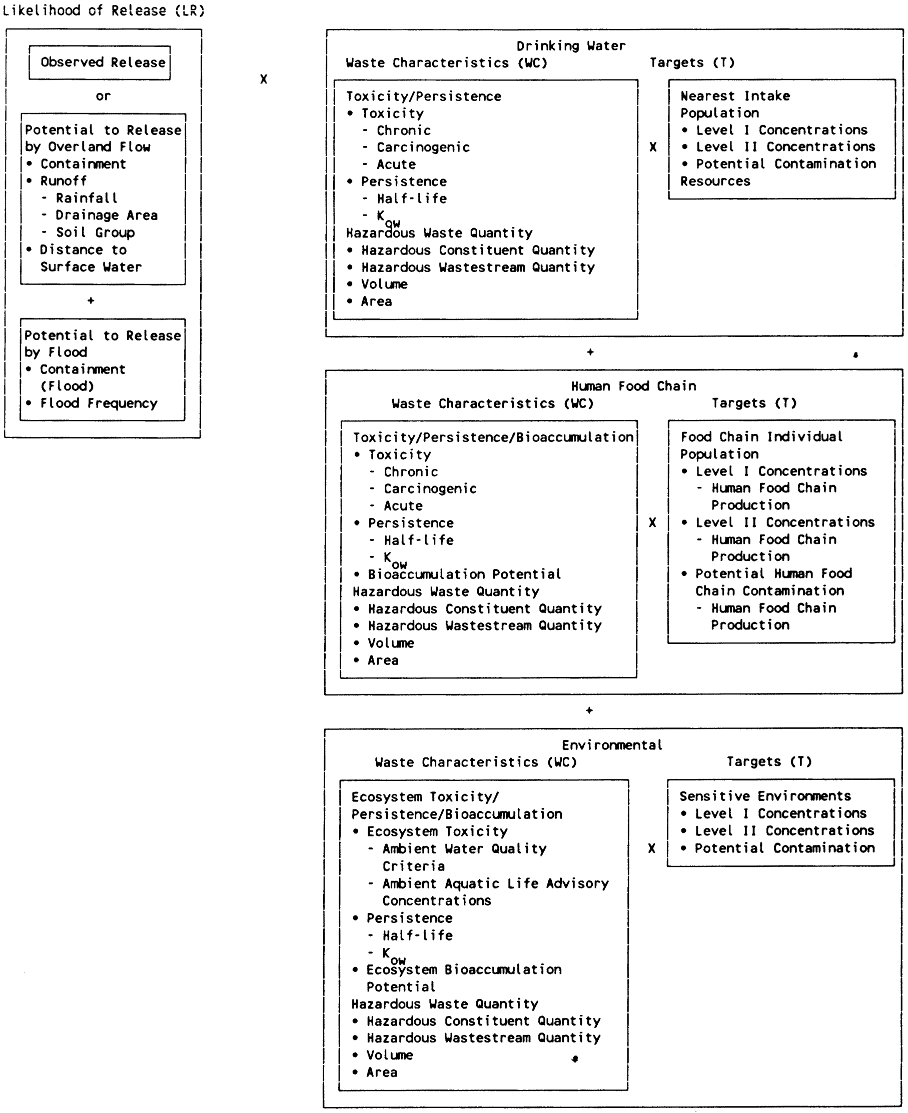


FIGURE 4-1
OVERVIEW OF SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT

TABLE 4–1—SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET

Factor categories and factors	Maximum value	Value assigned
Drinking Water Threat		
Likelihood of Release:		
1. Observed Release	550	_____
2. Potential to Release by Overland Flow:		
2a. Containment	10	_____
2b. Runoff	25	_____
2c. Distance to Surface Water	25	_____
2d. Potential to Release by Overland Flow (lines 2a[2b + 2c])	500	_____
3. Potential to Release by Flood:		
3a. Containment (Flood)	10	_____
3b. Flood Frequency	50	_____
3c. Potential to Release by Flood (lines 3a × 3b)	500	_____
4. Potential to Release (lines 2d + 3c, subject to a maximum of 500)	500	_____
5. Likelihood of Release (higher of lines 1 and 4)	550	_____
Waste Characteristics:		
6. Toxicity/Persistence	(a)	_____
7. Hazardous Waste Quantity	(a)	_____
8. Waste Characteristics	100	_____
Targets:		
9. Nearest Intake	50	_____
10. Population		
10a. Level I Concentrations	(b)	_____
10b. Level II Concentrations	(b)	_____
10c. Potential Contamination	(b)	_____
10d. Population (lines 10a + 10b + 10c)	(b)	_____
11. Resources	5	_____
12. Targets (lines 9 + 10d + 11)	(b)	_____
Drinking Water Threat Score:		
13. Drinking Water Threat Score ([lines 5 × 8 × 12]/82,500, subject to a maximum of 100)	100	_____
Human Food Chain Threat		
Likelihood of Release:		
14. Likelihood of Release (same value as line 5)	550	_____
Waste Characteristics:		
15. Toxicity/Persistence/Bioaccumulation	(a)	_____
16. Hazardous Waste Quantity	(a)	_____
17. Waste Characteristics	1,000	_____
Targets:		
18. Food Chain Individual	50	_____
19. Population		
19a. Level I Concentrations	(b)	_____
19b. Level II Concentrations	(b)	_____
19c. Potential Human Food Chain Contamination	(b)	_____
19d. Population (lines 19a + 19b + 19c)	(b)	_____
20. Targets (lines 18 + 19d)	(b)	_____
Human Food Chain Threat Score:		
21. Human Food Chain Threat Score ([lines 14 × 17 × 20]/82,500, subject to a maximum of 100)	100	_____
Environmental Threat		
Likelihood of Release:		
22. Likelihood of Release (same value as line 5)	550	_____
Waste Characteristics:		
23. Ecosystem Toxicity/Persistence/Bioaccumulation	(a)	_____
24. Hazardous Waste Quantity	(a)	_____
25. Waste Characteristics	1,000	
Targets:		
26. Sensitive Environments.		
26a. Level I Concentrations	(b)	_____
26b. Level II Concentrations	(b)	_____
26c. Potential Contamination	(b)	_____
26d. Sensitive Environments (lines 26a + 26b + 26c)	(b)	
27. Targets (value from line 26d)	(b)	
Environmental Threat Score:		
28. Environmental Threat Score ([lines 22 × 25 × 27]/82,500, subject to a maximum of 60)	60	_____
Surface Water Overland/Flood Migration Component Score for a Watershed		
29. Watershed Score[c] (lines 13 + 21 + 28, subject to a maximum of 100)	100	_____

TABLE 4–1—SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET—Continued

Factor categories and factors	Maximum value	Value assigned
Surface Water Overland/Flood Migration Component Score		
30. Component Score (S_{of})[c] (highest score from line 29 for all watersheds evaluated, subject to a maximum of 100)	100	_____

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] Do not round to nearest integer.

If the site is in more than one watershed:

- Calculate a separate overland/flood migration component score for each watershed, using likelihood of release, waste characteristics, and targets applicable to each watershed.
- Select the highest overland/flood migration component score from the watersheds evaluated and assign it as the overland/flood migration component score for the site.

4.1.2 *Drinking water threat.* Evaluate the drinking water threat for each watershed based on three factor categories: likelihood of release, waste characteristics, and targets.

4.1.2.1 *Drinking water threat—likelihood of release.* Evaluate the likelihood of release factor category for each watershed in terms of an observed release factor or a potential to release factor.

4.1.2.1.1 *Observed release.* Establish an observed release to surface water for a watershed by demonstrating that the site has released a hazardous substance to the surface water in the watershed. Base this demonstration on either:

- Direct observation:

–A material that contains one or more hazardous substances has been seen entering surface water through migration or is known to have entered surface water through direct deposition, or

–A source area has been flooded at a time that hazardous substances were present, and one or more hazardous substances were in contact with the flood waters, or

–When evidence supports the inference of a release of a material that contains one or more hazardous substances by the site to surface water, demonstrated adverse effects associated with that release may also be used to establish an observed release.

- Chemical analysis:

–Analysis of surface water, benthic, or sediment samples indicates that the concentration of hazardous substance(s) has increased significantly above the background concentration for the site for that type of sample (see section 2.3).

–Limit comparisons to similar types of samples and background concentrations—for example, compare surface water samples to surface water background concentrations.

–For benthic samples, limit comparisons to essentially sessile organisms.

–Some portion of the significant increase must be attributable to the site to establish the observed release, except: when the site itself consists of contaminated sediments with no identified source, no separate attribution is required.

If an observed release can be established for a watershed, assign an observed release factor value of 550 to that watershed, enter this value in table 4–1, and proceed to section 4.1.2.1.3. If no observed release can be established for the watershed, assign an observed release factor value of 0 to that watershed, enter this value in table 4–1, and proceed to section 4.1.2.1.2.

4.1.2.1.2 *Potential to release.* Evaluate potential to release only if an observed release cannot be established for the watershed. Evaluate potential to release based on two components: potential to release by overland flow (see section 4.1.2.1.2.1) and potential to release by flood (see section 4.1.2.1.2.2). Sum the values for these two components to obtain the potential to release factor value for the watershed, subject to a maximum value of 500.

4.1.2.1.2.1 *Potential to release by overland flow.* Evaluate potential to release by overland flow for the watershed based on three factors: containment, runoff, and distance to surface water.

Assign potential to release by overland flow a value of 0 for the watershed if:

- No overland segment of the hazardous substance migration path can be defined for the watershed, or
- The overland segment of the hazardous substance migration path for the watershed exceeds 2 miles before surface water is encountered.

If either condition applies, enter a value of 0 in table 4–1 and proceed to section 4.1.2.1.2.2 to evaluate potential to release by flood. If neither applies, proceed to section 4.1.2.1.2.1.1 to evaluate potential to release by overland flow.

4.1.2.1.2.1.1 *Containment.* Determine the containment factor value for the watershed as follows:

- If one or more sources is located in surface water in the watershed (for example, intact sealed drums in surface water), assign the containment factor a value of 10 for the watershed. Enter this value in table 4–1.

- If none of the sources is located in surface water in the watershed, assign a containment factor value from table 4–2 to each source at the site that can potentially release hazardous substances to the hazardous substance migration path for this watershed. Assign the containment factor value for the watershed as follows:
  - –Select the highest containment factor value assigned to those sources that meet the minimum size requirement described below. Assign this highest value as the containment factor value for the watershed. Enter this value in table 4–1.
  - –If, for this watershed, no source at the site meets the minimum size requirement, then select the highest containment factor value assigned to the sources at the site eligible to be evaluated for this watershed and assign it as the containment factor value for the watershed. Enter this value in table 4–1.

A source meets the minimum size requirement if its source hazardous waste quantity value (see section 2.4.2.1.5) is 0.5 or more. Do not include the minimum size requirement in evaluating any other factor of this surface water migration component, except potential to release by flood as specified in section 4.1.2.1.2.2.3.

4.1.2.1.2.1.2 *Runoff.* Evaluate runoff based on three components: rainfall, drainage area, and soil group.

TABLE 4–2—CONTAINMENT FACTOR VALUES FOR SURFACE WATER MIGRATION PATHWAY

Source	Assigned value
All Sources (Except Surface Impoundments, Land Treatment, Containers, and Tanks)	
Evidence of hazardous substance migration from source area (*i.e.*, source area includes source and any associated containment structures)..	10
No evidence of hazardous substance migration from source area *and:*	
(a) Neither of the following present: (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system.	10
(b) Any one of the two items in (a) present	9
(c) Any two of the following present: (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system, or (3) liner with functioning leachate collection and removal system immediately above liner.	7
(d) All items in (c) present	5
(e) All items in (c) present, plus no bulk or non-containerized liquids nor materials containing free liquids deposited in source area..	3
No evidence of hazardous substance migration from source area, double liner with functioning leachate collection and removal system above and between liners, *and:*	
(f) Only one of the following deficiencies present in containment: (1) bulk or noncontainerized liquids or materials containing free liquids deposited in source area, or (2) no or nonfunctioning or nonmaintained run-on control system and runoff management system, or (3) no or nonmaintained engineered cover.	3
(g) None of the deficiencies in (f) present.	0
Source area inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate is generated, liquids or materials containing free liquids not deposited in source area, and functioning and maintained run-on control present.	
Surface Impoundment	
Evidence of hazardous substance migration from surface impoundment	10
Free liquids present with either no diking, unsound diking, or diking that is not regularly inspected and maintained.	10
No evidence of hazardous substance migration from surface impoundment, free liquids present, sound diking that is regularly inspected and maintained, adequate freeboard, *and:*	
(a) No liner	9
(b) Liner	7
(c) Liner with functioning leachate collection and removal system below liner	5
(d) Double liner with functioning leachate collection and removal system between liners	3
No evidence of hazardous substance migration from surface impoundment and all free liquids eliminated at closure (either by removal of liquids or solidification of remaining wastes and waste residues).	Evaluate using **All Sources** criteria (with no bulk or free liquids deposited).
Land Treatment	
Evidence of hazardous substance migration from land treatment zone	10
No functioning and maintained run-on control and runoff management system	10
No evidence of hazardous substance migration from land treatment zone *and:*	
(a) Functioning and maintained run-on control and runoff management system	7
(b) Functioning and maintained run-on control and runoff management system, and vegetative cover established over entire land treatment area.	5

TABLE 4–2—CONTAINMENT FACTOR VALUES FOR SURFACE WATER MIGRATION PATHWAY—Continued

Source	Assigned value
(c) Land treatment area maintained in compliance with 40 CFR 264.280	0
Containers	
All containers buried	Evaluate using **All Sources** criteria.
Evidence of hazardous substance migration from container area (*i.e.*, container area includes containers and any associated containment structures).	10
No diking (or no similar structure) surrounding container area	10
Diking surrounding container area unsound or not regularly inspected and maintained	10
No evidence of hazardous substance migration from container area and container area surrounded by sound diking that is regularly inspected and maintained.	9
No evidence of hazardous substance migration from container area, container area surrounded by sound diking that is regularly inspected and maintained, *and:*	9
(a) Essentially impervious base under container area with liquids collection and removal system	7
(b) Containment system includes essentially impervious base, liquids collection system, sufficient capacity to contain 10 percent of volume of all containers, and functioning and maintained run-on control; and spilled or leaked hazardous substances and accumulated precipitation removed in timely manner to prevent overflow of collection system, at least weekly inspection of containers, hazardous substances in leaking or deteriorating containers transferred to containers in good condition, and containers sealed except when waste is added or removed.	5
(c) Free liquids present, containment system has sufficient capacity to hold total volume of all containers and to provide adequate freeboard, and single liner under container area with functioning leachate collection and removal system below liner.	5
(d) Same as (c) except: double liner under container area with functioning leachate collection and removal system between liners.	3
Containers inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate would be generated from any unsealed or ruptured containers, liquids or materials containing free liquids not deposited in any container, and functioning and maintained run-on control present.	0
No evidence of hazardous substance migration from container area, containers leaking, and all free liquids eliminated at closure (either by removal of liquids or solidification of remaining wastes and waste residues).	Evaluate using All Sources criteria (with no bulk or free liquids deposited).
Tank	
Below-ground tank	Evaluate using All Sources criteria
Evidence of hazardous substance migration from tank area (*i.e.*, tank area includes tank, ancillary equipment such as piping, and any associated containment structures).	10
No diking (or no similar structure) surrounding tank and ancillary equipment	10
Diking surrounding tank and ancillary equipment unsound or not regularly inspected and maintained	10
No evidence of hazardous substance migration from tank area and tank and ancillary equipment surrounded by sound diking that is regularly inspected and maintained.	9
No evidence of hazardous substance migration from tank area, tank and ancillary equipment surrounded by sound diking that is regularly inspected and maintained, *and:*	
(a) Tank and ancillary equipment provided with secondary containment (e.g., liner under tank area, vault system, double-wall) with leak detection and collection system.	7
(b) Tank and ancillary equipment provided with secondary containment system that detects and collects spilled or leaked hazardous substances and accumulated precipitation and has sufficient capacity to contain 110 percent of volume of largest tank within containment area, spilled or leaked hazardous substances and accumulated precipitation removed in a timely manner, at least weekly inspection of tank and secondary containment system, and all leaking or unfit-for-use tank systems promptly responded to.	5
(c) Containment system has sufficient capacity to hold total volume of all tanks within the tank containment area and to provide adequate freeboard, and single liner under tank containment area with functioning leachate collection and removal system below liner.	5
(d) Same as (c) except: double liner under tank containment area with functioning leachate collection and removal system between liners.	3
Tank is above ground, and inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate would be generated from any material released from tank, liquids or materials containing free liquids not deposited in any tank, and functioning and maintained run-on control present.	0

Rainfall. Determine the 2-year, 24-hour rainfall for the site. Use site-specific, 2-year, 24-hour rainfall data if records are available for at least 20 years. If such site-specific data are not available, estimate the 2-year, 24-hour rainfall for the site from a rainfall-frequency map. Do not round the rainfall value to the nearest integer.

Drainage area. Determine the drainage area for the sources at the site. Include in this drainage area both the source areas and the area upgradient of the sources, but exclude any portion of this drainage area for which runoff is diverted from entering the sources by storm sewers or run-on control and/or runoff management systems. Assign a drainage area value for the watershed from table 4–3.

Soil group. Based on the predominant soil group within the drainage area described above, assign a soil group designation for the watershed from table 4–4 as follows:

- Select the predominant soil group as that type which comprises the largest total area within the applicable drainage area.
- If a predominant soil group cannot be delineated, select that soil group in the drainage area that yields the highest value for the runoff factor.

Calculation of runoff factor value. Assign a combined rainfall/runoff value for the watershed from table 4–5, based on the 2-year, 24-hour rainfall and the soil group designation. Determine the runoff factor value for the watershed from table 4–6, based on the rainfall/runoff and drainage area values. Enter the runoff factor value in table 4–1.

TABLE 4–3—DRAINAGE AREA VALUES

Drainage area (acres)	Assigned value
Less than 50	1
50 to 250	2
Greater than 250 to 1,000	3
Greater than 1,000	4

TABLE 4–4—SOIL GROUP DESIGNATIONS

Surface soil description	Soil group designation
Coarse-textured soils with high infiltration rates (for example, sands, loamy sands).	A
Medium-textured soils with moderate infiltration rates (for example, sandy loams, loams).	B
Moderately fine-textured soils with low infiltration rates (for example, silty loams, silts, sandy clay loams).	C
Fine-textured soils with very low infiltration rates (for example, clays, sandy clays, silty clay loams, clay loams, silty clays); or impermeable surfaces (for example, pavement).	D

TABLE 4–5—RAINFALL/RUNOFF VALUES

2-Year, 24-hour rainfall (inches)	Soil group designation			
	A	B	C	D
Less than 1.0	0	0	2	3
1.0 to less than 1.5	0	1	2	3
1.5 to less than 2.0	0	2	3	4
2.0 to less than 2.5	1	2	3	4
2.5 to less than 3.0	2	3	4	4
3.0 to less than 3.5	2	3	4	5
3.5 or greater	3	4	5	6

TABLE 4–6—RUNOFF FACTOR VALUES

Drainage area value	Rainfall/runoff value						
	0	1	2	3	4	5	6
1	0	0	0	1	1	1	1
2	0	0	1	1	2	3	4
3	0	0	1	3	7	11	15
4	0	1	2	7	17	25	25

4.1.2.1.2.1.3 *Distance to surface water.* Evaluate the distance to surface water as the shortest distance, along the overland segment, from any source with a surface water containment factor value greater than 0 to either the mean high water level for tidal waters or the mean water level for other surface waters. Based on this distance, assign a value from table 4–7 to the distance to surface water factor for the watershed. Enter this value in table 4–1.

4.1.2.1.2.1.4 *Calculation of factor value for potential to release by overland flow.* Sum the factor values for runoff and distance to surface water for the watershed and multiply this sum by the factor value for containment. Assign the resulting product as the factor value for potential to release by overland flow for the watershed. Enter this value in table 4–1.

4.1.2.1.2.2 *Potential to release by flood.* Evaluate potential to release by flood for each watershed as the product of two factors: containment (flood) and flood frequency. Evaluate potential to release by flood separately for each source that is within the watershed. Furthermore, for each source, evaluate potential to release by flood separately for each category of floodplain in which the source lies. (See section 4.1.2.1.2.2.2 for the applicable floodplain categories.) Calculate the value for the potential to release by flood factor as specified in 4.1.2.1.2.2.3.

4.1.2.1.2.2.1 *Containment (flood).* For each source within the watershed, separately evaluate the containment (flood) factor for each category of floodplain in which the source is partially or wholly located. Assign a containment (flood) factor value from table 4–8 to each floodplain category applicable to that source. Assign a containment (flood) factor value of 0 to each floodplain category in which the source does not lie.

4.1.2.1.2.2.2 *Flood frequency.* For each source within the watershed, separately evaluate the flood frequency factor for each category of floodplain in which the source is partially or wholly located. Assign a flood frequency factor value from table 4–9 to each floodplain category in which the source is located.

4.1.2.1.2.2.3 *Calculation of factor value for potential to release by flood.* For each source within the watershed and for each category of floodplain in which the source is partially or wholly located, calculate a separate potential to release by flood factor value. Calculate this value as the product of the containment (flood) value and the flood frequency value applicable to the source for the floodplain category. Select the highest value calculated for those sources that meet the minimum size requirement specified in section 4.1.2.1.2.1.1 and assign it as the value for the potential to release by flood factor for the watershed. However, if, for this watershed, no source at the site meets the minimum size requirement, select the highest value calculated for the sources at the site eligible to be evaluated for this watershed and assign it as the value for this factor.

TABLE 4–7—DISTANCE TO SURFACE WATER FACTOR VALUES

Distance	Assigned value
Less than 100 feet	25
100 feet to 500 feet	20
Greater than 500 feet to 1,000 feet	16
Greater than 1,000 feet to 2,500 feet	9
Greater than 2,500 feet to 1.5 miles	6
Greater than 1.5 miles to 2 miles	3

TABLE 4–8—CONTAINMENT (FLOOD) FACTOR VALUES

Containment criteria	Assigned value
Documentation that containment at the source is designed, constructed, operated, and maintained to prevent a washout of hazardous substances by the flood being evaluated	0
Other	10

TABLE 4–9—FLOOD FREQUENCY FACTOR VALUES

Floodplain category	Assigned value
Source floods annually	50
Source in 10-year floodplain	50
Source in 100-year floodplain	25
Source in 500-year floodplain	7
None of above	0

Enter this highest potential to release by flood factor value for the watershed in table 4–1, as well as the values for containment (flood) and flood frequency that yield this highest value.

4.1.2.1.2.3 *Calculation of potential to release factor value.* Sum the factor values assigned to the watershed for potential to release by overland flow and potential to release by flood. Assign this sum as the potential to release factor value for the watershed, subject to a maximum value of 500. Enter this value in table 4–1.

4.1.2.1.3 *Calculation of drinking water threat-likelihood of release factor category value.* If an observed release is established for the watershed, assign the observed release factor value of 550 as the likelihood of release factor category value for that watershed. Otherwise, assign the potential to release factor value for that watershed as the likelihood of release factor category value for that watershed. Enter the value assigned in table 4–1.

4.1.2.2 *Drinking water threat-waste characteristics.* Evaluate the waste characteristics factor category for each watershed based on two factors: toxicity/persistence and hazardous waste quantity. Evaluate only those hazardous substances that are available to migrate from the sources at the site to surface water in the watershed via the overland/flood hazardous substance migration path for the watershed (see section 4.1.1.1). Such hazardous substances include:

- Hazardous substances that meet the criteria for an observed release to surface water in the watershed.
- All hazardous substances associated with a source that has a surface water containment factor value greater than 0 for the watershed (see sections 2.2.2, 2.2.3, 4.1.2.1.2.1.1, and 4.1.2.1.2.2.1).

4.1.2.2.1 *Toxicity/persistence.* For each hazardous substance, assign a toxicity factor value, a persistence factor value, and a combined toxicity/persistence factor value as specified in sections 4.1.2.2.1.1 through 4.1.2.2.1.3. Select the toxicity/persistence factor value for the watershed as specified in section 4.1.2.2.1.3.

4.1.2.2.1.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in section 2.4.1.1.

4.1.2.2.1.2 *Persistence.* Assign a persistence factor value to each hazardous substance. In assigning this value, evaluate persistence based primarily on the half-life of the hazardous substance in surface water and secondarily on the sorption of the hazardous substance to sediments. The half-life in surface water is defined for HRS purposes as the time required to reduce the initial concentration in surface water by one-half as a result of the combined decay processes of biodegradation, hydrolysis, photolysis, and volatilization. Sorption to sediments is evaluated for the HRS based on the logarithm of the n-octanol-water partition coefficient (log K_{ow}) of the hazardous substance.

Estimate the half-life ($t_{1/2}$) of a hazardous substance as follows:

$$t_{1/2} = \frac{1}{1/h + 1/b + 1/p + 1/v}$$

where:

h = Hydrolysis half-life.
b = Biodegradation half-life.
p = Photolysis half-life.
v = Volatilization half-life.

If one or more of these four component half-lives cannot be estimated for the hazardous substance from available data, delete that component half-life from the above equation. If none of these four component half-lives can be estimated for the hazardous substance from available data, use the default procedure indicated below. Estimate a half-life for the hazardous substance for lakes or for rivers, oceans, coastal tidal waters, and Great Lakes, as appropriate.

If a half-life can be estimated for a hazardous substance:

- Assign that hazardous substance a persistence factor value from the appropriate portion of table 4–10 (that is lakes; or rivers, oceans, coastal tidal waters, and Great Lakes).
- Select the appropriate portion of table 4–10 as follows:

–If there is one or more drinking water intakes along the hazardous substance migration path for the watershed, select the nearest drinking water intake as measured from the probable point of entry. If the in-water segment between the probable point of entry and this selected intake includes both lakes and other water bodies, use the lakes portion of table 4–10 only if more than half the distance to this selected intake lies in lake(s). Otherwise, use the rivers, oceans, coastal tidal waters, and Great Lakes portion of table 4–10. For contaminated sediments with no identified source, use the point where measurement begins (see section 4.1.1.2) rather than the probable point of entry.

–If there are no drinking water intakes but there are intakes or points of use for any of the resource types listed in section 4.1.2.3.3, select the nearest such intake or point of use. Select the portion of table 4–10 based on this intake or point of use in the manner specified for drinking water intakes.

–If there are no drinking water intakes and no specified resource intakes and points of use, but there is another type of resource listed in section 4.1.2.3.3 (for example, the water is usable for drinking water purposes even though not used), select the portion of table 4–10 based on the nearest point of this resource in the manner specified for drinking water intakes.

TABLE 4–10—PERSISTENCE FACTOR VALUES—HALF-LIFE

Surface water category	Substance half-life (days)	Assigned value[a]
Rivers, oceans, coastal tidal waters, and Great Lakes	Less than or equal to 0.2	0.0007
	Greater than 0.2 to 0.5	0.07
	Greater than 0.5 to 1.5	0.4
	Greater than 1.5	1
Lakes	Less than or equal to 0.02	0.0007
	Greater than 0.02 to 2	0.07
	Greater than 2 to 20	0.4
	Greater than 20	1

[a] Do not round to nearest integer.

If a half-life cannot be estimated for a hazardous substance from available data, use the following default procedure to assign a persistence factor value to that hazardous substance:

- For those hazardous substances that are metals (or metalloids), assign a persistence factor value of 1 as a default for all surface water bodies.
- For other hazardous substances (both organic and inorganic), assign a persistence factor value of 0.4 as a default for rivers, oceans, coastal tidal waters, and Great Lakes, and a persistence factor value of 0.07 as a default for lakes. Select the appropriate value in the same manner specified for using table 4–10.

Use the persistence factor value assigned based on half-life or the default procedure unless the hazardous substance can be assigned a higher factor value from Table 4–11, based on its Log K_{ow}. If a higher value can be assigned from table 4–11, assign this higher value as the persistence factor value for the hazardous substance.

TABLE 4–11—PERSISTENCE FACTOR VALUES—LOG K_{ow}

Log K_{ow}	Assigned value[a]
Less than 3.5	0.0007
3.5 to less than 4.0	0.07
4.0 to 4.5	0.4

TABLE 4–11—PERSISTENCE FACTOR VALUES—LOG K_{ow}—Continued

Log K_{ow}	Assigned value[a]
Greater than 4.5	1

[a] Use for lakes, rivers, oceans, coastal tidal waters, and Great Lakes. Do not round to nearest integer.

4.1.2.2.1.3 *Calculation of toxicity/persistence factor value.* Assign each hazardous substance a toxicity/persistence factor value from table 4–12, based on the values assigned to the hazardous substance for the toxicity and persistence factors. Use the hazardous substance with the highest toxicity/persistence factor value for the watershed to assign the toxicity/persistence factor value for the drinking water threat for the watershed. Enter this value in table 4–1.

4.1.2.2.2 *Hazardous waste quantity.* Assign a hazardous waste quantity factor value for the watershed as specified in section 2.4.2. Enter this value in table 4–1.

4.1.2.2.3 *Calculation of drinking water threat-waste characteristics factor category value.* Multiply the toxicity/persistence and hazardous waste quantity factor values for the watershed, subject to a maximum product of 1 × 10^8. Based on this product, assign a value from table 2–7 (section 2.4.3.1) to the drinking water threat-waste characteristics factor category for the watershed. Enter this value in table 4–1.

TABLE 4–12—TOXICITY/PERSISTENCE FACTOR VALUES[a]

Persistence factor value	Toxicity factor value					
	10,000	1,000	100	10	1	0
1.0	10,000	1,000	100	10	1	0
0.4	4,000	400	40	4	0.4	0
0.07	700	70	7	0.7	0.07	0
0.0007	7	0.7	0.07	0.007	0.0007	0

[a] Do not round to nearest integer.

4.1.2.3 *Drinking water threat-targets.* Evaluate the targets factor category for each watershed based on three factors: nearest intake, population, and resources.

To evaluate the nearest intake and population factors, determine whether the target surface water intakes are subject to actual or potential contamination as specified in section 4.1.1.2. Use either an observed release based on direct observation at the intake or the exposure concentrations from samples (or comparable samples) taken at or beyond the intake to make this determination (see section 4.1.2.1.1). The exposure concentrations for a sample (that is, surface water, benthic, or sediment sample) consist of the concentrations of those hazardous substances present that are significantly above background levels and attributable at least in part to the site (that is, those hazardous substance concentrations that meet the criteria for an observed release).

When an intake is subject to actual contamination, evaluate it using Level I concentrations or Level II concentrations. If the actual contamination is based on an observed release by direct observation, use Level II concentrations for that intake. However, if the actual contamination is based on an observed release from samples, determine which level applies for the intake by comparing the exposure concentrations from samples (or comparable samples) to health-based benchmarks as specified in sections 2.5.1 and 2.5.2. Use the health-based benchmarks from table 3–10 (section 3.3.1) in determining the level of contamination from samples. For contaminated sediments with no identified source, evaluate the actual contamination using Level II concentrations (see section 4.1.1.2).

4.1.2.3.1 *Nearest intake.* Evaluate the nearest intake factor based on the drinking water intakes along the overland/flood hazardous substance migration path for the watershed. Include standby intakes in evaluating this factor only if they are used for supply at least once a year.

Assign the nearest intake factor a value as follows and enter the value in table 4–1:

- If one or more of these drinking water intakes is subject to Level I concentrations as specified in section 4.1.2.3, assign a factor value of 50.
- If not, but if one or more of these drinking water intakes is subject to Level II concentrations, assign a factor value of 45.
- If none of these drinking water intakes is subject to Level I or Level II concentrations, determine the nearest of these drinking water intakes, as measured from the probable point of entry (or from the point where measurement begins for contaminated sediments with no identified source). Assign a dilution weight from table 4–13 to this intake, based on the type of surface water body in which it is located. Multiply this dilution weight by 20, round the product to the nearest integer, and assign it as the factor value.

Assign the dilution weight from table 4–13 as follows:

TABLE 4–13—SURFACE WATER DILUTION WEIGHTS

Type of surface water body[a]		Assigned dilution weight[b]
Descriptor	Flow characteristics	
Minimal stream	Less than 10 cfs[c]	1
Small to moderate stream	10 to 100 cfs	0.1
Moderate to large stream	Greater than 100 to 1,000 cfs	0.01
Large stream to river	Greater than 1,000 to 10,000 cfs	0.001
Large river	Greater than 10,000 to 100,000 cfs	0.0001
Very large river	Greater than 100,000 cfs	0.00001
Coastal tidal waters[d]	Flow not applicable, depth not applicable	0.0001
Shallow ocean zone[e] or Great Lake	Flow not applicable, depth less than 20 feet	0.0001
Moderate depth ocean zone[e] or Great Lake	Flow not applicable, depth 20 to 200 feet	0.00001
Deep ocean zone[e] or Great Lake	Flow not applicable, depth greater than 200 feet	0.000005
3-mile mixing zone in quiet flowing river	10 cfs or greater	0.5

[a] Treat each lake as a separate type of water body and assign a dilution weight as specified in text.

[b] Do not round to nearest integer.

[c] cfs = cubic feet per second.

[d] Embayments, harbors, sounds, estuaries, back bays, lagoons, wetlands, etc., seaward from mouths of rivers and landward from baseline of Territorial Sea.

[e] Seaward from baseline of Territorial Sea. This baseline represents the generalized U.S. coastline. It is parallel to the seaward limit of the Territorial Sea and other maritime limits such as the inner boundary of the Federal fisheries jurisdiction and the limit of States jurisdiction under the Submerged Lands Act, as amended.

- For a river (that is, surface water body types specified in table 4–13 as minimal stream through very large river), assign a dilution weight based on the average annual flow in the river at the intake. If available, use the average annual discharge as defined in the U.S. Geological Survey Water Resources Data Annual Report. Otherwise, estimate the average annual flow.
- For a lake, assign a dilution weight as follows:
  - –For a lake that has surface water flow entering the lake, assign a dilution weight based on the sum of the average annual flows for the surface water bodies entering the lake up to the point of the intake.
  - –For a lake that has no surface water flow entering, but that does have surface water flow leaving, assign a dilution weight based on the sum of the average annual flows for the surface water bodies leaving the lake.
  - –For a closed lake (that is, a lake without surface water flow entering or leaving), assign a dilution weight based on the average annual ground water flow into the lake, if available, using the dilution weight for the corresponding river flow rate in table 4–13. If not available, assign a default dilution weight of 1.
- For the ocean and the Great Lakes, assign a dilution weight based on depth.
- For coastal tidal waters, assign a dilution weight of 0.0001; do not consider depth or flow.
- For a quiet-flowing river that has average annual flow of 10 cubic feet per second (cfs) or greater and that contains the probable point of entry to surface water, apply a zone of mixing in assigning the dilution weight:
  - –Start the zone of mixing at the probable point of entry and extend it for 3 miles from the probable point of entry, except: if the surface water characteristics change to turbulent within this 3-mile distance, extend the zone of mixing only to the point at which the change occurs.
  - –Assign a dilution weight of 0.5 to any intake that lies within this zone of mixing.
  - –Beyond this zone of mixing, assign a dilution weight the same as for any other river (that is, assign the dilution weight based on average annual flow).
  - –Treat a quiet-flowing river with an average annual flow of less than 10 cfs the same as any other river (that is, assign it a dilution weight of 1).

In those cases where water flows from a surface water body with a lower assigned dilution weight (from table 4–13) to a surface water body with a higher assigned dilution weight (that is, water flows from a surface water body with more dilution to one with less dilution), use the lower assigned dilution weight as the dilution weight for the latter surface water body.

4.1.2.3.2 *Population.* In evaluating the population factor, include only persons served by drinking water drawn from intakes that are along the overland/flood hazardous substance migration path for the watershed and that are within the target distance limit specified in section 4.1.1.2. Include residents, students, and workers who regularly use the water. Exclude transient populations such as customers and travelers passing through the area. When a standby intake is maintained on a regular basis so that water can be withdrawn, include it in evaluating the population factor.

In estimating residential population, when the estimate is based on the number of residences, multiply each residence by the average number of persons per residence for the county in which the residence is located.

In estimating the population served by an intake, if the water from the intake is blended with other water (for example, water from other surface water intakes or ground water wells), apportion the total population regularly served by the blended system to the intake based on the intake's relative contribution to the total blended system. In estimating the intake's relative contribution, assume each well or intake contributes equally and apportion the population accordingly, except: if the relative contribution of any one intake or well exceeds 40 percent based on average annual pumpage or capacity, estimate the relative contribution of the wells and intakes considering the following data, if available:

- Average annual pumpage from the ground water wells and surface water intakes in the blended system.
- Capacities of the wells and intakes in the blended system.

For systems with standby surface water intakes or standby ground water wells, apportion the total population regularly served by the blended system as described above, except:

- Exclude standby ground water wells in apportioning the population.
- When using pumpage data for a standby surface water intake, use average pumpage for the period during which the standby intake is used rather than average annual pumpage.
- For that portion of the total population that could be apportioned to a standby surface water intake, assign that portion of the population either to that standby intake or to the other surface water intake(s) and ground water well(s) that serve that population; do not assign that portion of the population both to the standby intake and to the other intake(s) and well(s) in the blended system. Use the apportioning that results in the highest population factor value. (Either include all standby intake(s) or exclude some or all of the standby intake(s) as appropriate to obtain this highest value.) Note that the specific standby intake(s) included or excluded and, thus, the specific apportioning may vary in evaluating different watersheds and in evaluating the ground water pathway.

4.1.2.3.2.1 *Level of contamination.* Evaluate the population factor based on three factors: Level I concentrations, Level II concentrations, and potential contamination. Determine which factor applies for an intake as specified in section 4.1.2.3. Evaluate intakes subject to Level I concentration as specified in section 4.1.2.3.2.2, intakes subject to Level II concentration as specified in section 4.1.2.3.2.3, and intakes subject to potential contamination as specified in section 4.1.2.3.2.4.

For the potential contamination factor, use population ranges in evaluating the factor as specified in section 4.1.2.3.2.4. For the Level I and Level II concentrations factors, use the population estimate, not population ranges, in evaluating both factors.

4.1.2.3.2.2 *Level I concentrations.* Sum the number of people served by drinking water from intakes subject to Level I concentrations. Multiply this sum by 10. Assign this product as the value for this factor. Enter this value in table 4–1.

4.1.2.3.2.3 *Level II concentrations.* Sum the number of people served by drinking water from intakes subject to Level II concentrations. Do not include people already counted under the Level I concentrations factor. Assign this sum as the value for this factor. Enter this value in table 4–1.

4.1.2.3.2.4 *Potential contamination.* For each applicable type of surface water body in table 4–14, first determine the number of people served by drinking water from intakes subject to potential contamination in that type of surface water body. Do not include those people already counted under the Level I and Level II concentrations factors.

TABLE 4–14—DILUTION-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FACTOR FOR SURFACE WATER MIGRATION PATHWAY[a]

Type of surface water body[b]	Number of people													
	0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,001 to 3,000,000	3,000,001 to 10,000,000
Minimal stream (<10 cfs)	0	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455	5,213,590
Small to moderate stream (10 to 100 cfs)	0	0.4	2	5	16	52	163	521	1,633	5,214	16,325	52,136	163,245	521,359
Moderate to large stream (>100 to 1,000 cfs)	0	0.04	0.2	0.5	2	5	16	52	163	521	1,633	5,214	16,325	52,136
Large stream to river (>1,000 to 10,000 cfs)	0	0.004	0.02	0.05	0.2	0.5	2	5	16	52	163	521	1,632	5,214
Large river (>10,000 to 100,000 cfs)	0	0	0.002	0.005	0.02	0.05	0.2	0.5	2	5	16	52	163	521
Very large river (>100,000 cfs)	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	0.5	2	5	16	52
Shallow ocean zone or Great Lake (depth <20 feet)	0	0	0.002	0.005	0.02	0.05	0.2	0.5	2	5	16	52	163	521
Moderate ocean zone or Great Lake (depth 20 to 200 feet)	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	0.5	2	5	16	52
Deep ocean zone or Great Lakes (depth >200 feet)	0	0	0	0	0.001	0.003	0.008	0.03	0.08	0.3	1	3	8	26
3-mile mixing zone in quiet flowing river (≥10 cfs)	0	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227	2,606,795

[a] Round the number of people to nearest integer. Do not round the assigned dilution-weighted population value to nearest integer.

[b] Treat each lake as a separate type of water body and assign it a dilution-weighted population value using the surface water body type with the same dilution-weighted from table 4–13 as the lake. If drinking water is withdrawn from coastal tidal water or the ocean, assign a dilution-weighted population value to it using the surface water body type with the same dilution weight from table 4–13 as the coastal tidal water or the ocean zone.

For each type of surface water body, assign a dilution-weighted population value from table 4–14, based on the number of people included for that type of surface water body. (Note that the dilution-weighted population values in table 4–14 incorporate the dilution weights from table 4–13. Do not multiply the values from table 4–14 by these dilution weights.)

Calculate the value for the potential contamination factor (PC) for the watershed as follows:

$$PC = \frac{1}{10}\sum_{i=1}^{n}\left(W_i\right)$$

where:

W_i = Dilution-weighted population from table 4–14 for surface water body type i.

n = Number of different surface water body types in the watershed.

If PC is less than 1, do not round it to the nearest integer; if PC is 1 or more, round to the nearest integer. Enter this value for the potential contamination factor in table 4–1.

4.1.2.3.2.5 *Calculation of population factor value.* Sum the factor values for Level I concentrations, Level II concentrations, and potential contamination. Do not round this sum to the nearest integer. Assign this sum as the population factor value for the watershed. Enter this value in table 4–1.

4.1.2.3.3 *Resources.* To evaluate the resources factor for the watershed, select the highest value below that applies to the watershed. Assign this value as the resources factor value for the watershed. Enter this value in table 4–1.

Assign a value of 5 if, within the in-water segment of the hazardous substance migration path for the watershed, the surface water is used for one or more of the following purposes:

- Irrigation (5 acre minimum) of commercial food crops or commercial forage crops.
- Watering of commercial livestock.
- Ingredient in commercial food preparation.
- Major or designated water recreation area, excluding drinking water use.

Assign a value of 5 if, within the in-water segment of the hazardous substance migration path for the watershed, the surface water is not used for drinking water, but either of the following applies:

- Any portion of the surface water is designated by a State for drinking water use under section 305(a) of the Clean Water Act, as amended.
- Any portion of the surface water is usable for drinking water purposes.

Assign a value of 0 if none of the above applies.

4.1.2.3.4 *Calculation of drinking water threat-targets factor category value.* Sum the nearest intake, population, and resources factor values for the watershed. Do not round this sum to the nearest integer. Assign this sum as the drinking water threat-targets factor category value for the watershed. Enter this value in table 4–1.

4.1.2.4 *Calculation of the drinking water threat score for a watershed.* Multiply the drinking water threat factor category values for likelihood of release, waste characteristics, and targets for the watershed, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum of 100, as the drinking water threat score for the watershed. Enter this value in table 4–1.

4.1.3 *Human food chain threat.* Evaluate the human food chain threat for each watershed based on three factor categories: likelihood of release, waste characteristics, and targets.

4.1.3.1 *Human food chain threat-likelihood of release.* Assign the same likelihood of release factor category value for the human food chain threat for the watershed as would be assigned in section 4.1.2.1.3 for the drinking water threat. Enter this value in table 4–1.

4.1.3.2 *Human food chain threat-waste characteristics.* Evaluate the waste characteristics factor category for each watershed based on two factors: toxicity/persistence/bioaccumulation and hazardous waste quantity.

4.1.3.2.1 *Toxicity/persistence/bioaccumulation.* Evaluate all those hazardous substances eligible to be evaluated for toxicity/persistence in the drinking water threat for the watershed (see section 4.1.2.2).

4.1.3.2.1.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in section 2.4.1.1.

4.1.3.2.1.2 *Persistence.* Assign a persistence factor value to each hazardous substance as specified for the drinking water threat (see section 4.1.2.2.1.2), except: use the predominant water category (that is, lakes; or rivers, oceans, coastal tidal waters, or Great Lakes) between the probable point of entry and the nearest fishery (not the nearest drinking water or resources intake) along the hazardous substance migration path for the watershed to determine which portion of table 4–10 to use. Determine the predominant water category based on distance as specified in section 4.1.2.2.1.2. For contaminated sediments with no identified source, use the point where measurement begins rather than the probable point of entry.

4.1.3.2.1.3 *Bioaccumulation potential.* Use the following data hierarchy to assign a bioaccumulation potential factor value to each hazardous substance:

- Bioconcentration factor (BCF) data.
- Logarithm of the n-octanol-water partition coefficient (log K_{ow}) data.
- Water solubility data.

Assign a bioaccumulation potential factor value to each hazardous substance from table 4–15.

If BCF data are available for any aquatic human food chain organism for the substance being evaluated, assign the bioaccumulation potential factor value to the hazardous substance as follows:

- If BCF data are available for both fresh water and salt water for the hazardous substance, use the BCF data that correspond to the type of water body (that is, fresh water or salt water) in which the fisheries are located to assign the bioaccumulation potential factor value to the hazardous substance.
- If, however, some of the fisheries being evaluated are in fresh water and some are in salt water, or if any are in brackish water, use the BCF data that yield the higher factor value to assign the bioaccumulation potential factor value to the hazardous substance.
- If BCF data are available for either fresh water or salt water, but not for both, use the available BCF data to assign the bioaccumulation potential factor value to the hazardous substance.

If BCF data are not available for the hazardous substance, use log K_{ow} data to assign a bioaccumulation potential factor value to organic substances, but not to inorganic substances. If BCF data are not available, and if either log K_{ow} data are not available, the log K_{ow} is available but exceeds 6.0, or the substance is an inorganic substance, use water solubility data to assign a bioaccumulation potential factor value.

TABLE 4–15—BIOACCUMULATION POTENTIAL FACTOR VALUES [a]

If bioconcentration factor (BCF) data are available for any aquatic human food chain organism, assign a value as follows: [b]

BCF	Assigned value
Greater than or equal to 10,000	50,000
1,000 to less than 10,000	5,000
100 to less than 1,000	500
10 to less than 100	50
1 to less than 10	5
Less than 1	0.5

If BCF data are not available, and log K_{ow} data are available and do not exceed 6.0, assign a value to an organic hazardous substance as follows (for inorganic hazardous substances, skip this step and proceed to the next):

Log K_{ow}	Assigned value
5.5 to 6.0	50,000
4.5 to less than 5.5	5,000
3.2 to less than 4.5	500
2.0 to less than 3.2	50
0.8 to less than 2.0	5
Less than 0.8	0.5

If BCF data are not available, and if either Log K_{ow} data are not available, a log K_{ow} is available but exceeds 6.0, or the substance is an inorganic substance, assign a value as follows:

TABLE 4–15—BIOACCUMULATION POTENTIAL FACTOR VALUES [a]—CONCLUDED

Water solubility (mg/l)	Assigned value
Less than 25	50,000
25 to 500	5,000
Greater than 500 to 1,500	500
Greater than 1,500	0.5

If none of these data are available, assign a value of 0.5.

[a] Do not round to nearest integer.

[b] See text for use of freshwater and saltwater BCF data.

Do not distinguish between fresh water and salt water in assigning the bioaccumulation potential factor value based on log K_{ow} or water solubility data.

If none of these data are available, assign the hazardous substance a bioaccumulation potential factor value of 0.5.

4.1.3.2.1.4 *Calculation of toxicity/persistence/bioaccumulation factor value.* Assign each hazardous substance a toxicity/persistence factor value from table 4–12, based on the values assigned to the hazardous substance for the toxicity and persistence factors. Then assign each hazardous substance a toxicity/persistence/bioaccumulation factor value from table 4–16, based on the values assigned for the toxicity/persistence and bioaccumulation potential factors. Use the hazardous substance with the highest toxicity/persistence/bioaccumulation factor value for the watershed to assign the value to this factor. Enter this value in table 4–1.

TABLE 4–16—TOXICITY/PERSISTENCE/BIOACCUMULATION FACTOR VALUES [a]

Toxicity persistence factor value	Bioaccumulation potential factor value					
	50,000	5,000	500	50	5	0.5
10,000	5×10^8	5×10^7	5×10^6	5×10^5	5×10^4	5,000
4,000	2×10^8	2×10^7	2×10^6	2×10^5	2×10^4	2,000
1,000	5×10^7	5×10^6	5×10^5	5×10^4	5,000	500
700	3.5×10^7	3.5×10^6	3.5×10^5	3.5×10^4	3,500	350
400	2×10^7	2×10^6	2×10^5	2×10^4	2,000	200
100	5×10^6	5×10^5	5×10^4	5,000	500	50

TABLE 4–16—TOXICITY/PERSISTENCE/BIOACCUMULATION FACTOR VALUES [a]—Continued

Toxicity persistence factor value	Bioaccumulation potential factor value					
	50,000	5,000	500	50	5	0.5
70	3.5×10^6	3.5×10^5	3.5×10^4	3,500	350	35
40	2×10^6	2×10^5	2×10^4	2,000	200	20
10	5×10^5	5×10^4	5,000	500	50	5
7	3.5×10^5	3.5×10^4	3,500	350	35	3.5
4	2×10^5	2×10^4	2,000	200	20	2
1	5×10^4	5,000	500	50	5	0.5
0.7	3.5×10^4	3,500	350	35	3.5	0.35
0.4	2×10^4	2,000	200	20	2	0.2
0.07	3,500	350	35	3.5	0.35	0.035
0.007	350	35	3.5	0.35	0.035	0.0035
0.0007	35	3.5	0.35	0.035	0.0035	0.00035
0	0	0	0	0	0	0

[a] Do not round to nearest integer.

4.1.3.2.2 *Hazardous waste quantity.* Assign the same factor value for hazardous waste quantity for the watershed as would be assigned in section 4.1.2.2.2 for the drinking water threat. Enter this value in table 4–1.

4.1.3.2.3 *Calculation of human food chain threat-waste characteristics factor category value.* For the hazardous substance selected for the watershed in section 4.1.3.2.1.4, use its toxicity/persistence factor value and bioaccumulation potential factor value as follows to assign a value to the waste characteristics factor category. First, multiply the toxicity/persistence factor value and the hazardous waste quantity factor value for the watershed, subject to a maximum product of 1×10^8. Then multiply this product by the bioaccumulation potential factor value for this hazardous substance, subject to a maximum product of 1×10^{12}. Based on this second product, assign a value from Table 2–7 (section 2.4.3.1) to the human food chain threat-waste characteristics factor category for the watershed. Enter this value in table 4–1.

4.1.3.3 *Human food chain threat-targets.* Evaluate two target factors for each watershed: food chain individual and population. For both factors, determine whether the target fisheries are subject to actual or potential human food chain contamination.

Consider a fishery (or portion of a fishery) within the target distance limit of the watershed to be subject to actual human food chain contamination if any of the following apply:

- A hazardous substance having a bioaccumulation potential factor value of 500 or greater is present either in an observed release by direct observation to the watershed or in a surface water or sediment sample from the watershed at a level that meets the criteria for an observed release to the watershed from the site, and at least a portion of the fishery is within the boundaries of the observed release (that is, it is located either at the point of direct observation or at or between the probable point of entry and the most distant sampling point establishing the observed release).
- The fishery is closed, and a hazardous substance for which the fishery has been closed has been documented in an observed release to the watershed from the site, and at least a portion of the fishery is within the boundaries of the observed release.
- A hazardous substance is present in a tissue sample from an essentially sessile, benthic, human food chain organism from the watershed at a level that meets the criteria for an observed release to the watershed from the site, and at least a portion of the fishery is within the boundaries of the observed release.

For a fishery that meets any of these three criteria, but that is not wholly within the boundaries of the observed release, consider only the portion of the fishery that is within the boundaries of the observed release to be subject to actual human food chain contamination. Consider the remainder of the fishery within the target distance limit to be subject to potential food chain contamination.

In addition, consider all other fisheries that are partially or wholly within the target distance limit for the watershed, including fisheries partially or wholly within the boundaries of an observed release for the watershed that do not meet any of the three criteria listed above, to be subject to potential human food chain contamination. If only a portion of the fishery is within the target distance limit for the watershed, include only that portion in evaluating the targets factor category.

When a fishery (or portion of a fishery) is subject to actual food chain contamination, determine the part of the fishery subject to Level I concentrations and the part subject to Level II concentrations. If the actual food chain contamination is based on direct observation, evaluate it using Level II concentrations. However, if the actual food chain contamination is based on samples from the watershed, use these samples and, if available, additional tissue samples from aquatic human food chain organisms as specified below, to determine the part subject to Level I concentrations and the part subject to Level II concentrations:

- Determine the level of actual contamination from samples (including tissue samples from essentially sessile, benthic organisms) that meet the criteria for actual food chain contamination by comparing the exposure concentrations (see section 4.1.2.3) from these samples (or comparable samples) to the health-based benchmarks from table 4–17, as described in section 2.5.1 and 2.5.2. Use only the exposure concentrations for those hazardous substances in the sample (or comparable samples) that meet the criteria for actual contamination of the fishery.
- In addition, determine the level of actual contamination from other tissue samples by comparing the concentrations of hazardous substances in the tissue samples (or comparable tissue samples) to the health-based benchmarks from table 4–17, as described in sections 2.5.1 and 2.5.2. Use only those additional tissue samples and only those hazardous substances in the tissue samples that meet all the following criteria:
  - –The tissue sample is from a location that is within the boundaries of the actual food chain contamination for the site (that is, either at the point of direct observation or at or between the probable point of entry and the most distant sample point meeting the criteria for actual food chain contamination).
  - –The tissue sample is from a species of aquatic human food chain organism that spends extended periods of time within the boundaries of the actual food chain contamination for the site and that is not an essentially sessile, benthic organism.
  - –The hazardous substance is a substance that is also present in a surface water, benthic, or sediment sample from within the target distance limit for the watershed and, for such a sample, meets the criteria for actual food chain contamination.

TABLE 4–17—HEALTH-BASED BENCHMARKS FOR HAZARDOUS SUBSTANCES IN HUMAN FOOD CHAIN

- Concentration corresponding to Food and Drug Administration Action Level (FDAAL) for fish or shellfish.
- Screening concentration for cancer corresponding to that concentration that corresponds to the 10^{-6} individual cancer risk for oral exposures.
- Screening concentration for noncancer toxicological responses corresponding to the Reference Dose (RfD) for oral exposures.

4.1.3.3.1 *Food chain individual.* Evaluate the food chain individual factor based on the fisheries (or portions of fisheries) within the target distance limit for the watershed. Assign this factor a value as follows:

- If any fishery (or portion of a fishery) is subject to Level I concentrations, assign a value of 50.
- If not, but if any fishery (or portion of a fishery) is subject to Level II concentrations, assign a value of 45.
- If not, but if there is an observed release of a hazardous substance having a bioaccumulation potential factor value of 500 or greater to surface water in the watershed and there is a fishery (or portion of a fishery) present anywhere within the target distance limit, assign a value of 20.
- If there is no observed release to surface water in the watershed or there is no observed release of a hazardous substance having a bioaccumulation potential factor value of 500 or greater, but there is a fishery (or portion of a fishery) present anywhere within the target distance limit, assign a value as follows:
  - –Using table 4–13, determine the highest dilution weight (that is, lowest amount of dilution) applicable to the fisheries (or portions of fisheries) within the target distance limit. Multiply this dilution weight by 20 and round to the nearest integer.
  - –Assign this calculated value as the factor value.
- If there are no fisheries (or portions of fisheries) within the target distance limit of the watershed, assign a value of 0.

Enter the value assigned in table 4–1.

4.1.3.3.2 *Population.* Evaluate the population factor for the watershed based on three factors: Level I concentrations, Level II concentrations, and potential human food chain contamination. Determine which factor applies for a fishery (or portion of a fishery) as specified in section 4.1.3.3.

4.1.3.3.2.1 *Level I concentrations.* Determine those fisheries (or portions of fisheries) within the watershed that are subject to Level I concentrations.

Estimate the human food chain population value for each fishery (or portion of a fishery) as follows:

- Estimate human food chain production for the fishery based on the estimated annual production (in pounds) of human food chain organisms (for example, fish, shellfish) for that fishery, except: if the fishery is closed and a hazardous substance for which the fishery has been closed has been documented in an observed release to the fishery from a source at the site, use the estimated annual production for the period prior to closure of the fishery or use the estimated annual production from comparable fisheries that are not closed.
- Assign the fishery a value for human food chain population from table 4–18, based on the estimated human food production for the fishery.

- Set boundaries between fisheries at those points where human food chain production changes or where the surface water dilution weight changes.

Sum the human food chain population value for each fishery (and portion of a fishery). Multiply this sum by 10. If the product is less than 1, do not round it to the nearest integer; if 1 or more, round to the nearest integer. Assign the resulting value as the Level I concentrations factor value. Enter this value in table 4–1.

4.1.3.3.2.2 *Level II concentrations.* Determine those fisheries (or portions of fisheries) within the watershed that are subject to Level II concentrations. Do not include any fisheries (or portions of fisheries) already counted under the Level I concentrations factor.

Assign each fishery (or portion of a fishery) a value for human food chain population from table 4–18, based on the estimated human food production for the fishery. Estimate the human food chain production for the fishery as specified in section 4.1.3.3.2.1.

Sum the human food chain population value for each fishery (and portion of a fishery). If this sum is less than 1, do not round it to the nearest integer; if 1 or more, round to the nearest integer. Assign the resulting value as the Level II concentrations factor value. Enter this value in table 4–1.

TABLE 4–18—HUMAN FOOD CHAIN POPULATION VALUES[a]

Human food chain production (pounds per year)	Assigned human food chain population value
0	0
Greater than 0 to 100	0.03
Greater than 100 to 1,000	0.3
Greater than 1,000 to 10,000	3
Greater than 10,000 to 100,000	31
Greater than 100,000 to 1,000,000	310
Greater than 10^6 to 10^7	3,100
Greater than 10^7 to 10^8	31,000
Greater than 10^8 to 10^9	310,000
Greater than 10^9	3,100,000

[a] Do not round to nearest integer.

4.1.3.3.2.3 *Potential human food chain contamination.* Determine those fisheries (or portions of fisheries) within the watershed that are subject to potential human food chain contamination. Do not include those fisheries (or portion of fisheries) already counted under the Level I or Level II concentrations factors.

Calculate the value for the potential human food chain contamination factor (PF) for the watershed as follows:

$$PF = \frac{1}{10}\sum_{i=1}^{n} P_i D_i$$

where:

P_i = Human food chain population value for fishery i.

D_i = Dilution weight from table 4–13 for fishery i.

n = Number of fisheries subject to potential human food chain contamination.

In calculating PF:

- Estimate the human food chain population value (P_i) for a fishery (or portion of a fishery) as specified in section 4.1.3.3.2.1.
- Assign the fishery (or portion of a fishery) a dilution weight as indicated in table 4–13 (section 4.1.2.3.1), except: do not assign a dilution weight of 0.5 for a ‘‘3-mile mixing zone in quiet flowing river’’; instead assign a dilution weight based on the average annual flow.

If PF is less than 1, do not round it to the nearest integer; if PF is 1 or more, round to the nearest integer. Enter the value assigned in table 4–1.

4.1.3.3.2.4 *Calculation of population factor value.* Sum the values for the Level I concentrations, Level II concentrations, and potential human food chain contamination factors for the watershed. Do not round this sum to the nearest integer. Assign it as the population factor value for the watershed. Enter this value in table 4–1.

4.1.3.3.3 *Calculation of human food chain threat-targets factor category value.* Sum the food chain individual and population factor values for the watershed. Do not round this sum to the nearest integer. Assign it as the human food chain threat-targets factor category value for the watershed. Enter this value in table 4–1.

4.1.3.4 *Calculation of human food chain threat score for a watershed.* Multiply the human food chain threat factor category values for likelihood of release, waste characteristics, and targets for the watershed, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum of 100, as the human food chain threat score for the watershed. Enter this score in table 4–1.

4.1.4 *Environmental threat.* Evaluate the environmental threat for the watershed based on three factor categories: likelihood of release, waste characteristics, and targets.

4.1.4.1 *Environmental threat-likelihood of release.* Assign the same likelihood of release factor category value for the environmental threat for the watershed as would be assigned in section 4.1.2.1.3 for the drinking water threat. Enter this value in table 4–1.

4.1.4.2 *Environmental threat-waste characteristics.* Evaluate the waste characteristics factor category for each watershed based on two factors: ecosystem toxicity/persistence/bioaccumulation and hazardous waste quantity.

4.1.4.2.1 *Ecosystem toxicity/persistence/bioaccumulation.* Evaluate all those hazardous substances eligible to be evaluated for toxicity/persistence in the drinking water threat for the watershed (see section 4.1.2.2).

4.1.4.2.1.1 *Ecosystem toxicity.* Assign an ecosystem toxicity factor value from Table 4–19 to each hazardous substance on the basis of the following data hierarchy:

- EPA chronic Ambient Water Quality Criterion (AWQC) for the substance.
- EPA chronic Ambient Aquatic Life Advisory Concentrations (AALAC) for the substance.
- EPA acute AWQC for the substance.
- EPA acute AALAC for the substance.
- Lowest LC_{50} value for the substance.

In assigning the ecosystem toxicity factor value to the hazardous substance:

- If either an EPA chronic AWQC or AALAC is available for the hazardous substance, use it to assign the ecosystem toxicity factor value. Use the chronic AWQC in preference to the chronic AALAC when both are available.
- If neither is available, use the EPA acute AWQC or AALAC to assign the ecosystem toxicity factor value. Use the acute AWQC in preference to the acute AALAC.
- If none of the chronic and acute AWQCs and AALACs is available, use the lowest LC_{50} value to assign the ecosystem toxicity factor value.
- If an LC_{50} value is also not available, assign an ecosystem toxicity factor value of 0 to the hazardous substance and use other hazardous substances for which data are available in evaluating the pathway.

If an ecosystem toxicity factor value of 0 is assigned to all hazardous substances eligible to be evaluated for the watershed (that is, insufficient data are available for evaluating all the substances), use a default value of 100 as the ecosystem toxicity factor value for all these hazardous substances.

With regard to the AWQC, AALAC, or LC_{50} selected for assigning the ecosystem toxicity factor value to the hazardous substance:

- If values for the selected AWQC, AALAC, or LC_{50} are available for both fresh water and marine water for the hazardous substance, use the value that corresponds to the type of water body (that is, fresh water or salt water) in which the sensitive environments are located to assign the ecosystem toxicity factor value to the hazardous substance.
- If, however, some of the sensitive environments being evaluated are in fresh water and some are in salt water, or if any are in brackish water, use the value (fresh water or marine) that yields the higher factor value to assign the ecosystem toxicity factor value to the hazardous substance.
- If a value for the selected AWQC, AALAC, or LC_{50} is available for either fresh water or marine water, but not for both, use the available one to assign an ecosystem toxicity factor value to the hazardous substance.

TABLE 4–19—ECOSYSTEM TOXICITY FACTOR VALUES

If an EPA chronic AWQC [a] or AALAC [b] is available, assign a value as follows: [c]

EPA chronic AWQC or AALAC	Assigned value
Less than 1 μg/l	10,000
1 to 10 μg/l	1,000
Greater than 10 to 100 μg/l	100
Greater than 100 to 1,000 μg/l	10
Greater than 1,000 μg/l	1

If neither an EPA chronic AWQC nor EPA chronic AALAC is available, assign a value based on the EPA acute AWQC or AALAC as follows: [c]

EPA acute AWQC or AALAC	Assigned value
Less than 100 μg/l	10,000
100 to 1,000 μg/l	1,000
Greater than 1,000 to 10,000 μg/l	100
Greater than 10,000 to 100,000 μg/l	10
Greater than 100,000 μg/l	1

If neither an EPA chronic or acute AWQC nor EPA chronic or acute AALAC is available, assign a value from the LC_{50} as follows:

LC_{50}	Assigned value
Less than 100 μg/l	10,000
100 to 1,000 μg/l	1,000
Greater than 1,000 to 10,000 μg/l	100
Greater than 10,000 to 100,000 μg/l	10
Greater than 100,000 μg/l	1

If none of the AWQCs and AALACs nor the LC_{50} is available, assign a value of 0.

[a] AWQC—Ambient Water Quality Criteria.

[b] AALAC—Ambient Aquatic Life Advisory Concentrations.

[c] Use the AWQC value in preference to the AALAC when both are available. See text for use of fresh water and marine values.

4.1.4.2.1.2 *Persistence.* Assign a persistence factor value to each hazardous substance as specified in section 4.1.2.2.1.2, except: use the predominant water category (that is lakes; or rivers, oceans, coastal tidal waters, or Great Lakes) between the probable point of entry and the nearest sensitive environment (not the nearest drinking water or resources intake) along the hazardous substance migration path for the watershed to determine which portion of table 4–10 to use. Determine the predominant water category based on distance as specified in section 4.1.2.2.1.2. For contaminated sediments with no identified source, use the point where measurement begins rather than the probable point of entry.

4.1.4.2.1.3 *Ecosystem bioaccumulation potential.* Assign an ecosystem bioaccumulation potential factor value to each hazardous substance in the same manner specified for the bioaccumulation potential factor in section 4.1.3.2.1.3, except:

- Use BCF data for all aquatic organisms, not just for aquatic human food chain organisms.

- Use the BCF data that corresponds to the type of water body (that is, fresh water or salt water) in which the sensitive environments (not fisheries) are located.

4.1.4.2.1.4 *Calculation of ecosystem toxicity/persistence/bioaccumulation factor value.* Assign each hazardous substance an ecosystem toxicity/persistence factor value from table 4–20, based on the values assigned to the hazardous substance for the ecosystem toxicity and persistence factors. Then assign each hazardous substance an ecosystem toxicity/persistence/bioaccumulation factor value from table 4–21, based on the values assigned for the ecosystem toxicity/persistence and ecosystem bioaccumulation potential factors. Select the hazardous substance with the highest ecosystem toxicity/persistence/bioaccumulation factor value for the watershed and use it to assign the value to this factor. Enter this value in table 4–1.

TABLE 4–20—ECOSYSTEM TOXICITY/PERSISTENCE FACTOR VALUES [a]

Persistence factor value	Ecosystem toxicity factor value					
	10,000	1,000	100	10	1	0
1.0	10,000	1,000	100	10	1	0
0.4	4,000	400	40	4	0.4	0
0.07	700	70	7	0.7	0.07	0
0.0007	7	0.7	0.07	0.007	0.0007	0

[a] Do not round to nearest integer.

TABLE 4–21—ECOSYSTEM TOXICITY/PERSISTENCE/BIOACCUMULATION FACTOR VALUES [a]

Ecosystem toxicity persistence factor value	Ecosystem bioaccumulation potential factor value					
	50,000	5,000	500	50	5	0.5
10,000	5×10^8	5×10^7	5×10^6	5×10^5	5×10^4	5,000
4,000	2×10^8	2×10^7	2×10^6	2×10^5	2×10^4	2,000
1,000	5×10^7	5×10^6	5×10^5	5×10^4	5,000	500
700	3.5×10^7	3.5×10^6	3.5×10^5	3.5×10^4	3,500	350
400	2×10^7	2×10^6	2×10^5	2×10^4	2,000	200
100	5×10^6	5×10^5	5×10^4	5,000	500	50
70	3.5×10^6	3.5×10^5	3.5×10^4	3,500	350	35
40	2×10^6	2×10^5	2×10^4	2,000	200	20
10	5×10^5	5×10^4	5,000	500	50	5
7	3.5×10^5	3.5×10^4	3,500	350	35	3.5
4	2×10^5	2×10^4	2,000	200	20	2
1	5×10^4	5,000	500	50	5	0.5
0.7	3.5×10^4	3,500	350	35	3.5	0.35
0.4	2×10^4	2,000	200	20	2	0.2
0.07	3,500	350	35	3.5	0.35	0.035
0.007	350	35	3.5	0.35	0.035	0.0035
0.0007	35	3.5	0.35	0.035	0.0035	0.00035
0	0	0	0	0	0	0

[a] Do not round to nearest integer.

4.1.4.2.2 *Hazardous waste quantity.* Assign the same factor value for hazardous waste quantity for the watershed as would be assigned in section 4.1.2.2.2 for the drinking water threat. Enter this value in table 4–1.

4.1.4.2.3 *Calculation of environmental threat-waste characteristics factor category value.* For the hazardous substance selected for the watershed in section 4.1.4.2.1.4, use its ecosystem toxicity/persistence factor value and ecosystem bioaccumulation potential factor value as follows to assign a value to the waste characteristics factor category. First, multiply the ecosystem toxicity/persistence factor value and the hazardous waste quantity factor value for the watershed, subject to a maximum product of 1×10^8. Then multiply this product by the ecosystem bioaccumulation potential factor value for this hazardous substance, subject to a maximum product of 1×10^{12}. Based on this second product, assign a value from Table 2–7 (section 2.4.3.1) to the environmental threat-waste characteristics factor category for the watershed. Enter this value in table 4–1.

TABLE 4–22—ECOLOGICAL-BASED BENCHMARKS FOR HAZARDOUS SUBSTANCES IN SURFACE WATER

- Concentration corresponding to EPA Ambient Water Quality Criteria (AWQC) for protection of aquatic life (fresh water or marine).
- Concentration corresponding to EPA Ambient Aquatic Life Advisory Concentrations (AALAC).

- Select the appropriate AWQC and AALAC as follows:
  - –Use chronic value, if available; otherwise use acute value.
  - –If the sensitive environment being evaluated is in fresh water, use fresh water value, except: if no fresh water value is available, use marine value if available.
  - –If the sensitive environment being evaluated is in salt water, use marine value, except: if no marine value is available, use fresh water value if available.
  - –If the sensitive environment being evaluated is in both fresh water and salt water, or is in brackish water, use lower of fresh water or marine values.

TABLE 4–23—SENSITIVE ENVIRONMENTS RATING VALUES

Sensitive environment	Assigned value
Critical habitat[a] for Federal designated endangered or threatened species Marine Sanctuary National Park Designated Federal Wilderness Area Areas identified under Coastal Zone Management Act[b] Sensitive areas identified under National Estuary Program[c] or Near Coastal Waters Program[d] Critical areas identified under the Clean Lakes Program[e] National Monument[f] National Seashore Recreational Area National Lakeshore Recreational Area	100
Habitat known to be used by Federal designated or proposed endangered or threatened species National Preserve National or State Wildlife Refuge Unit of Coastal Barrier Resources System Coastal Barrier (undeveloped) Federal land designated for protection of natural ecosystems Administratively Proposed Federal Wilderness Area Spawning areas critical[g] for the maintenance of fish/shellfish species within river, lake, or coastal tidal waters Migratory pathways and feeding areas critical for maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which the fish spend extended periods of time Terrestrial areas utilized for breeding by large or dense aggregations of animals[h] National river reach designated as Recreational	75
Habitat known to be used by State designated endangered or threatened species Habitat known to be used by species under review as to its Federal endangered or threatened status Coastal Barrier (partially developed) Federal designated Scenic or Wild River	50
State land designated for wildlife or game management State designated Scenic or Wild River State designated Natural Areas Particular areas, relatively small in size, important to maintenance of unique biotic communities	25
State designated areas for protection or maintenance of aquatic life[i]	5

[a] Critical habitat as defined in 50 CFR 424.02.

[b] Areas identified in State Coastal Zone Management plans as requiring protection because of ecological value.

[c] National Estuary Program study areas (subareas within estuaries) identified in Comprehensive Conservation and Management Plans as requiring protection because they support critical life stages of key estuarine species (Section 320 of Clean Water Act, as amended).

[d] Near Coastal Waters as defined in Sections 104(b)(3), 304(1), 319, and 320 of Clean Water Act, as amended.

[e] Clean Lakes Program critical areas (subareas within lakes, or in some cases entire small lakes) identified by State Clean Lake Plans as critical habitat (Section 314 of Clean Water Act, as amended).

[f] Use only for air migration pathway.

[g] Limit to areas described as being used for intense or concentrated spawning by a given species.

[h] For the air migration pathway, limit to terrestrial vertebrate species. For the surface water migration pathway, limit to terrestrial vertebrate species with aquatic or semiaquatic foraging habits.

[i] Areas designated under Section 305(a) of Clean Water Act, as amended.

TABLE 4–24—WETLANDS RATING VALUES FOR SURFACE WATER MIGRATION PATHWAY

Total length of wetlands[a] (miles)	Assigned value
Less than 0.1	0
0.1 to 1	25
Greater than 1 to 2	50
Greater than 2 to 3	75
Greater than 3 to 4	100
Greater than 4 to 8	150
Greater than 8 to 12	250
Greater than 12 to 16	350
Greater than 16 to 20	450
Greater than 20	500

[a] Wetlands as defined in 40 CFR section 230.3.

4.1.4.3 *Environmental threat-targets.* Evaluate the environmental threat-targets factor category for a watershed using one factor: sensitive environments.

4.1.4.3.1 *Sensitive environments.* Evaluate sensitive environments along the hazardous substance migration path for the watershed based on three factors: Level I concentrations, Level II concentrations, and potential contamination.

Determine which factor applies to each sensitive environment as specified in section 4.1.2.3, except: use ecological-based benchmarks (Table 4–22) rather than health-based benchmarks (Table 3–10) in determining the level of contamination from samples. In determining the level of actual contamination, use a point of direct observation anywhere within the sensitive environment or samples (that is, surface water, benthic, or sediment samples) taken anywhere within or beyond the sensitive environment (or anywhere adjacent to or beyond the sensitive environment if it is contiguous to the migration path).

4.1.4.3.1.1 *Level I concentrations.* Assign value(s) from table 4–23 to each sensitive environment subject to Level I concentrations.

For those sensitive environments that are wetlands, assign an additional value from table 4–24. In assigning a value from table 4–24, include only those portions of wetlands located along the hazardous substance migration path in the area of Level I concentrations. If a wetland is located partially along the area of Level I concentrations and partially along the area of Level II concentrations and/or potential contamination, then solely for purposes of table 4–24, count the portion(s) along the areas of Level II concentrations or potential contamination under the Level II concentrations factor (section 4.1.4.3.1.2) or potential contamination factor (section 4.1.4.3.1.3), as appropriate.

Estimate the total length of wetlands along the hazardous substance migration path (that is, wetland frontage) in the area of Level I concentrations and assign a value from table 4–24 based on this total length. Estimate this length as follows:

- For an isolated wetland or for a wetland where the probable point of entry to surface water is in the wetland, use the perimeter of that portion of the wetland subject to Level I concentrations as the length.
- For rivers, use the length of the wetlands contiguous to the in-water segment of the hazardous substance migration path (that is, wetland frontage).
- For lakes, oceans, coastal tidal waters, and Great Lakes, use the length of the wetlands along the shoreline within the target distance limit (that is, wetland frontage along the shoreline).

Calculate the Level I concentrations factor value (SH) for the watershed as follows:

$$SH = 10\left(WH + \sum_{i=1}^{n} S_i\right)$$

where:

WH = Value assigned from table 4–24 to wetlands along the area of Level I concentrations.

S_i = Value(s) assigned from table 4–23 to sensitive environment i.

n = Number of sensitive environments from table 4–23 subject to Level I concentrations.

Enter the value assigned in table 4–1.

4.1.4.3.1.2 *Level II concentrations.* Assign value(s) from table 4–23 to each sensitive environment subject to Level II concentrations. Do not include sensitive environments already counted for table 4–23 under the Level I concentrations factor for this watershed.

For those sensitive environments that are wetlands, assign an additional value from table 4–24. In assigning a value from table 4–24, include only those portions of wetlands located along the hazardous substance migration path in the area of Level II concentrations, as specified in section 4.1.4.3.1.1.

Estimate the total length of wetlands along the hazardous substance migration path (that is, wetland frontage) in the area of Level II concentrations and assign a value from table 4–24 based on this total length. Estimate this length as specified in section 4.1.4.3.1.1, except: for an isolated wetland or for a wetland where the probable point of entry to surface water is in the wetland, use the perimeter of that portion of the wetland subject to Level II (not Level I) concentrations as the length.

Calculate the Level II concentrations value (SL) for the watershed as follows:

$$SL = WL + \sum_{i=1}^{n} S_i$$

where:

WL = Value assigned from table 4–24 to wetlands along the area of Level II concentrations.

S_i = Value(s) assigned from table 4–23 to sensitive environment i.

n = Number of sensitive environments from table 4–23 subject to Level II concentrations.

Enter the value assigned in table 4–1.

4.1.4.3.1.3 *Potential contamination.* Assign value(s) from table 4–23 to each sensitive environment subject to potential contamination. Do not include sensitive environments already counted for table 4–23 under the Level I or Level II concentrations factors.

For each type of surface water body in table 4–13 (section 4.1.2.3.1), sum the value(s) assigned from table 4–23 to the sensitive environments along that type of surface water body, except: do not use the surface water body type "3-mile mixing zone in quiet flowing river." If a sensitive environment is along two or more types of surface water bodies (for example, Wildlife Refuge contiguous to both a moderate stream and a large river), assign the sensitive environment only to that surface water body type having the highest dilution weight value from table 4–13.

For those sensitive environments that are wetlands, assign an additional value from table 4–24. In assigning a value from table 4–24, include only those portions of wetlands located along the hazardous substance migration path in the area of potential contamination, as specified in section 4.1.4.3.1.1. Aggregate these wetlands by type of surface water body, except: do not use the surface water body type "3-mile mixing zone in quiet flowing river." Treat the wetlands aggregated within each type of surface water body as separate sensitive environments solely for purposes of applying table 4–24. Estimate the total length of the wetlands within each surface water body type as specified in section 4.1.4.3.1.1, except: for an isolated wetland or for a wetland where the probable point of entry to surface water is in the wetland, use the perimeter of that portion of the wetland subject to potential contamination (or the portion of that perimeter that is within the target distance limit) as the length. Assign a separate value from table 4–24 for each type of surface water body in the watershed.

Calculate the potential contamination factor value (SP) for the watershed as follows:

$$SP = \frac{1}{10}\sum_{j=1}^{m}\left(\left[W_j + S_j\right]D_j\right)$$

where:

$$S_j = \sum_{i=1}^{n} S_{ij}$$

S_{ij} = Value(s) assigned from table 4–23 to sensitive environment i in surface water body type j.

n = Number of sensitive environments from table 4–23 subject to potential contamination.

W_j = Value assigned from table 4–24 for wetlands along the area of potential contamination in surface water body type j.

D_j = Dilution weight from table 4–13 for surface water body type j.

m = Number of different surface water body types from table 4–13 in the watershed.

If SP is less than 1, do not round it to the nearest integer; if SP is 1 or more, round to the nearest integer. Enter this value for the potential contamination factor in table 4–1.

4.1.4.3.1.4 *Calculation of environmental threat-targets factor category value.* Sum the values for the Level I concentrations, Level II concentrations, and potential contamination factors for the watershed. Do not round this sum to the nearest integer. Assign this sum as the environmental threat-targets factor category value for the watershed. Enter this value in table 4–1.

4.1.4.4 *Calculation of environmental threat score for a watershed.* Multiply the environmental threat factor category values for likelihood of release, waste characteristics, and targets for the watershed, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum of 60, as the environmental threat score for the watershed. Enter this score in table 4–1.

4.1.5 *Calculation of overland/flood migration component score for a watershed.* Sum the scores for the three threats for the watershed (that is, drinking water, human food chain, and environmental threats). Assign the resulting score, subject to a maximum value of 100, as the surface water overland/flood migration component score for the watershed. Enter this score in table 4–1.

4.1.6 *Calculation of overland/flood migration component score.* Select the highest surface water overland/flood migration component score from the watersheds evaluated. Assign this score as the surface water overland/flood migration component score for the site, subject to a maximum score of 100. Enter this score in table 4–1.

4.2 *Ground water to surface water migration component.* Use the ground water to surface water migration component to evaluate surface water threats that result from migration of hazardous substances from a source at the site to surface water via ground water. Evaluate three types of threats for this component: drinking water threat, human food chain threat, and environmental threat.

4.2.1 *General considerations.*

4.2.1.1 *Eligible surface waters.* Calculate ground water to surface water migration component scores only for surface waters (see section 4.0.2) for which all the following conditions are met:

- A portion of the surface water is within 1 mile of one or more sources at the site having a containment factor value greater than 0 (see section 4.2.2.1.2).
- No aquifer discontinuity is established between the source and the portion of the surface water within 1 mile of the source (see section 3.0.1.2.2). However, if hazardous substances have migrated across an apparent discontinuity within this 1 mile distance, do not consider a discontinuity present in scoring the site.
- The top of the uppermost aquifer is at or above the bottom of the surface water.

Do not evaluate this component for sites consisting solely of contaminated sediments with no identified source.

4.2.1.2 *Definition of hazardous substance migration path for ground water to surface water migration component.* The hazardous substance migration path includes both the ground water segment and the surface water in-water segment that hazardous substances would take as they migrate away from sources at the site:

- Restrict the ground water segment to migration via the uppermost aquifer between a source and the surface water.
- Begin the surface water in-water segment at the probable point of entry from the uppermost aquifer to the surface water. Identify the probable point of entry as that point of the surface water that yields the shortest straight-line distance, within the aquifer boundary (see section 3.0.1.2), from the sources at the site with a containment factor value greater than 0 to the surface water.
  - –For rivers, continue the in-water segment in the direction of flow (including any tidal flows) for the distance established by the target distance limit (see section 4.2.1.4).
  - –For lakes, oceans, coastal tidal waters, or Great Lakes, do not consider flow direction. Instead apply the target distance limit as an arc.
  - –If the in-water segment includes both rivers and lakes (or oceans, coastal tidal waters, or Great Lakes), apply the target distance limit to their combined in-water segments.

Consider a site to be in two or more watersheds for this component if two or more hazardous substance migration paths from the sources at the site do not reach a common point within the target distance limit. If the site is in more than one watershed, define a separate hazardous substance migration path for each watershed. Evaluate the ground water to surface water migration component for each watershed separately as specified in section 4.2.1.5.

4.2.1.3 *Observed release of a specific hazardous substance to surface water in-water segment.* Section 4.2.2.1.1 specifies the criteria for assigning values to the observed release factor for the ground water to surface water migration component. With regard to an individual hazardous substance, consider an observed release of that hazardous substance to be established for the surface water in-water segment of the ground water to surface water migration component only when the hazardous substance meets the criteria both for an observed release both to ground water (see section 4.2.2.1.1) and for an observed release by chemical analysis to surface water (see section 4.1.2.1.1).

If the hazardous substance meets the section 4.1.2.1.1 criteria for an observed release by chemical analysis to surface water but does not also meet the criteria for an observed release to ground water, do not use any samples of that hazardous substance from the surface water in-water segment in evaluating the factors of this component (for example, do not use the hazardous substance in establishing targets subject to actual contamination or in determining the level of actual contamination for a target).

4.2.1.4 *Target distance limit.* Determine the target distance limit for each watershed as specified in section 4.1.1.2, except: do not extend the target distance limit to a sample location beyond 15 miles unless at least one hazardous substance in a sample from that location meets the criteria in section 4.2.1.3 for an observed release to the surface water in-water segment.

Determine the targets eligible to be evaluated for each watershed and establish whether these targets are subject to actual or potential contamination as specified in section 4.1.1.2, except: do not establish actual contamination based on a sample location unless at least one hazardous substance in a sample from that location meets the criteria in section 4.2.1.3 for an observed release to the surface water in-water segment.

4.2.1.5 *Evaluation of ground water to surface water migration component.* Evaluate the drinking water threat, human food chain threat, and environmental threat for each watershed for this component based on three factor categories: likelihood of release, waste characteristics, and targets. Figure 4–2 indicates the factors included within each factor category for each type of threat.

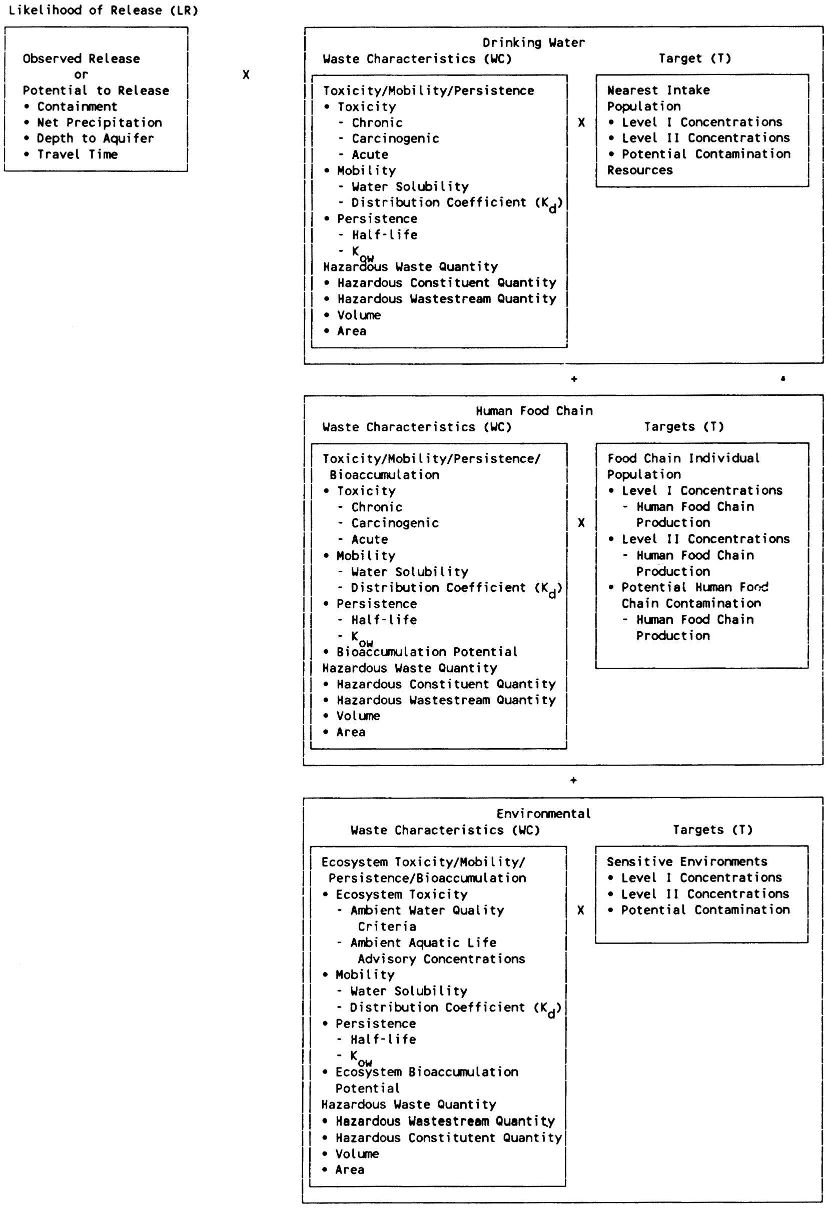


Figure 4-2
OVERVIEW OF GROUND WATER TO SURFACE WATER MIGRATION COMPONENT

Determine the ground water to surface water migration component score (S_{gs}) for a watershed in terms of the factor category values as follows:

$$S_{gs} = \frac{\sum_{i=1}^{3} (LR_i)(WC_i)(T_i)}{SF}$$

where:

LR_i = Likelihood of release factor category value for threat i (that is, drinking water, human food chain, or environmental threat).

WC_i = Waste characteristics factor category value for threat i.

T_i = Targets factor category value for threat i.

SF = Scaling factor.

Table 4–25 outlines the specific calculation procedure.

If the site is in only one watershed, assign the ground water to surface water migration component score for that watershed as the ground water to surface water migration component score for the site.

If the site is in more than one watershed:

- Calculate a separate ground water to surface water migration component score for each watershed, using likelihood of release, waste characteristics, and targets applicable to each watershed.
- Select the highest ground water to surface water migration component score from the watersheds evaluated and assign it as the ground water to surface water migration component score for the site.

TABLE 4–25—GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET

Factor categories and factors	Maximum value	Value assigned
Drinking Water Threat		
Likelihood of Release to Aquifer:		
1. Observed Release	550	
2. Potential to Release:		
2a. Containment	10	
2b. Net Precipitation	10	
2c. Depth to Aquifer	5	
2d. Travel Time	35	
2e. Potential to Release (lines 2a[2b + 2c + 2d])	500	
3. Likelihood of Release (higher of lines 1 and 2e)	550	
Waste Characteristics:		
4. Toxicity/Mobility/Persistence	(a)	
5. Hazardous Waste Quantity	(a)	
6. Waste Characteristics	100	
Targets:		
7. Nearest Intake	50	
8. Population		
8a. Level I Concentrations	(b)	
8b. Level II Concentrations	(b)	
8c. Potential Contamination	(b)	
8d. Population (lines 8a + 8b + 8c)	....	
9. Resources	5	
10. Targets (lines 7 + 8d + 9)	(b)	
Drinking Water Threat Score:		
11. Drinking Water Threat Score ([lines 3 × 6 × 10]/82,500, subject to a maximum of 100)	100	
Human Food Chain Threat		
Likelihood of Release:		
12. Likelihood of Release (same value as line 3)	550	
Waste Characteristics:		
13. Toxicity/Mobility/Persistence/Bioaccumulation	(a)	
14. Hazardous Waste Quantity	(a)	
15. Waste Characteristics	1,000	
Targets:		
16. Food Chain Individual	50	
17. Population:		
17a. Level I Concentrations	(b)	
17b. Level II Concentrations	(b)	
17c. Potential Human Food Chain Contamination	(b)	
17d. Population (lines 17a + 17b + 17c)	(b)	
18. Targets (Lines 16 + 17d)	(b)	
Human Food Chain Threat Score:		
19. Human Food Chain Threat Score ([lines 12 × 15 × 18]/82,500, subject to a maximum of 100)	100	
Environmental Threat		
Likelihood of Release:		
20. Likelihood of Release (same value as line 3)	550	
Waste Characteristics:		
21. Ecosystem Toxicity/Mobility/Persistence/Bioaccumulation	(a)	

TABLE 4–25—GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET—Continued

Factor categories and factors	Maximum value	Value assigned
22. Hazardous Waste Quantity	(a)	_____
23. Waste Characteristics	1,000	_____
Targets:		
24. Sensitive Environments:		
24a. Level I Concentrations	(b)	_____
24b. Level II Concentrations	(b)	_____
24c. Potential Contamination	(b)	_____
24d. Sensitive Environments (lines 24a + 24b + 24c)	(b)	_____
25. Targets (value from line 24d)	(b)	_____
Environmental Threat Score:		
26. Environmental Threat Score ([lines 20 × 23 × 25]/82,500, subject to a maximum of 60)	60	_____
Ground Water to Surface Water Migration Component Score for a Watershed		
27. Watershed Score[c] (lines 11 + 19 + 26, subject to a maximum of 100)	100	_____
28. Component Score (S_{gs})[c] (highest score from Line 27 for all watersheds evaluated, subject to a maximum of 100)	100	_____

[a] Maximum value applies to waste characteristics category.

[b] Maximum value not applicable.

[c] Do not round to nearest integer.

4.2.2 *Drinking water threat*. Evaluate the drinking water threat for each watershed based on three factor categories: likelihood of release, waste characteristics, and targets.

4.2.2.1 *Drinking water threat-likelihood of release*. Evaluate the likelihood of release factor category for each watershed in terms of an observed release factor or a potential to release factor.

4.2.2.1.1 *Observed release*. Establish an observed release to the uppermost aquifer as specified in section 3.1.1. If an observed release can be established for the uppermost aquifer, assign an observed release factor value of 550 to that watershed, enter this value in table 4–25, and proceed to section 4.2.2.1.3. If no observed release can be established, assign an observed release factor value of 0, enter this value in table 4–25, and proceed to section 4.2.2.1.2.

4.2.2.1.2 *Potential to release*. Evaluate potential to release only if an observed release cannot be established for the uppermost aquifer. Calculate a potential to release value for the uppermost aquifer as specified in section 3.1.2 and sections 3.1.2.1 through 3.1.2.5. Assign the potential to release value for the uppermost aquifer as the potential to release factor value for the watershed. Enter this value in table 4–25.

4.2.2.1.3 *Calculation of drinking water threat-likelihood of release factor category value*. If an observed release is established for the uppermost aquifer, assign the observed release factor value of 550 as the likelihood of release factor category value for the watershed. Otherwise, assign the potential to release factor value as the likelihood of release factor category value for the watershed. Enter the value assigned in table 4–25.

4.2.2.2 *Drinking water threat-waste characteristics*. Evaluate the waste characteristics factor category for each watershed based on two factors: toxicity/mobility/persistence and hazardous waste quantity. Evaluate only those hazardous substances available to migrate from the sources at the site to the uppermost aquifer (see section 3.2). Such hazardous substances include:

- Hazardous substances that meet the criteria for an observed release to ground water.
- All hazardous substances associated with a source that has a ground water containment factor value greater than 0 (see sections 2.2.2, 2.2.3, and 3.1.2.1).

4.2.2.2.1 *Toxicity/mobility/persistence*. For each hazardous substance, assign a toxicity factor value, a mobility factor value, a persistence factor value, and a combined toxicity/mobility/persistence factor value as specified in sections 4.2.2.2.1.1 through 4.2.2.2.1.4.

4.2.2.2.1.1 *Toxicity*. Assign a toxicity factor value to each hazardous substance as specified in section 2.4.1.1.

4.2.2.2.1.2 *Mobility*. Assign a ground water mobility factor value to each hazardous substance as specified in section 3.2.1.2.

4.2.2.2.1.3 *Persistence*. Assign a surface water persistence factor value to each hazardous substance as specified in section 4.1.2.2.1.2.

4.2.2.2.1.4 *Calculation of toxicity/mobility/persistence factor value*. First, assign each hazardous substance a toxicity/mobility factor value from table 3–9 (section 3.2.1.3), based on the values assigned to the hazardous substance for the toxicity and mobility factors. Then assign each hazardous substance a toxicity/mobility/persistence factor value from table 4–26, based on the values assigned for the toxicity/mobility and persistence factors. Use the substance with the highest toxicity/mobility/ persistence factor value for the watershed to assign the value to this factor. Enter this value in table 4–25.

4.2.2.2.2 *Hazardous waste quantity.* Assign the same factor value for hazardous waste quantity for the watershed as would be assigned for the uppermost aquifer in section 3.2.2. Enter this value in table 4–25.

4.2.2.2.3 *Calculation of drinking water threat-waste characteristics factor category value.* Multiply the toxicity/mobility/persistence and hazardous waste quantity factor values for the watershed, subject to a maximum product of 1 × 10^8. Based on this product, assign a value from table 2–7 (section 2.4.3.1) to the drinking water threat-waste characteristics factor category for the watershed. Enter this value in table 4–25.

4.2.2.3 *Drinking water threat-targets.* Evaluate the targets factor category for each watershed based on three factors: nearest intake, population, and resources.

TABLE 4–26—TOXICITY/MOBILITY/PERSISTENCE FACTOR VALUES [a]

Toxicity/mobility factor value	Persistence factor value			
	1.0	0.4	0.07	0.0007
10,000	10,000	4,000	700	7
2,000	2,000	800	140	1.4
1,000	1,000	400	70	0.7
200	200	80	14	0.14
100	100	40	7	0.07
20	20	8	1.4	0.014
10	10	4	0.7	0.007
2	2	0.8	0.14	0.0014
1	1	0.4	0.07	7×10^{-4}
0.2	0.2	0.08	0.014	1.4×10^{-4}
0.1	0.1	0.04	0.007	7×10^{-5}
0.02	0.02	0.008	0.0014	1.4×10^{-5}
0.01	0.01	0.004	7×10^{-4}	7×10^{-6}
0.002	0.002	8×10^{-4}	1.4×10^{-4}	1.4×10^{-6}
0.001	0.001	4×10^{-4}	7×10^{-5}	7×10^{-7}
2×10^{-4}	2×10^{-4}	8×10^{-5}	1.4×10^{-5}	1.4×10^{-7}
1×10^{-4}	1×10^{-4}	4×10^{-5}	7×10^{-6}	7×10^{-8}
2×10^{-5}	2×10^{-5}	8×10^{-6}	1.4×10^{-6}	1.4×10^{-8}
2×10^{-6}	2×10^{-6}	8×10^{-7}	1.4×10^{-7}	1.4×10^{-9}
2×10^{-7}	2×10^{-7}	8×10^{-8}	1.4×10^{-8}	1.4×10^{-10}
2×10^{-8}	2×10^{-8}	8×10^{-9}	1.4×10^{-9}	1.4×10^{-11}
2×10^{-9}	2×10^{-9}	8×10^{-10}	1.4×10^{-10}	1.4×10^{-12}
0	0	0	0	0

[a] Do not round to nearest integer.

For the nearest intake and population factors, determine whether the target surface water intakes are subject to actual or potential contamination as specified in section 4.1.1.2, subject to the restrictions specified in sections 4.2.1.3 and 4.2.1.4.

When the intake is subject to actual contamination, evaluate it using Level I concentrations or Level II concentrations. Determine which level applies for the intake by comparing the exposure concentrations from a sample (or comparable samples) to health-based benchmarks as specified in section 4.1.2.3, except use only those samples from the surface water in-water segment and only those hazardous substances in such samples that meet the conditions in sections 4.2.1.3 and 4.2.1.4.

4.2.2.3.1 *Nearest intake.* Assign a value to the nearest intake factor as specified in section 4.1.2.3.1 with the following modification. For the intake being evaluated, multiply its dilution weight from table 4–13 (section 4.1.2.3.1) by a value selected from table 4–27. Use the resulting product, not the value from table 4–13, as the dilution weight for the intake for the ground water to surface water component. Do not round this product to the nearest integer.

Select the value from table 4–27 based on the angle Θ, the angle defined by the sources at the site and either the two points at the intersection of the surface water body and the 1-mile distance ring of any two other points of the surface water body within the 1-mile distance ring, whichever results in the largest angle. (See Figure 4–3 for an example of how to determine Θ.) If the surface water body does not extend to the 1-mile ring at one or both ends, define Θ using the surface water endpoint(s) within the 1-mile ring or any two other points of the surface water body within the 1-mile distance ring, whichever results in the largest angle.

TABLE 4–27—DILUTION WEIGHT ADJUSTMENTS

Angle Θ (degrees)	Assigned value[a]
0	0
Greater than 0 to 18	0.05
Greater than 18 to 54	0.1
Greater than 54 to 90	0.2
Greater than 90 to 126	0.3
Greater than 126 to 162	0.4
Greater than 162 to 198	0.5
Greater than 198 to 234	0.6
Greater than 234 to 270	0.7
Greater than 270 to 306	0.8
Greater than 306 to 342	0.9
Greater than 342 to 360	1.0

[a] Do not round to nearest integer.

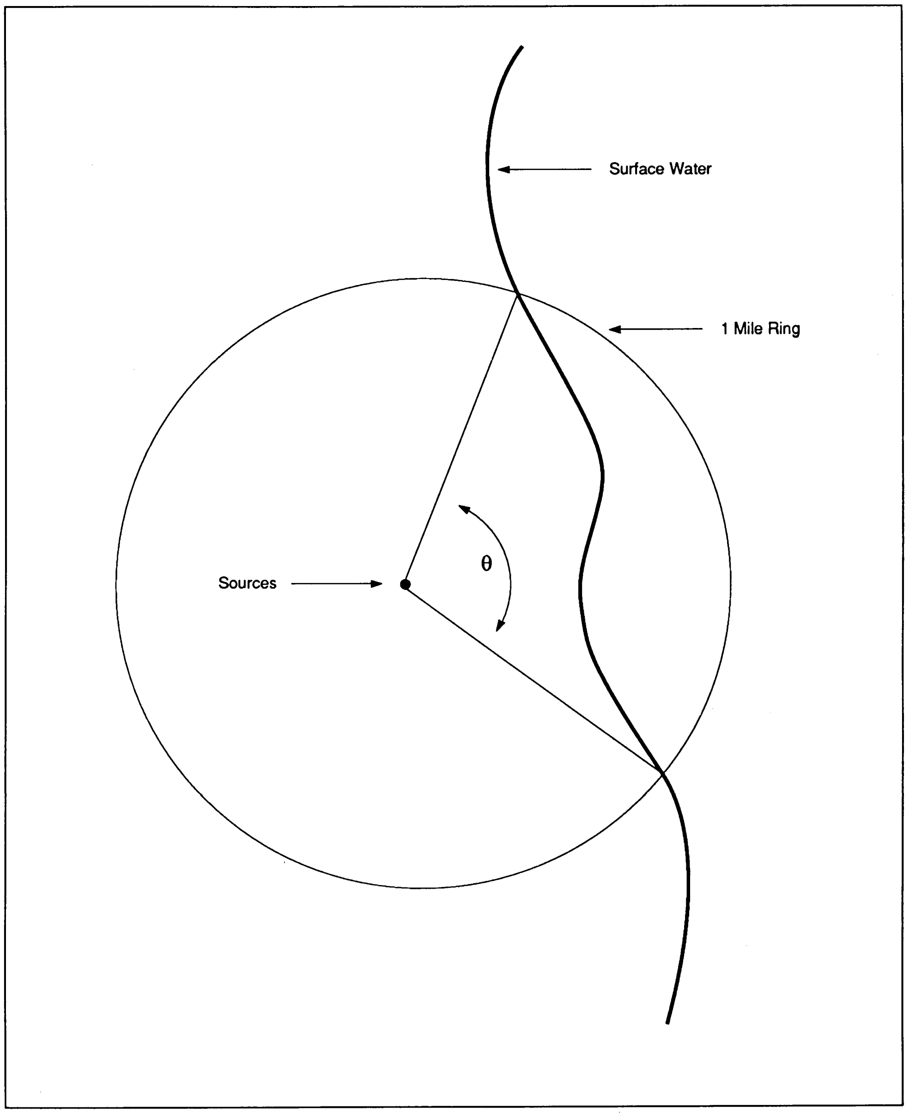


FIGURE 4-3
SAMPLE DETERMINATION OF GROUND WATER
TO SURFACE WATER ANGLE

TABLE 4–28—TOXICITY/MOBILITY/PERSISTENCE/BIOACCUMULATION FACTOR VALUES[a]

Toxicity/mobility/persistence factor value	Bioaccumlation potential factor value					
	50,000	5,000	500	50	5	0.5
10,000	5×10^8	5×10^7	5×10^6	5×10^5	5×10^4	5,000
4,000	2×10^8	2×10^7	2×10^6	2×10^5	2×10^4	2,000
2,000	1×10^8	1×10^7	1×10^6	1×10^5	1×10^4	1,000

TABLE 4–28—TOXICITY/MOBILITY/PERSISTENCE/BIOACCUMULATION FACTOR VALUES [a]—Continued

Toxicity/mobility/persistence factor value	Bioaccumlation potential factor value					
	50,000	5,000	500	50	5	0.5
1,000	5×10^{7}	5×10^{6}	5×10^{5}	5×10^{4}	5,000	500
800	4×10^{7}	4×10^{6}	4×10^{5}	4×10^{4}	4,000	400
700	3.5×10^{7}	3.5×10^{6}	3.5×10^{5}	3.5×10^{4}	3,500	350
400	2×10^{7}	2×10^{6}	2×10^{5}	2×10^{4}	2,000	200
200	1×10^{7}	1×10^{6}	1×10^{5}	1×10^{4}	1,000	100
140	7×10^{6}	7×10^{5}	7×10^{4}	7,000	700	70
100	5×10^{6}	5×10^{5}	5×10^{4}	5,000	500	50
80	4×10^{6}	4×10^{5}	4×10^{4}	4,000	400	40
70	3.5×10^{6}	3.5×10^{5}	3.5×10^{4}	3,500	350	35
40	2×10^{6}	2×10^{5}	2×10^{4}	2,000	200	20
20	1×10^{6}	1×10^{5}	1×10^{4}	1,000	100	10
14	7×10^{5}	7×10^{4}	7,000	700	70	7
10	5×10^{5}	5×10^{4}	5,000	500	50	5
8	4×10^{5}	4×10^{4}	4,000	400	40	4
7	3.5×10^{5}	3.5×10^{4}	3,500	350	35	3.5
4	2×10^{5}	2×10^{4}	2,000	200	20	2
2	1×10^{5}	1×10^{4}	1,000	100	10	1
1.4	7×10^{4}	7,000	700	70	7	0.7
1.0	5×10^{4}	5,000	500	50	5	0.5
0.8	4×10^{4}	4,000	400	40	4	0.4
0.7	3.5×10^{4}	3,500	350	35	3.5	0.35
0.4	2×10^{4}	2,000	200	20	2	0.2
0.2	1×10^{4}	1,000	100	10	1	0.1
0.14	7,000	700	70	7	0.7	0.07
0.1	5,000	500	50	5	0.5	0.05
0.08	4,000	400	40	4	0.4	0.04
0.07	3,500	350	35	3.5	0.35	0.035
0.04	2,000	200	20	2	0.2	0.02
0.02	1,000	100	10	1	0.1	0.01
0.014	700	70	7	0.7	0.07	0.007
0.01	500	50	5	0.5	0.05	0.005
0.008	400	40	4	0.4	0.04	0.004
0.007	350	35	3.5	0.35	0.035	0.0035
0.004	200	20	2	0.2	0.02	0.002
0.002	100	10	1	0.1	0.01	0.001
0.0014	70	7	0.7	0.07	0.007	7×10^{-4}
0.001	50	5	0.5	0.05	0.005	5×10^{-4}
8×10^{-4}	40	4	0.4	0.04	0.004	4×10^{-4}
7×10^{-4}	35	3.5	0.035	0.035	0.0035	3.5×10^{-4}
4×10^{-4}	20	2	0.2	0.02	0.002	2×10^{-4}
2×10^{-4}	10	1	0.1	0.01	0.001	1×10^{-4}
1.4×10^{-4}	7	0.7	0.07	0.007	7×10^{-4}	7×10^{-5}
1×10^{-4}	5	0.5	0.05	0.005	5×10^{-4}	5×10^{-5}
8×10^{-5}	4	0.4	0.04	0.004	4×10^{-4}	4×10^{-5}
7×10^{-5}	3.5	0.35	0.035	0.0035	3.5×10^{-4}	3.5×10^{-5}
4×10^{-5}	2	0.2	0.02	0.002	2×10^{-4}	2×10^{-5}
2×10^{-5}	1	0.1	0.01	0.001	1×10^{-4}	1×10^{-5}
1.4×10^{-5}	0.7	0.07	0.007	7×10^{-4}	7×10^{-5}	7×10^{-6}
8×10^{-6}	0.4	0.04	0.004	4×10^{-4}	4×10^{-5}	4×10^{-6}
7×10^{-6}	0.35	0.035	0.0035	3.5×10^{-4}	3.5×10^{-5}	3.5×10^{-6}
2×10^{-6}	0.1	0.01	0.001	1×10^{-4}	1×10^{-5}	1×10^{-6}
1.4×10^{-6}	0.07	0.007	7×10^{-4}	7×10^{-5}	7×10^{-6}	7×10^{-7}
8×10^{-7}	0.04	0.004	4×10^{-4}	4×10^{-5}	4×10^{-6}	4×10^{-7}
7×10^{-7}	0.035	0.0035	3.5×10^{-4}	3.5×10^{-5}	3.5×10^{-6}	3.5×10^{-7}
2×10^{-7}	0.01	0.001	1×10^{-4}	1×10^{-5}	1×10^{-6}	1×10^{-7}
1.4×10^{-7}	0.007	7×10^{-4}	7×10^{-5}	7×10^{-6}	7×10^{-7}	7×10^{-8}
8×10^{-8}	0.004	4×10^{-4}	4×10^{-5}	4×10^{-6}	4×10^{-7}	4×10^{-8}
7×10^{-8}	0.0035	3.5×10^{-4}	3.5×10^{-5}	3.5×10^{-6}	3.5×10^{-7}	3.5×10^{-8}
2×10^{-8}	0.001	1×10^{-4}	1×10^{-5}	1×10^{-6}	1×10^{-7}	1×10^{-8}
1.4×10^{-8}	7×10^{-4}	7×10^{-5}	7×10^{-6}	7×10^{-7}	7×10^{-8}	7×10^{-9}
8×10^{-9}	4×10^{-4}	4×10^{-5}	4×10^{-6}	4×10^{-7}	4×10^{-8}	4×10^{-9}
2×10^{-9}	1×10^{-4}	1×10^{-5}	1×10^{-6}	1×10^{-7}	1×10^{-8}	1×10^{-9}
1.4×10^{-9}	7×10^{-5}	7×10^{-6}	7×10^{-7}	7×10^{-8}	7×10^{-9}	7×10^{-10}
8×10^{-10}	4×10^{-5}	4×10^{-6}	4×10^{-7}	4×10^{-8}	4×10^{-9}	4×10^{-10}
1.4×10^{-10}	7×10^{-6}	7×10^{-7}	7×10^{-8}	7×10^{-9}	7×10^{-10}	4×10^{-11}

TABLE 4–28—TOXICITY/MOBILITY/PERSISTENCE/BIOACCUMULATION FACTOR VALUES [a]—Continued

Toxicity/mobility/persistence factor value	Bioaccumlation potential factor value					
	50,000	5,000	500	50	5	0.5
1.4×10^{-11}	7×10^{-7}	7×10^{-8}	7×10^{-9}	7×10^{-10}	7×10^{-11}	7×10^{-12}
1.4×10^{-12}	7×10^{-8}	7×10^{-9}	7×10^{-10}	7×10^{-11}	7×10^{-12}	7×10^{-13}
0	0	0	0	0	0	0

[a] Do not round to nearest integer.

4.2.2.3.2 *Population.* Evaluate the population factor for the watershed based on three factors: Level I concentrations, Level II concentrations, and potential contamination. Determine which factor applies to an intake as specified in section 4.2.2.3. Determine the population to be counted for that intake as specified in section 4.1.2.3.2, using the target distance limits in section 4.2.1.4 and the hazardous substance migration path in section 4.2.1.2.

4.2.2.3.2.1 *Level I concentrations.* Assign a value to this factor as specified in section 4.1.2.3.2.2.

4.2.2.3.2.2 *Level II concentrations.* Assign a value to this factor as specified in section 4.1.2.3.2.3.

4.2.2.3.2.3 *Potential contamination.* For each applicable type of surface water body in table 4–14, determine the dilution-weighted population value as specified in section 4.1.2.3.2.4. Select the appropriate dilution weight adjustment value from table 4–27 as specified in section 4.2.2.3.1.

Calculate the value for the potential contamination factor (PC) for the watershed as follows:

$$PC = \frac{A}{10} \sum_{i=1}^{n} W_i$$

where:

A = Dilution weight adjustment value from table 4–27.

W_i = Dilution-weighted population from table 4–14 for surface water body type i.

n = Number of different surface water body types in the watershed.

If PC is less than 1, do not round it to the nearest integer; if PC is 1 or more, round to the nearest integer. Enter the value in table 4–25.

4.2.2.3.2.4 *Calculation of population factor value.* Sum the factor values for Level I concentrations, Level II concentrations, and potential contamination. Do not round this sum to the nearest integer. Assign this sum as the population factor value for the watershed. Enter this value in table 4–25.

4.2.2.3.3 *Resources.* Assign a value to the resources factor as specified in section 4.1.2.3.3.

4.2.2.3.4 *Calculation of drinking water threat-targets factor category value.* Sum the nearest intake, population, and resources factor values for the watershed. Do not round this sum to the nearest integer. Assign this sum as the drinking water threat-targets factor category value for the watershed. Enter this value in table 4–25.

4.2.2.4 *Calculation of drinking water threat score for a watershed.* Multiply the drinking water threat factor category values for likelihood of release, waste characteristics, and targets for the watershed, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum of 100, as the drinking water threat score for the watershed. Enter this score in table 4–25.

4.2.3 *Human food chain threat.* Evaluate the human food chain threat for a watershed based on three factor categories: likelihood of release, waste characteristics, and targets.

4.2.3.1 *Human food chain threat-likelihood of release.* Assign the same likelihood of release factor category value for the human food chain threat for the watershed as would be assigned in section 4.2.2.1.3 for the drinking water threat. Enter this value in table 4–25.

4.2.3.2 *Human food chain threat-waste characteristics.* Evaluate the waste characteristics factor category for each watershed based on two factors: toxicity/mobility/persistence/bioaccumulation and hazardous waste quantity.

4.2.3.2.1 *Toxicity/mobility/persistence/bioaccumulation.* Evaluate all those hazardous substances eligible to be evaluated for toxicity/mobility/persistence in the drinking water threat for the watershed (see section 4.2.2.2.1).

4.2.3.2.1.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in section 2.4.1.1.

4.2.3.2.1.2 *Mobility.* Assign a ground water mobility factor value to each hazardous substance as specified for the drinking water threat (see section 4.2.2.2.1.2).

4.2.3.2.1.3 *Persistence.* Assign a surface water persistence factor value to each hazardous substance as specified for the drinking water threat (see section 4.2.2.2.1.3), except: use the predominant water category (that is, lakes; or rivers, oceans, coastal tidal waters, or Great Lakes) between the probable point of entry and the nearest fishery (not the nearest drinking water or resources intake) along the hazardous substance migration path for the watershed to determine which portion of table 4–10 to use. Determine the predominant water category based on distance as specified in section 4.1.2.2.1.2.

4.2.3.2.1.4 *Bioaccumulation potential.* Assign a bioaccumulation potential factor value to each hazardous substance as specified in section 4.1.3.2.1.3.

4.2.3.2.1.5 *Calculation of toxicity/mobility/ persistence/ bioaccumulation factor value.* Assign each hazardous substance a toxicity/mobility factor value from table 3–9 (section 3.2.1.3), based on the values assigned to the hazardous substance for the toxicity and mobility factors. Then assign each hazardous substance a toxicity/mobility/persistence factor value from table 4–26, based on the values assigned for the toxicity/mobility and persistence factors. Then assign each hazardous substance a toxicity/mobility/persistence/bioaccumulation factor value from table 4–28. Use the substance with the highest toxicity/mobility/persistence/bioaccumulation factor value for the watershed to assign the value to this factor for the watershed. Enter this value in table 4–25.

4.2.3.2.2 *Hazardous waste quantity.* Assign the same factor value for hazardous waste quantity for the watershed as would be assigned in section 4.2.2.2.2 for the drinking water threat. Enter this value in table 4–25.

4.2.3.2.3 *Calculation of human food chain threat-waste characteristics factor category value.* For the hazardous substance selected for the watershed in section 4.2.3.2.1.5, use its toxicity/mobility/ persistence factor value and bioaccumulation potential factor value as follows to assign a value to the waste characteristics factor category. First, multiply the toxicity/mobility/persistence factor value and the hazardous waste quantity factor value for the watershed, subject to a maximum product of 1×10^8. Then multiply this product by the bioaccumulation potential factor value for this hazardous substance, subject to a maximum product of 1×10^{12}. Based on this second product, assign a value from table 2–7 (section 2.4.3.1) to the human food chain threat-waste characteristics factor category for the watershed. Enter this value in table 4–25.

4.2.3.3 *Human food chain threat-targets.* Evaluate two target factors for the watershed: food chain individual and population.

For both factors, determine whether the target fisheries are subject to Level I concentrations, Level II concentrations, or potential human food chain contamination. Determine which applies to each fishery (or portion of a fishery) as specified in section 4.1.3.3, subject to the restrictions specified in sections 4.2.1.3 and 4.2.1.4.

4.2.3.3.1 *Food chain individual.* Assign a value to the food chain individual factor as specified in section 4.1.3.3.1 with the following modification. When a dilution weight is used, multiply the appropriate dilution weight from table 4–13 by the adjustment value selected from table 4–27, as specified in section 4.2.2.3.1. Use the resulting product, not the value from table 4–13, as the dilution weight in assigning the factor value. Do not round this product to the nearest integer. Enter the value assigned in table 4–25.

4.2.3.3.2 *Population.* Evaluate the population factor for the watershed based on three factors: Level I concentrations, Level II concentrations, and potential human food chain contamination. Determine which of these factors is to be applied to each fishery as specified in section 4.2.3.3.

4.2.3.3.2.1 *Level I concentrations.* Assign a value to this factor as specified in section 4.1.3.3.2.1. Enter this value in table 4–25.

4.2.3.3.2.2 *Level II concentrations.* Assign a value to this factor as specified in section 4.1.3.3.2.2. Enter this value in table 4–25.

4.2.3.3.2.3 *Potential human food chain contamination.* Assign a value to this factor as specified in section 4.1.3.3.2.3 with the following modification. For each fishery being evaluated, multiply the appropriate dilution weight for that fishery from table 4–13 by the adjustment value selected from table 4–27, as specified in section 4.2.2.3.1. Use the resulting product, not the value from table 4–13, as the dilution weight for the fishery. Do not round this product to the nearest integer. Enter the value assigned in table 4–25.

4.2.3.3.2.4 *Calculation of population factor value.* Sum the factor values for Level I concentrations, Level II concentrations, and potential human food chain contamination for the watershed. Do not round this sum to the nearest integer. Assign this sum as the population factor value for the watershed. Enter this value in table 4–25.

4.2.3.3.3 *Calculation of human food chain threat-targets factor category value.* Sum the food chain individual and population factor values for the watershed. Do not round this sum to the nearest integer. Assign this sum as the human food chain threat-targets factor category value for the watershed. Enter this value in table 4–25.

4.2.3.4 *Calculation of human food chain threat score for a watershed.* Multiply the human food chain threat factor category values for likelihood of release, waste characteristics, and targets for the watershed, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum of 100, as the human food chain threat score for the watershed. Enter this score in table 4–25.

4.2.4 *Environmental threat.* Evaluate the environmental threat for the watershed based on three factor categories: likelihood of release, waste characteristics, and targets.

4.2.4.1 *Environmental threat-likelihood of release*. Assign the same likelihood of release factor category value for the environmental threat for the watershed as would be assigned in section 4.2.2.1.3 for the drinking water threat. Enter this value in table 4–25.

4.2.4.2 *Environmental threat-waste characteristics*. Evaluate the waste characteristics factor category for each watershed based on two factors: ecosystem toxicity/mobility/persistence/bioaccumulation and hazardous waste quantity.

4.2.4.2.1 *Ecosystem toxicity/mobility/persistence/bioaccumulation*. Evaluate all those hazardous substances eligible to be evaluated for toxicity/mobility/persistence in the drinking water threat for the watershed (see section 4.2.2.2.1).

4.2.4.2.1.1 *Ecosystem toxicity*. Assign an ecosystem toxicity factor value to each hazardous substance as specified in section 4.1.4.2.1.1.

4.2.4.2.1.2 *Mobility*. Assign a ground water mobility factor value to each hazardous substance as specified in section 4.2.2.2.1.2 for the drinking water threat.

4.2.4.2.1.3 *Persistence*. Assign a surface water persistence factor value to each hazardous substance as specified in section 4.2.2.2.1.3 for the drinking water threat, except: use the predominant water category (that is, lakes; or rivers, oceans, coastal tidal waters, or Great Lakes) between the probable point of entry and the nearest sensitive environment (not the nearest drinking water or resources intake) along the hazardous substance migration path for the watershed to determine which portion of table 4–10 to use. Determine the predominant water category based on distance as specified in section 4.1.2.2.1.2.

4.2.4.2.1.4 *Ecosystem bioaccumulation potential*. Assign an ecosystem bioaccumulation potential factor value to each hazardous substance as specified in section 4.1.4.2.1.3.

4.2.4.2.1.5 *Calculation of ecosystem toxicity/mobility/persistence/ bioaccumulation factor value*. Assign each hazardous substance an ecosystem toxicity/mobility factor value from table 3–9 (section 3.2.1.3), based on the values assigned to the hazardous substance for the ecosystem toxicity and mobility factors. Then assign each hazardous substance an ecosystem toxicity/mobility/persistence factor value from table 4–29, based on the values assigned for the ecosystem toxicity/mobility and persistence factors. Then assign each hazardous substance an ecosystem toxicity/mobility/persistence/bioaccumulation factor value from table 4–30, based on the values assigned for the ecosystem toxicity/mobility/persistence and ecosystem bioaccumulation potential factors. Select the substance with the highest ecosystem toxicity/mobility/persistence/bioaccumulation factor value for the watershed and use it to assign the value to this factor for the watershed. Enter this value in table 4–25.

TABLE 4–29—ECOSYSTEM TOXICITY/MOBILITY/PERSISTENCE FACTOR VALUES [a]

Ecosystem toxicity/mobility factor value	Persistence factor value			
	1.0	0.4	0.07	0.0007
10,000	10,000	4,000	700	7
2,000	2,000	800	140	1.41,000
1,000	1,000	400	70	0.7
200	200	80	14	0.14
100	100	40	7	0.07
20	20	8	1.4	0.014
10	10	4	0.7	0.007
2	2	0.8	0.14	0.0014
1	1	0.4	0.07	7×10^{-4}
0.2	0.2	0.08	0.014	1.4×10^{-4}
0.1	0.1	0.04	0.007	7×10^{-5}
0.2	0.2	0.008	0.0014	1.4×10^{-5}
0.01	0.01	0.004	7×10^{-4}	7×10^{-6}
0.002	0.002	8×10^{-4}	1.4×10^{-4}	1.4×10^{-6}
0.001	0.001	4×10^{-4}	7×10^{-5}	7×10^{-7}
2×10^{-4}	2×10^{-4}	8×10^{-5}	1.4×10^{-5}	1.4×10^{-7}
1×10^{-4}	1×10^{-4}	4×10^{-5}	7×10^{-6}	7×10^{-8}
2×10^{-5}	2×10^{-5}	8×10^{-6}	1.4×10^{-6}	1.4×10^{-8}
2×10^{-6}	2×10^{-6}	8×10^{-7}	1.4×10^{-7}	1.4×10^{-9}
2×10^{-7}	2×10^{-7}	8×10^{-8}	1.4×10^{-8}	1.4×10^{-10}
2×10^{-8}	2×10^{-8}	8×10^{-9}	1.4×10^{-9}	1.4×10^{-11}
2×10^{-9}	2×10^{-9}	8×10^{-10}	1.4×10^{-10}	1.4×10^{-12}
0	0	0	0	0

[a] Do not round to nearest integer.

TABLE 4–30—ECOSYSTEM TOXICITY/MOBILITY/PERSISTENCE/BIOACCUMULATION FACTOR VALUES [a]

Ecosystem toxicity/mobility/persistence factor value	Ecosystem bioaccumulation potential factor value					
	50,000	5,000	500	50	5	0.5
10,000	5×10^8	5×10^7	5×10^6	5×10^5	5×10^4	5,000
4,000	2×10^8	2×10^7	2×10^6	2×10^5	2×10^4	2,000
2,000	$1, \times 10^8$	1×10^7	1×10^6	1×10^5	1×10^4	1,000
1,000	5×10^7	5×10^6	5×10^5	5×10^4	5,000	500
800	4×10^7	4×10^6	4×10^5	4×10^4	4,000	400
700	3.5×10^7	3.5×10^6	3.5×10^5	3.5×10^4	3,500	350
400	2×10^7	2×10^6	2×10^5	2×10^4	2,000	200
200	1×10^7	1×10^6	1×10^5	1×10^4	1,000	100
140	7×10^6	7×10^5	7×10^4	7,000	700	70
100	5×10^6	5×10^5	5×10^4	5,000	500	50
80	4×10^6	4×10^5	4×10^4	4,000	400	40
70	3.5×10^6	3.5×10^5	3.5×10^4	3,500	350	35
40	2×10^6	2×10^5	2×10^4	2,000	200	20
20	1×10^6	1×10^5	1×10^4	1,000	100	10
14	7×10^5	7×10^4	7,000	700	70	7
10	5×10^5	5×10^4	5,000	500	50	5
8	4×10^5	4×10^4	4,000	400	40	4
7	3.5×10^5	3.5×10^4	3,500	350	35	3.5
4	2×10^5	2×10^4	2,000	200	20	2
2	1×10^5	1×10^4	1,000	100	10	1
1.4	7×10^4	7,000	700	70	7	0.7
1.0	5×10^4	5,000	500	50	5	0.5
0.8	4×10^4	4,000	400	40	4	0.4
0.7	3.5×10^4	3,500	350	35	3.5	0.35
0.4	2×10^4	2,000	200	20	2	0.2
0.2	1×10^4	1,000	100	10	1	0.1
0.14	7,000	700	70	7	0.7	0.07
0.1	5,000	500	50	5	0.5	0.05
0.08	4,000	400	40	4	0.4	0.04
0.07	3,500	350	35	3.5	0.35	0.035
0.04	2,000	200	20	2	0.2	0.02
0.02	1,000	100	10	1	0.1	0.01
0.014	700	70	7	0.7	0.07	0.007
0.01	500	50	5	0.5	0.05	0.005
0.008	400	40	4	0.4	0.04	0.004
0.007	350	35	3.5	0.35	0.035	0.0035
0.004	200	20	2	0.2	0.02	0.002
0.002	100	10	1	0.1	0.01	0.001
0.0014	70	7	0.7	0.07	0.007	7×10^{-4}
0.001	50	5	0.5	0.05	0.005	5×10^{-4}
8×10^{-4}	40	4	0.4	0.04	0.004	4×10^{-4}
7×10^{-4}	35	3.5	0.35	0.035	0.0035	3.5×10^{-4}
4×10^{-4}	20	2	0.2	0.02	0.002	2×10^{-4}
2×10^{-4}	10	1	0.1	0.01	0.001	1×10^{-4}
1.4×10^{-4}	7	0.7	0.07	0.007	7×10^{-4}	7×10^{-5}
1×10^{-4}	5	0.5	0.05	0.005	5×10^{-4}	5×10^{-5}
8×10^{-5}	4	0.4	0.04	0.004	4×10^{-4}	4×10^{-5}
7×10^{-5}	3.5	0.35	0.035	0.0035	3.5×10^{-4}	3.5×10^{-5}
4×10^{-5}	2	0.2	0.02	0.002	2×10^{-4}	2×10^{-5}
2×10^{-5}	1	0.1	0.01	0.001	1×10^{-4}	1×10^{-5}
1.4×10^{-5}	0.7	0.07	0.007	7×10^{-4}	7×10^{-5}	7×10^{-6}
8×10^{-6}	0.4	0.04	0.004	4×10^{-4}	4×10^{-5}	4×10^{-6}
7×10^{-6}	0.35	0.035	0.0035	3.5×10^{-4}	3.5×10^{-5}	3.5×10^{-6}
2×10^{-6}	0.1	0.01	0.001	1×10^{-4}	1×10^{-5}	1×10^{-6}
1.4×10^{-6}	0.07	0.007	7×10^{-4}	7×10^{-5}	7×10^{-6}	7×10^{-7}
8×10^{-7}	0.04	0.004	4×10^{-4}	4×10^{-5}	4×10^{-6}	4×10^{-7}
7×10^{-7}	0.035	0.0035	3.5×10^{-4}	3.5×10^{-5}	3.5×10^{-6}	3.5×10^{-7}
2×10^{-7}	0.01	0.001	1×10^{-4}	1×10^{-5}	1×10^{-6}	1×10^{-7}
1.4×10^{-7}	0.007	7×10^{-4}	7×10^{-5}	7×10^{-6}	7×10^{-7}	7×10^{-8}
8×10^{-8}	0.004	4×10^{-4}	4×10^{-5}	4×10^{-6}	4×10^{-7}	4×10^{-8}
7×10^{-8}	0.0035	3.5×10^{-4}	3.5×10^{-5}	3.5×10^{-6}	3.5×10^{-7}	3.5×10^{-8}
2×10^{-8}	0.001	1×10^{-4}	1×10^{-5}	1×10^{-6}	1×10^{-7}	1×10^{-8}
1.4×10^{-8}	7×10^{-4}	7×10^{-5}	7×10^{-6}	7×10^{-7}	7×10^{-8}	7×10^{-9}
8×10^{-9}	4×10^{-4}	4×10^{-5}	4×10^{-6}	4×10^{-7}	4×10^{-8}	4×10^{-9}
2×10^{-9}	1×10^{-4}	1×10^{-5}	1×10^{-6}	1×10^{-7}	1×10^{-8}	1×10^{-9}

TABLE 4–30—ECOSYSTEM TOXICITY/MOBILITY/PERSISTENCE/BIOACCUMULATION FACTOR VALUES [a]—Continued

Ecosystem toxicity/mobility/persistence factor value	Ecosystem bioaccumulation potential factor value					
	50,000	5,000	500	50	5	0.5
1.4×10^{-9}	7×10^{-5}	7×10^{-6}	7×10^{-7}	7×10^{-8}	7×10^{-9}	7×10^{-10}
8×10^{-10}	4×10^{-5}	4×10^{-6}	4×10^{-7}	4×10^{-8}	4×10^{-9}	4×10^{-10}
1.4×10^{-10}	7×10^{-6}	7×10^{-7}	7×10^{-8}	7×10^{-9}	7×10^{-10}	7×10^{-11}
1.4×10^{-11}	7×10^{-7}	7×10^{-8}	7×10^{-9}	7×10^{-10}	7×10^{-11}	7×10^{-12}
1.4×10^{-12}	7×10^{-8}	7×10^{-9}	7×10^{-10}	7×10^{-11}	7×10^{-12}	7×10^{-13}
0	0	0	0	0	0	0

[a] Do not round to nearest integer.

4.2.4.2.2 *Hazardous waste quantity*. Assign the same factor value for hazardous waste quantity for the watershed as would be assigned in section 4.2.2.2.2 for the drinking water threat. Enter this value in table 4–25.

4.2.4.2.3 *Calculation of environmental threat-waste characteristics factor category value*. For the hazardous substance selected for the watershed in section 4.2.4.2.1.5, use its ecosystem toxicity/mobility/persistence factor value and ecosystem bioaccumulation potential factor value as follows to assign a value to the waste characteristics factor category. First, multiply the ecosystem toxicity/mobility/persistence factor value and the hazardous waste quantity factor value for the watershed, subject to a maximum product of 1×10^8. Then multiply this product by the ecosystem bioaccumulation potential factor value for this hazardous substance, subject to a maximum product of 1×10^{12}. Based on this product, assign a value from table 2–7 (section 2.4.3.1) to the environmental threat-waste characteristics category for the watershed. Enter the value in table 4–25.

4.2.4.3 *Environmental threat-targets*. Evaluate the environmental threat-targets factor category for a watershed using one factor: sensitive environments.

4.2.4.3.1 *Sensitive environments*. Evaluate sensitive environments for the watershed based on three factors: Level I concentrations, Level II concentrations, and potential contamination. Determine which applies to each sensitive environment as specified in section 4.1.4.3.1, except: use only those samples from the surface water in-water segment and only those hazardous substances in such samples that meet the conditions in sections 4.2.1.3 and 4.2.1.4.

4.2.4.3.1.1 *Level I concentrations*. Assign a value to this factor as specified in section 4.1.4.3.1.1. Enter this value in table 4–25.

4.2.4.3.1.2 *Level II concentrations*. Assign a value to this factor as specified in section 4.1.4.3.1.2. Enter this value in table 4–25.

4.2.4.3.1.3 *Potential contamination*. Assign a value to this factor as specified in section 4.1.4.3.1.3 with the following modification. Multiply the appropriate dilution weight from table 4–13 for the sensitive environments in each type of surface water body by the adjustment value selected from table 4–27, as specified in section 4.2.2.3.1. Use the resulting product, not the value from table 4–13, as the dilution weight for the sensitive environments in that type of surface water body. Do not round this product to the nearest integer. Enter the value assigned in table 4–25.

4.2.4.3.1.4 *Calculation of environmental threat-targets factor category value*. Sum the values for Level I concentrations, Level II concentrations, and potential contamination for the watershed. Do not round this sum to the nearest integer. Assign this sum as the environmental threat targets factor category value for the watershed. Enter this value in table 4–25.

4.2.4.4 *Calculation of environmental threat score for a watershed*. Multiply the environmental threat factor category values for likelihood of release, waste characteristics, and targets for the watershed, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum of 60, as the environmental threat score for the watershed. Enter this score in table 4–25.

4.2.5 *Calculation of ground water to surface water migration component score for a watershed*. Sum the scores for the three threats for the watershed (that is, drinking water, human food chain, and environmental threats). Assign the resulting score, subject to a maximum value of 100, as the ground water to surface water migration component score for the watershed. Enter this score in table 4–25.

4.2.6 *Calculation of ground water to surface water migration component score*. Select the highest ground water to surface water migration component score from the watersheds evaluated. Assign this score as the ground water to surface water migration component score for the site, subject to a maximum score of 100. Enter this score in table 4–25.

4.3 *Calculation of surface water migration pathway score*. Determine the surface water migration pathway score as follows:

- If only one of the two surface water migration components (overland/flood or ground water to surface water) is scored, assign the score of that component as the surface water migration pathway score.
- If both components are scored, select the higher of the two component scores from sections 4.1.6 and 4.2.6. Assign that score as the surface water migration pathway score.

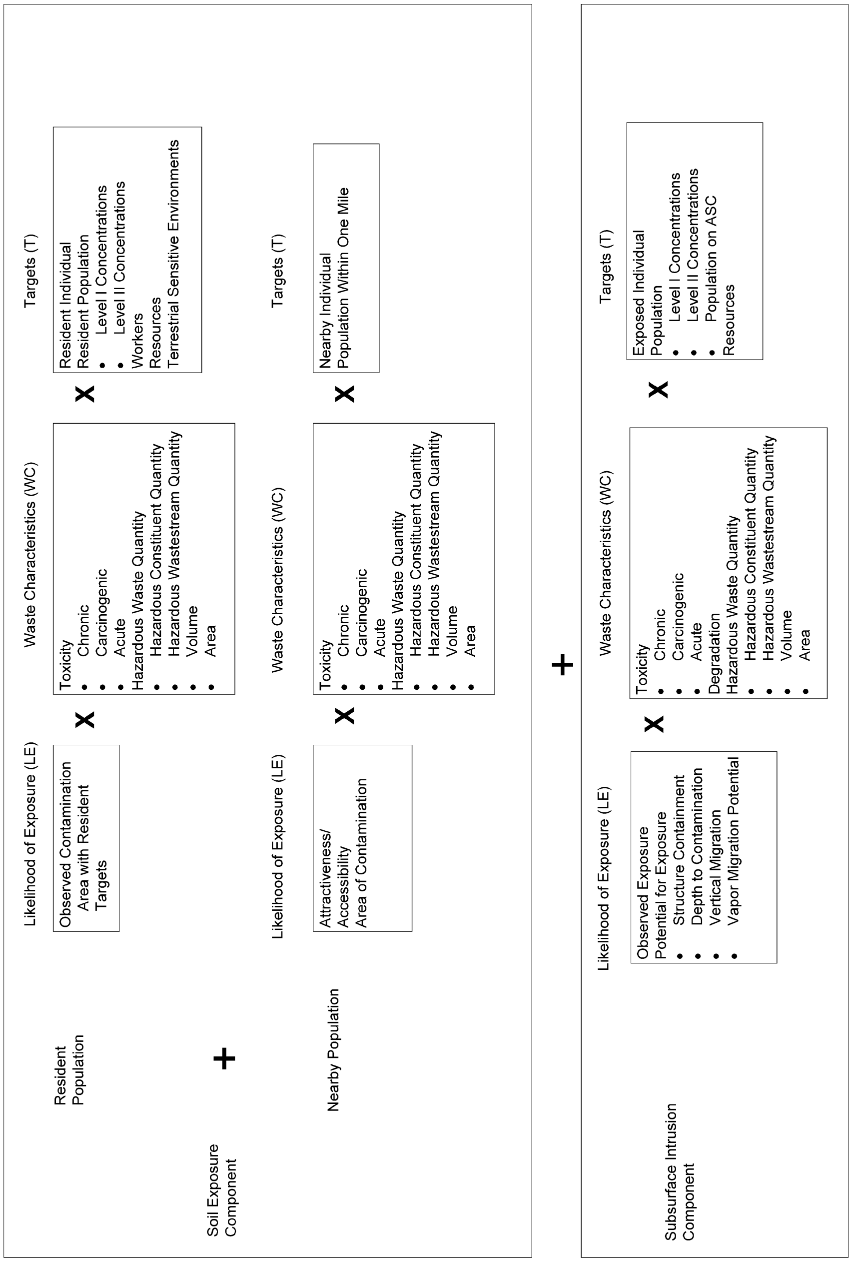
5.0 SOIL EXPOSURE AND SUBSURFACE INTRUSION PATHWAY

5.0.1 *Exposure components.* Evaluate the soil exposure and subsurface intrusion pathway based on two exposure components:

- Soil exposure component (see section 5.1).
- Subsurface intrusion component (see section 5.2).

Score one or both components considering their relative importance. If only one component is scored, assign its score as the soil exposure and subsurface intrusion pathway score. If both components are scored, sum the two scores and assign it as the soil exposure and subsurface intrusion pathway score, subject to a maximum of 100.

Figure 5-1 Overview of the Soil Exposure and Subsurface Intrusion Pathway



5.1 *Soil exposure component*. Evaluate the soil exposure component based on two threats: Resident population threat and nearby population threat. Evaluate both threats based on three factor categories: Likelihood of exposure, waste characteristics, and targets. Figure 5–1 indicates the factors included within each factor category for each type of threat.

Determine the soil exposure component score (S_{se}) in terms of the factor category values as follows:

$$S_{se} = \frac{\sum_{i=1}^{2}(LE_i)(WC_i)(T_i)}{SF}$$

Where:

LE_i = Likelihood of exposure factor category value for threat i (that is, resident population threat or nearby population threat).
WC_i = Waste characteristics factor category value for threat i.
T_i = Targets factor category value for threat i.
SF = Scaling factor.

Table 5–1 outlines the specific calculation procedure.

TABLE 5–1—SOIL EXPOSURE COMPONENT SCORESHEET

Factor categories and factors	Maximum value	Value assigned
Resident Population Threat		
Likelihood of Exposure:		
1. Likelihood of Exposure	550	
Waste Characteristics:		
2. Toxicity	(a)	
3. Hazardous Waste Quantity	(a)	
4. Waste Characteristics	100	
Targets:		
5. Resident Individual	50	
6. Resident Population:.		
6a. Level I Concentrations	(b)	
6b. Level II Concentrations	(b)	
6c. Resident Population (lines 6a + 6b)	(b)	
7. Workers	15	
8. Resources	5	
9. Terrestrial Sensitive Environments	(c)	
10. Targets (lines 5 + 6c + 7 + 8 + 9)	(b)	
Resident Population Threat Score:		
11. Resident Population Threat (lines 1 × 4 × 10)	(b)	
Nearby Population Threat		
Likelihood of Exposure:		
12. Attractiveness/Accessibility	100	
13. Area of Contamination	100	
14. Likelihood of Exposure	500	
Waste Characteristics:		
15. Toxicity	(a)	
16. Hazardous Waste Quantity	(a)	
17. Waste Characteristics	100	
Targets:		
18. Nearby Individual	1	
19. Population Within 1 Mile	(b)	
20. Targets (lines 18 + 19)	(b)	
Nearby Population Threat Score:		
21. Nearby Population Threat (lines 14 × 17 × 20)	(b)	
Soil Exposure Component Score:		
22. Soil Exposure Component Score[d] (S_{se}), (lines [11 + 21]/82,500, subject to a maximum of 100)	100	

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] No specific maximum value applies to factor. However, pathway score based solely on terrestrial sensitive environments is limited to maximum of 60.
[d] Do not round to nearest integer.

5.1.0 *General considerations.* Evaluate the soil exposure component based on areas of observed contamination:

- Consider observed contamination to be present at sampling locations where analytic evidence indicates that:
  - —A hazardous substance attributable to the site is present at a concentration significantly above background levels for the site (see Table 2–3 in section 2.3 for the criteria for determining analytical significance), *and*
  - —This hazardous substance, if not present at the surface, is covered by 2 feet or less of cover material (for example, soil).
- Establish areas of observed contamination based on sampling locations at which there is observed contamination as follows:
  - —For all sources except contaminated soil, if observed contamination from the site is present at any sampling location within the source, consider that entire source to be an area of observed contamination.
  - —For contaminated soil, consider both the sampling location(s) with observed contamination from the site and the area lying between such locations to be an area of observed contamination, unless available information indicates otherwise.
- If an area of observed contamination (or portion of such an area) is covered by a permanent, or otherwise maintained, essentially impenetrable material (for example, asphalt) that is not more than 2 feet thick, exclude that area (or portion of the area) in evaluating the soil exposure component.
- For an area of observed contamination, consider only those hazardous substances that meet the criteria for observed contamination for that area to be associated with that area in evaluating the soil exposure component (see section 2.2.2).

If there is observed contamination, assign scores for the resident population threat and the nearby population threat, as specified in sections 5.1.1 and 5.1.2. If there is no observed contamination, assign the soil exposure component of the soil exposure and subsurface intrusion pathway a score of 0.

5.1.1 *Resident population threat.* Evaluate the resident population threat only if there is an area of observed contamination in one or more of the following locations:

- Within the property boundary of a residence, school, or day care center *and* within 200 feet of the respective residence, school, or day care center, or
- Within a workplace property boundary *and* within 200 feet of a workplace area, or
- Within the boundaries of a resource specified in section 5.1.1.3.4, or
- Within the boundaries of a terrestrial sensitive environment specified in section 5.1.1.3.5.

If not, assign the resident population threat a value of 0, enter this value in Table 5–1, and proceed to the nearby population threat (section 5.1.2).

5.1.1.1 *Likelihood of exposure.* Assign a value of 550 to the likelihood of exposure factor category for the resident population threat if there is an area of observed contamination in one or more locations listed in section 5.1.1. Enter this value in Table 5–1.

5.1.1.2 *Waste characteristics.* Evaluate waste characteristics based on two factors: toxicity and hazardous waste quantity. Evaluate only those hazardous substances that meet the criteria for observed contamination at the site (see section 5.1.0).

5.1.1.2.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in section 2.4.1.1. Use the hazardous substance with the highest toxicity factor value to assign the value to the toxicity factor for the resident population threat. Enter this value in Table 5–1.

5.1.1.2.2 *Hazardous waste quantity.* Assign a hazardous waste quantity factor value as specified in section 2.4.2. In estimating the hazardous waste quantity, use Table 5–2 and:

- Consider only the first 2 feet of depth of an area of observed contamination, except as specified for the volume measure.
- Use the volume measure (see section 2.4.2.1.3) only for those types of areas of observed contamination listed in Tier C of Table 5–2. In evaluating the volume measure for these listed areas of observed contamination, use the full volume, not just the volume within the top 2 feet.
- Use the area measure (see section 2.4.2.1.4), not the volume measure, for all other types of areas of observed contamination, even if their volume is known.

Enter the value assigned in Table 5–1.

TABLE 5–2—HAZARDOUS WASTE QUANTITY EVALUATION EQUATIONS FOR SOIL EXPOSURE COMPONENT

Tier	Measure	Units	Equation for assigning value[a]
A	Hazardous Constituent Quantity (C)	lb	C.
B[b]	Hazardous Wastestream Quantity (W)	lb	W/5,000.
C[b]	Volume (V).		
	Surface Impoundment[c]	yd^3	V/2.5.
	Drums[d]	gallon	V/500.
	Tanks and Containers Other Than Drums	yd^3	V/2.5.

TABLE 5–2—HAZARDOUS WASTE QUANTITY EVALUATION EQUATIONS FOR SOIL EXPOSURE COMPONENT—Continued

Tier	Measure	Units	Equation for assigning value[a]
D[b]	Area (A).		
	Landfill	ft^2	A/34,000.
	Surface Impoundment	ft^2	A/13.
	Surface Impoundment (Buried/backfilled)	ft^2	A/13.
	Land treatment	ft^2	A/270.
	Pile[e]	ft^2	A/34.
	Contaminated Soil	ft^2	A/34,000.

[a] Do not round nearest integer.
[b] Convert volume to mass when necessary: 1 ton = 2,000 pounds = 1 cubic yard = 4 drums = 200 gallons.
[c] Use volume measure only for surface impoundments containing hazardous substances present as liquids. Use area measures in Tier D for dry surface impoundments and for buried/backfilled surface impoundments.
[d] If actual volume of drums is unavailable, assume 1 drum = 50 gallons.
[e] Use land surface area under pile, not surface area of pile.

5.1.1.2.3 *Calculation of waste characteristics factor category value.* Multiply the toxicity and hazardous waste quantity factor values, subject to a maximum product of 1 × 10^8. Based on this product, assign a value from Table 2–7 (section 2.4.3.1) to the waste characteristics factor category. Enter this value in Table 5–1.

5.1.1.3 *Targets.* Evaluate the targets factor category for the resident population threat based on five factors: Resident individual, resident population, workers, resources, and terrestrial sensitive environments.

In evaluating the targets factor category for the resident population threat, count only the following as targets:

- Resident individual—a person living or attending school or day care on a property with an area of observed contamination *and* whose residence, school, or day care center, respectively, is on or within 200 feet of the area of observed contamination.
- Worker—a person working on a property with an area of observed contamination *and* whose workplace area is on or within 200 feet of the area of observed contamination.
- Resources located on an area of observed contamination, as specified in section 5.1.1.
- Terrestrial sensitive environments located on an area of observed contamination, as specified in section 5.1.1.

5.1.1.3.1 *Resident individual.* Evaluate this factor based on whether there is a resident individual, as specified in section 5.1.1.3, who is subject to Level I or Level II concentrations.

First, determine those areas of observed contamination subject to Level I concentrations and those subject to Level II concentrations as specified in sections 2.5.1 and 2.5.2. Use the health-based benchmarks from Table 5–3 in determining the level of contamination. Then assign a value to the resident individual factor as follows:

- Assign a value of 50 if there is at least one resident individual for one or more areas subject to Level I concentrations.
- Assign a value of 45 if there is no such resident individuals, but there is at least one resident individual for one or more areas subject to Level II concentrations.
- Assign a value of 0 if there is no resident individual.

Enter the value assigned in Table 5–1.

5.1.1.3.2 *Resident population.* Evaluate resident population based on two factors: Level I concentrations and Level II concentrations. Determine which factor applies as specified in sections 2.5.1 and 2.5.2, using the health-based benchmarks from Table 5–3. Evaluate populations subject to Level I concentrations as specified in section 5.1.1.3.2.1 and populations subject to Level II concentrations as specified in section 5.1.1.3.2.2.

TABLE 5–3—HEALTH-BASED BENCHMARKS FOR HAZARDOUS SUBSTANCES IN SOILS

Screening concentration for cancer corresponding to that concentration that corresponds to the 10^{-6} individual cancer risk for oral exposures.
Screening concentration for noncancer toxicological responses corresponding to the Reference Dose (RfD) for oral exposures.

Count only those persons meeting the criteria for resident individual as specified in section 5.1.1.3. In estimating the number of people living on property with an area of observed contamination, when the estimate is based on the number of residences, multiply each residence by the average number of persons per residence for the county in which the residence is located.

5.1.1.3.2.1 *Level I concentrations.* Sum the number of resident individuals subject to Level I concentrations and multiply this sum by 10. Assign the resulting product as the value for this factor. Enter this value in Table 5–1.

5.1.1.3.2.2 *Level II concentrations.* Sum the number of resident individuals subject to Level II concentrations. Do not include those people already counted under the Level I concentrations factor. Assign this sum as the value for this factor. Enter this value in Table 5–1.

5.1.1.3.2.3 *Calculation of resident population factor value.* Sum the factor values for Level I concentrations and Level II concentrations. Assign this sum as the resident population factor value. Enter this value in Table 5–1.

5.1.1.3.3 *Workers.* Evaluate this factor based on the number of workers that meet the section 5.1.1.3 criteria. Assign a value for these workers using Table 5–4. Enter this value in Table 5–1.

TABLE 5–4—FACTOR VALUES FOR WORKERS

Number of workers	Assigned value
0	0
1 to 100	5
101 to 1,000	10
Greater than 1,000	15

5.1.1.3.4 *Resources.* Evaluate the resources factor as follows:

- Assign a value of 5 to the resources factor if one or more of the following is present on an area of observed contamination at the site:

—Commercial agriculture.
—Commercial silviculture.
—Commercial livestock production or commercial livestock grazing.

- Assign a value of 0 if none of the above are present.

Enter the value assigned in Table 5–1.

5.1.1.3.5 *Terrestrial sensitive environments.* Assign value(s) from Table 5–5 to each terrestrial sensitive environment that meets the eligibility criteria of section 5.1.1.3.

Calculate a value (ES) for terrestrial sensitive environments as follows:

$$\mathrm{ES} = \sum_{i=1}^{n} \mathrm{S_i}$$

Where:

S_i = Value(s) assigned from Table 5–5 to terrestrial sensitive environment i.
n = Number of terrestrial sensitive environments meeting section 5.1.1.3 criteria.

Because the pathway score based solely on terrestrial sensitive environments is limited to a maximum of 60, determine the value for the terrestrial sensitive environments factor as follows:

TABLE 5–5—TERRESTRIAL SENSITIVE ENVIRONMENTS RATING VALUES

Terrestrial sensitive environments	Assigned value
Terrestrial critical habitat[a] for Federal designated endangered or threatened species	100
National Park	
Designated Federal Wilderness Area	
National Monument.	
Terrestrial habitat known to be used by Federal designated or proposed threatened or endangered species	75
National Preserve (terrestrial)	
National or State Terrestrial Wildlife Refuge	
Federal land designated for protection of natural ecosystems	
Administratively proposed Federal Wilderness Area	
Terrestrial areas utilized for breeding by large or dense aggregations of animals[b].	
Terrestrial habitat known to be used by State designated endangered or threatened species	50
Terrestrial habitat known to be used by species under review as to its Federal designated endangered or threatened status	
State lands designated for wildlife or game management	25
State designated Natural Areas	
Particular areas, relatively small in size, important to maintenance of unique biotic communities.	

[a] Critical habitat as defined in 50 CFR 424.02.
[b] Limit to vertebrate species.

- Multiply the values assigned to the resident population threat for likelihood of exposure (LE), waste characteristics (WC), and ES. Divide the product by 82,500.

—If the result is 60 or less, assign the value ES as the terrestrial sensitive environments factor value.

—If the result exceeds 60, calculate a value EC as follows:

$$EC = \frac{(60)(82{,}500)}{(LE)(WC)}$$

Assign the value EC as the terrestrial sensitive environments factor value. Do not round this value to the nearest integer.

Enter the value assigned for the terrestrial sensitive environments factor in Table 5–1.

5.1.1.3.6 *Calculation of resident population targets factor category value.* Sum the values for the resident individual, resident population, workers, resources, and terrestrial sensitive environments factors. Do not round to the nearest integer. Assign this sum as the targets factor category value for the resident population threat. Enter this value in Table 5–1.

5.1.1.4 *Calculation of resident population threat score.* Multiply the values for likelihood of exposure, waste characteristics, and targets for the resident population threat, and round the product to the nearest integer. Assign this product as the resident population threat score. Enter this score in Table 5–1.

5.1.2 *Nearby population threat.* Include in the nearby population only those individuals who live or attend school within a 1-mile travel distance of an area of observed contamination at the site and who do not meet the criteria for resident individual as specified in section 5.1.1.3.

Do not consider areas of observed contamination that have an attractiveness/accessibility factor value of 0 (see section 5.1.2.1.1) in evaluating the nearby population threat.

5.1.2.1 *Likelihood of exposure.* Evaluate two factors for the likelihood of exposure factor category for the nearby population threat: attractiveness/accessibility and area of contamination.

5.1.2.1.1 *Attractiveness/accessibility.* Assign a value for attractiveness/accessibility from Table 5–6 to each area of observed contamination, excluding any land used for residences. Select the highest value assigned to the areas evaluated and use it as the value for the attractiveness/accessibility factor. Enter this value in Table 5–1.

5.1.2.1.2 *Area of contamination.* Evaluate area of contamination based on the total area of the areas of observed contamination at the site. Count only the area(s) that meet the criteria in section 5.1.0 and that receive an attractiveness/accessibility value greater than 0. Assign a value to this factor from Table5–7. Enter this value in Table 5–1.

TABLE 5–6—ATTRACTIVENESS/ACCESSIBILITY VALUES

Area of observed contamination	Assigned value
Designated recreational area	100
Regularly used for public recreation (for example, fishing, hiking, softball)	75
Accessible and unique recreational area (for example, vacant lots in urban area)	75
Moderately accessible (may have some access improvements, for example, gravel road), with some public recreation use	50
Slightly accessible (for example, extremely rural area with no road improvement), with some public recreation use	25
Accessible, with no public recreation use	10
Surrounded by maintained fence or combination of maintained fence and natural barriers	5
Physically inaccessible to public, with no evidence of public recreation use	0

TABLE 5–7—AREA OF CONTAMINATION FACTOR VALUES

Total area of the areas of observed contamination (square feet)	Assigned value
Less than or equal to 5,000	5
Greater than 5,000 to 125,000	20
Greater than 125,000 to 250,000	40
Greater than 250,000 to 375,000	60
Greater than 375,000 to 500,000	80
Greater than 500,000	100

5.1.2.1.3 *Likelihood of exposure factor category value.* Assign a value from Table 5–8 to the likelihood of exposure factor category, based on the values assigned to the attractiveness/accessibility and area of contamination factors. Enter this value in Table 5–1.

TABLE 5–8—NEARBY POPULATION LIKELIHOOD OF EXPOSURE FACTOR VALUES

Area of contamination factor value	Attractiveness/accessibility factor value						
	100	75	50	25	10	5	0
100	500	500	375	250	125	50	0
80	500	375	250	125	50	25	0
60	375	250	125	50	25	5	0
40	250	125	50	25	5	5	0
20	125	50	25	5	5	5	0
5	50	25	5	5	5	5	0

5.1.2.2 *Waste characteristics.* Evaluate waste characteristics based on two factors: toxicity and hazardous waste quantity. Evaluate only those hazardous substances that meet the criteria for observed contamination (see section 5.1.0) at areas that can be assigned an attractiveness/accessibility factor value greater than 0.

5.1.2.2.1 *Toxicity.* Assign a toxicity factor value as specified in section 2.4.1.1 to each hazardous substance meeting the criteria in section 5.1.2.2. Use the hazardous substance with the highest toxicity factor value to assign the value to the toxicity factor for the nearby population threat. Enter this value in Table 5–1.

5.1.2.2.2 *Hazardous waste quantity.* Assign a value to the hazardous waste quantity factor as specified in section 5.1.1.2.2, except: consider only those areas of observed contamination that can be assigned an attractiveness/accessibility factor value greater than 0. Enter the value assigned in Table 5–1.

5.1.2.2.3 *Calculation of waste characteristics factor category value.* Multiply the toxicity and hazardous waste quantity factor values, subject to a maximum product of 1×10^8. Based on this product, assign a value from Table 2–7 (section 2.4.3.1) to the waste characteristics factor category. Enter this value in Table 5–1.

5.1.2.3 *Targets.* Evaluate the targets factory category for the nearby population threat based on two factors: nearby individual and population within a 1-mile travel distance from the site.

5.1.2.3.1 *Nearby individual.* If one or more persons meet the section 5.1.1.3 criteria for a resident individual, assign this factor a value of 0. Enter this value in Table 5–1.

If no person meets the criteria for a resident individual, determine the shortest travel distance from the site to any residence or school. In determining the travel distance, measure the shortest overland distance an individual would travel from a residence or school to the nearest area of observed contamination for the site with an attractiveness/accessibility factor value greater than 0. If there are no natural barriers to travel, measure the travel distance as the shortest straight-line distance from the residence or school to the area of observed contamination. If natural barriers exist (for example, a river), measure the travel distance as the shortest straight-line distance from the residence or school to the nearest crossing point and from there as the shortest straight-line distance to the area of observed contamination. Based on the shortest travel distance, assign a value from Table 5–9 to the nearest individual factor. Enter this value in Table 5–1.

TABLE 5–9—NEARBY INDIVIDUAL FACTOR VALUES

Travel distance for nearby individual (miles)	Assigned value
Greater than 0 to ¼	[a] 1
Greater than ¼ to 1	0

[a] Assign a value of 0 if one or more persons meet the section 5.1.1.3 criteria for resident individual.

5.1.2.3.2 *Population within 1 mile.* Determine the population within each travel distance category of Table 5–10. Count residents and students who attend school within this travel distance. Do not include those people already counted in the resident population threat. Determine travel distances as specified in section 5.1.2.3.1.

In estimating residential population, when the estimate is based on the number of residences, multiply each residence by the average number of persons per residence for the county in which the residence is located.

Based on the number of people included within a travel distance category, assign a distance-weighted population value for that travel distance from Table 5–10.

Calculate the value for the population within 1 mile factor (PN) as follows:

$$PN = \frac{1}{10}\sum_{i=1}^{3} W_i$$

Where:

W_i=Distance-weighted population value from Table 5–10 for travel distance category i.

If PN is less than 1, do not round it to the nearest integer; if PN is 1 or more, round to the nearest integer. Enter this value in Table 5–1.

5.1.2.3.3 *Calculation of nearby population targets factor category value.* Sum the values for the nearby individual factor and the population within 1 mile factor. Do not round this sum to the nearest integer. Assign this sum as the targets factor category value for the nearby population threat. Enter this value in Table 5–1.

TABLE 5–10—DISTANCE WEIGHTED POPULATION VALUES FOR NEARBY POPULATION THREAT [a]

Travel distance category (miles)	Number of people within the travel distance category											
	0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000
Greater than 0 to ¼	0	0.1	0.4	1.0	4	13	41	130	408	1,303	4,081	13,034
Greater than ¼ to ½	0	0.05	0.2	0.7	2	7	20	65	204	652	2,041	6,517
Greater than ½ to 1	0	0.02	0.1	0.3	1	3	10	33	102	326	1,020	3,258

[a] Round the number of people present within a travel distance category to nearest integer. Do not round the assigned distance-weighted population value to nearest integer.

5.1.2.4 *Calculation of nearby population threat score.* Multiply the values for likelihood of exposure, waste characteristics, and targets for the nearby population threat, and round the product to the nearest integer. Assign this product as the nearby population threat score. Enter this score in Table 5–1.

5.1.3 *Calculation of soil exposure component score.* Sum the resident population threat score and the nearby population threat score, and divide the sum by 82,500. Assign the resulting value, subject to a maximum of 100, as the soil exposure component score (S_{se}). Enter this score in Table 5–1.

5.2 *Subsurface intrusion component.* Evaluate the subsurface intrusion component based on three factor categories: likelihood of exposure, waste characteristics, and targets. Figure 5–1 indicates the factors included within each factor category for the subsurface intrusion component.

Determine the component score (S_{ssi}) in terms of the factor category values as follows:

$$S_{ssi} = \frac{(LE)(WC)(T)}{SF}$$

Where:

LE=Likelihood of exposure factor category value.

WC=Waste characteristics factor category value.

T=Targets factor category value.

SF=Scaling factor.

Table 5–11 outlines the specific calculation procedure.

TABLE 5–11—SUBSURFACE INTRUSION COMPONENT SCORESHEET

Factor categories and factors	Maximum value	Value assigned
Subsurface Intrusion Component:		
Likelihood of Exposure:		
1. Observed Exposure	550	
2. Potential for Exposure.		
2a. Structure Containment	10	
2b. Depth to contamination	10	
2c. Vertical Migration	15	
2d. Vapor Migration Potential	25	
3. Potential for Exposure (lines 2a * (2b + 2c + 2d), subject to a maximum of 500)	500	
4. Likelihood of Exposure (higher of lines 1 or 3)	550	
Waste Characteristics:		
5. Toxicity/Degradation	(a)	
6. Hazardous Waste Quantity	(a)	
7. Waste Characteristics (subject to a maximum of 100)	100	
Targets:		
8. Exposed Individual	50	
9. Population:.		
9a. Level I Concentrations	(b)	
9b. Level II Concentrations	(b)	
9c. Population within an Area of Subsurface Contamination	(b)	
9d. Total Population (lines 9a + 9b + 9c)	(b)	
10. Resources	5	
11. Targets (lines 8 + 9d + 10)	(b)	
Subsurface Intrusion Component Score:		
12. Subsurface Intrusion Component (lines 4 × 7 × 11)/82,500[c] (subject to a maximum of 100)	100	
Soil Exposure and Subsurface Intrusion Pathway Score:		
13. Soil Exposure Component + Subsurface Intrusion Component (subject to a maximum of 100)	100	

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] Do not round to the nearest integer.

5.2.0 *General considerations*. The subsurface intrusion component evaluates the threats from hazardous substances that have or could intrude into regularly occupied structures from the subsurface. Evaluate the subsurface intrusion component based on the actual or potential intrusion of hazardous substances into all regularly occupied structures that have structure containment values greater than zero and meet the criteria identified in the section below as being either in an area of observed exposure or in an area of subsurface contamination. These structures may or may not have subunits. Subunits are partitioned areas within a structure with separate heating, ventilating, and air conditioning (HVAC) systems or distinctly different air exchange rates. Subunits include regularly occupied partitioned tenant spaces such as office suites, apartments, condos, common or shared areas, and portions of residential, commercial or industrial structures with separate heating, ventilating, and air conditioning (HVAC) systems.

In evaluating the subsurface intrusion component, consider the following:

- Area(s) of observed exposure: An area of observed exposure is delineated by regularly occupied structures with documented contamination meeting observed exposure criteria; an area of observed exposure includes regularly occupied structures with samples meeting observed exposure criteria or inferred to be within an area of observed exposure based on samples meeting observed exposure criteria (see section 5.2.1.1.1 *Observed exposure*). Establish areas of observed exposure as follows:

—For regularly occupied structures that have no subunits, consider both the regularly occupied structures containing sampling location(s) meeting observed exposure criteria for the site and the regularly occupied structure(s) in the area lying between such locations to be an area of observed exposure (*i.e.*, inferred to be in an area of observed exposure), unless available information indicates otherwise.

—In multi-story, multi-subunit, regularly occupied structures, consider all subunits on a level with sampling locations meeting observed exposure criteria from the site and all levels below, if any, to be within an area of observed exposure, unless available information indicates otherwise.

—In multi-tenant structures, that do not have a documented observed exposure, but are located in an area lying between locations where observed exposures have been documented, consider only those regularly occupied subunits, if any, on the lowest level of the structure, to be within an area of observed exposure (*i.e.*, inferred to be in an area of observed exposure, unless available information indicates otherwise.

- Area(s) of subsurface contamination: An area of subsurface contamination is delineated by sampling locations meeting observed release criteria for subsurface intrusion, excluding areas of observed exposure (see Table 2–3 in section 2.3). The area within an area of subsurface contamination includes potentially exposed populations. If the significant increase in hazardous substance levels cannot be attributed at least in part to the site, and cannot be attributed to other sites, attribution can be established based on the presence of hazardous substances in the area of subsurface contamination. Establish areas of subsurface contamination as follows:

—Exclude those areas that contain structures meeting the criteria defined as an area of observed exposure.

—Consider both the sampling location(s) with subsurface contamination meeting observed release criteria from the site and the area lying between such locations to be an area of subsurface contamination (*i.e.*, inferred to be in an area of subsurface contamination). If sufficient data is available and state of the science shows there is no unacceptable risk due to subsurface intrusion into a regularly occupied structure located within an area of subsurface contamination, that structure can be excluded from the area of subsurface contamination.

—Evaluate an area of subsurface contamination based on hazardous substances that:

■ Meet the criteria for observed exposure of a chemical that has a vapor pressure greater than or equal to one torr or a Henry's constant greater than or equal to 10^{-5} atm-m^3/mol, or

■ Meet the criteria for observed release in an area of subsurface contamination and have a vapor pressure greater than or equal to one torr or a Henry's constant greater than or equal to 10^{-5} atm-m^3/mol, or

■ Meet the criteria for an observed release in a structure within, or in a sample from below, an area of observed exposure and have a vapor pressure greater than or equal to one torr or a Henry's constant greater than or equal to 10^{-5} atm-m^3/mol.

—Evaluate all structures with no subunits that have containment factor values greater than zero, and not documented to meet observed exposure criteria to be in an area of subsurface contamination if they are lying between locations of subsurface intrusion samples meeting observed release criteria.

—Evaluate multi-subunit structures as follows:

■ If an observed exposure has been documented based on a gaseous indoor air sample, consider all regularly occupied subunit(s), if any, on the level immediately above the level where an observed exposure has been documented (or has been inferred to be within an area of observed exposure), to be within an area of subsurface contamination. If sufficient data is available and state of the science shows there is no unacceptable risk due to subsurface intrusion on the level immediately above the level where an observed exposure has been documented (or has been inferred to be within an area of observed exposure) that level can be excluded from the area of subsurface contamination.

■ If observed release criteria have been met based on a gaseous indoor air sample collected from a level not regularly occupied, consider all regularly occupied subunit(s), if any, on the level immediately above the level where the observed release criteria has been documented, to be within an area of subsurface contamination. If sufficient data is available and state of the science shows there is no unacceptable risk due to subsurface intrusion on the level immediately above the level where the observed release criteria has been documented that level can be excluded from the area of subsurface contamination.

■ If any regularly occupied multi-subunit structure is inferred to be in an area of subsurface contamination, consider only those regularly occupied subunit(s), if any, on the lowest level, to be within an area of subsurface contamination. If sufficient data is available and state of the science shows there is no unacceptable risk due to subsurface intrusion on the lowest level, that structure can be excluded from the area of subsurface contamination.

See Section 7.0 for establishing an area of subsurface contamination based on the presence of radioactive hazardous substances.

If there is no area of observed exposure and no area of subsurface contamination, assign a score of 0 for the subsurface intrusion component.

5.2.1 *Subsurface intrusion component.* Evaluate this component only if there is an area of observed exposure or area of subsurface contamination:

- Within or underlying a residence, school, day care center, workplace, or
- Within or underlying a resource specified in section 5.2.1.3.3.

5.2.1.1 *Likelihood of exposure.* Assign a value of 550 to the likelihood of exposure factor category for the subsurface intrusion component if there is an area of observed exposure in one or more locations listed in section 5.2.1. Enter this value in Table 5–11.

5.2.1.1.1 *Observed exposure.* Establish observed exposure in a regularly occupied structure by demonstrating that a hazardous substance has been released into a regularly occupied structure via the subsurface. Base this demonstration on either of the following criteria:

- Direct observation:

—A solid, liquid, or gaseous material that contains one or more hazardous substances attributable to the site has been observed entering a regularly occupied structure through migration via the subsurface or is known to have entered a regularly occupied structure via the subsurface, or

—When evidence supports the inference of subsurface intrusion of a material that contains one or more hazardous substances associated with the site into a regularly occupied structure, demonstrated adverse effects associated with that release may be used to establish observed exposure.

- Chemical analysis:

—Analysis of indoor samples indicates that the concentration of hazardous substance(s) is significantly above the background concentration for the site for that type of sample (see section 2.3).

—Some portion of the significant increase above background must be attributable to the site to establish the observed exposure. Documentation of this attribution should account for possible concentrations of the hazardous substance(s) in outdoor air or from materials found in the regularly occupied structure, and should provide a rationale for the increase being from subsurface intrusion.

If observed exposure can be established in a regularly occupied structure, assign an observed exposure factor value of 550, enter this value in Table 5–11, and proceed to section 5.2.1.1.3. If no observed exposure can be established, assign an observed exposure factor value of 0, enter this value in Table 5–11, and proceed to section 5.2.1.1.2.

5.2.1.1.2 *Potential for exposure.* Evaluate potential for exposure only if an observed exposure cannot be established, but an area of subsurface contamination has been delineated. Evaluate potential for exposure based only on the presence of hazardous substances with a vapor pressure greater than or equal to one torr or a Henry's constant greater than or equal to 10^{-5} atm-m^3/mol. Evaluate potential for exposure for each area of subsurface contamination based on four factors: Structure containment (see section 5.2.1.1.2.1), depth to contamination (see section 5.2.1.1.2.2), vertical migration (see section 5.2.1.1.2.3) and vapor migration potential (see section 5.2.1.1.2.4). For each area of subsurface contamination, assign the highest value for each factor. If information is insufficient to calculate any single factor value used to calculate the potential for exposure factor values at an identified area of subsurface contamination, information collected for another area of subsurface contamination at the site may be used when evaluating potential for exposure. Calculate the potential for exposure value for the site as specified in section 5.2.1.1.2.5.

5.2.1.1.2.1 *Structure containment.* Calculate containment for eligible hazardous substances within this component as directed in Table 5–12 and enter this value into Table 5–11. Assign each regularly occupied structure within an area of subsurface contamination the highest appropriate structure containment value from Table 5–12 and use the regularly occupied structure at the site with the highest structure containment value in performing the potential for exposure calculation. For all regularly occupied structures with unknown containment features assign a structure containment value of greater than zero for the purposes of evaluating targets (see section 5.2.1.3).

TABLE 5–12—STRUCTURE CONTAINMENT

No.	Evidence of structure containment	Assigned value
1.	Regularly occupied structure with evidence of subsurface intrusion, including documented observed exposure or sampling of bio or inert gases, such as methane and radon.	10
2.	Regularly occupied structure with open preferential subsurface intrusion pathways (*e.g.,* sumps, foundation cracks, unsealed utility lines).	10
3.	Regularly occupied structure with an engineered vapor migration barrier system that does not address all preferential subsurface intrusion pathways.	7
4.	Regularly occupied structure with an engineered passive vapor mitigation system *without* documented institutional controls (*e.g.,* deed restrictions) or evidence of regular maintenance and inspection.	6
5.	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (*e.g.,* sumps, foundation cracks, unsealed utility lines).	4
6.	Regularly occupied structure with an engineered passive vapor mitigation system (*e.g.,* passive venting) *with* documented institutional controls (*e.g.,* deed restrictions) or evidence of regular maintenance and inspection.	3
7.	Regularly occupied structure with an engineered, active vapor mitigation system (*e.g.,* active venting) *without* documented institutional controls (*e.g.,* deed restrictions) and funding in place for on-going operation, inspection and maintenance.	2

TABLE 5–12—STRUCTURE CONTAINMENT—Continued

No.	Evidence of structure containment	Assigned value
8.	Regularly occupied structure with a permanent engineered, active vapor mitigation system (*e.g.,* active venting) *with* documented institutional controls (*e.g.,* deed restrictions) and funding in place for on-going operation, inspection and maintenance.	1
9.	Regularly occupied structure with a foundation raised greater than 6 feet above ground surface (*e.g.,* structure on stilts) or structure that has been built, and maintained, in a manner to prevent subsurface intrusion.	0

5.2.1.1.2.2 *Depth to contamination.* Assign each area of subsurface contamination a depth to contamination based on the least depth to either contaminated crawl space or subsurface media underlying a regularly occupied structure. Measure this depth to contamination based on the distance between the lowest point of a regularly occupied structure to the highest known point of hazardous substances eligible to be evaluated. Use any regularly occupied structure within an area of subsurface contamination with a structure containment factor value greater than zero. Subtract from the depth to contamination the thickness of any subsurface layer composed of features that would allow channelized flow (*e.g.*, karst, lava tubes, open fractures, as well as manmade preferential pathways such as utility conduits or drainage systems).

Based on this calculated depth, assign a factor value from Table 5–13. If the necessary information is available at multiple locations, calculate the depth to contamination at each location. Use the location having the least depth to contamination to assign the factor value. Enter this value in Table 5–11.

TABLE 5–13—DEPTH TO CONTAMINATION

Depth range [1] [2]	Depth to contamination assigned value
0 to <10 ft (Including subslab and semi-enclosed or enclosed crawl space contamination)	10
>10 to 20 ft	8
>20 to 50 ft	6
>50 to 100 ft	4
>100 to 150 ft	2
>150 ft	0

[1] If any part of the subsurface profile has channelized flow features, assign that portion of the subsurface profile a depth of 0.

[2] Measure elevation below any regularly occupied structure within an area of subsurface contamination at a site. Select the regularly occupied structure with the least depth to contamination below a structure.

5.2.1.1.2.3 *Vertical migration.* Evaluate the vertical migration factor for each area of subsurface contamination based on the geologic materials in the interval between the lowest point of a regularly occupied structure and the highest known point of hazardous substances in the subsurface. Use any regularly occupied structure either within an area of subsurface contamination or overlying subsurface soil gas or ground water contamination. Assign a value to the vertical migration factor as follows:

- If the depth to contamination (see section 5.2.1.1.2.2) is 10 feet or less, assign a value of 15.
- If the depth to contamination is greater than 10 feet, do not consider layers or portions of layers within the first 10 feet of the depth to contamination (as assigned in section 5.2.1.1.2.2).
- If, for the interval between the lowest point of a regularly occupied structure and the highest point of hazardous substances in the subsurface, all layers that underlie a portion of a regularly occupied structure at the site are karst or otherwise allow channelized flow, assign a value of 15.
- Otherwise:

—Select the lowest effective porosity/permeability layer(s) from within the interval identified above. Consider only layers at least 1 foot thick.—Assign a value for individual layers from Table 5–14 using the hydraulic conductivity of the layer, if available. If the hydraulic conductivity is not available, assign a value based on the type of material in the selected layer.

—If more than one layer has the same assigned porosity/permeability value, include all such layers and sum their thicknesses. Assign a thickness of 0 feet to a layer with channelized flow features found within any area of subsurface contamination at the site.

—Assign a value from Table 5–15 to the vertical migration factor, based on the thickness and assigned porosity/permeability value of the lowest effective porosity/permeability layer(s).

Determine vertical migration only at locations within an area of subsurface contamination at the site. If the necessary subsurface geologic information is available at multiple locations, evaluate the vertical migration factor at each location. Use the location having the highest vertical migration factor value to assign the factor value. Enter this value in Table 5–11.

TABLE 5–14—EFFECTIVE POROSITY/PERMEABILITY OF GEOLOGIC MATERIALS

Type of material	Hydraulic conductivity (cm/sec)	Assigned porosity/ permeability value
Gravel; clean sand; highly permeable fractured igneous and metamorphic rocks; permeable basalt; karst limestones and dolomites.	Greater than or equal to 1×10^{-3}.	1
Sand; sandy clays; sandy loams; loamy sands; sandy silts; sediments that are predominantly sand; highly permeable till (coarse-grained, unconsolidated or compact and highly fractured); peat; moderately permeable limestones and dolomites (no karst); moderately permeable sandstone; moderately permeable fractured igneous and metamorphic rocks.	Less than 1×10^{-3} ..	2
Silt; loams; silty loams; loesses; silty clays; sediments that are predominantly silts; moderately permeable till (fine-grained, unconsolidated till, or compact till with some fractures); low permeability limestones and dolomites (no karst); low permeability sandstone; low permeability fractured igneous and metamorphic rocks.	Less than 1×10^{-5} ..	3
Clay; low permeability till (compact unfractured till); shale; unfractured metamorphic and igneous rocks.	Less than 1×10^{-7} ..	4

TABLE 5–15—VERTICAL MIGRATION FACTOR VALUES [a]

Assigned porosity/permeability value	Thickness of lowest porosity layer(s) [b] (feet)					
	0 to 5	Greater than 5 to 10	Greater than 10 to 20	Greater than 20 to 50	Greater than 50 to 100	Greater than 100 to 150
1	15	15	14	11	8	6
2	15	14	12	9	6	4
3	15	13	10	7	5	2
4	15	12	9	6	3	1

[a] If depth to contamination is 10 feet or less or if, for the interval being evaluated, all layers that underlie a portion of the structure at the site are karst or have other channelized flow features, assign a value of 15.

[b] Consider only layers at least 1 foot thick.

5.2.1.1.2.4 *Vapor migration potential.* Evaluate this factor for each area of subsurface contamination as follows:

- If the depth to contamination (see section 5.2.1.1.2.2) is 10 feet or less, assign a value of 25.
- Assign a value for vapor migration potential to each of the gaseous hazardous substances associated with the area of subsurface contamination (see section 2.2.2) as follows:

—Assign values from Table 5–16 for both vapor pressure and Henry's constant to each hazardous substance. If Henry's constant cannot be determined for a hazardous substance, assign that hazardous substance a value of 2 for the Henry's constant component.

—Sum the two values assigned to each hazardous substance.

—Based on this sum, assign each hazardous substance a value from Table 5–17 for vapor migration potential.

- Assign a value for vapor migration potential to each area of subsurface contamination as follows:

—Select the hazardous substance associated with the area of subsurface contamination with the highest vapor migration potential value and assign this value as the vapor migration potential factor value for the area of subsurface contamination.

Enter this value in Table 5–11.

TABLE 5–16—VALUES FOR VAPOR PRESSURE AND HENRY'S CONSTANT

	Assigned value
Vapor Pressure (Torr):	
Greater than 10	3
1 to 10	2
Less than 1	0
Henry's Constant (atm-m^3/mol):	
Greater than 10^{-3}	3
Greater than 10^{-4} to 10^{-3}	2
10^{-5} to 10^{-4}	1
Less than 10^{-5}	0

TABLE 5–17—VAPOR MIGRATION POTENTIAL FACTOR VALUES FOR A HAZARDOUS SUBSTANCE

Sum of values for vapor pressure and Henry's constant	Assigned value
0	0
1 or 2	5
3 or 4	15
5 or 6	25

5.2.1.1.2.5 *Calculation of potential for exposure factor value.* For each identified area of subsurface contamination, sum the factor values for depth to contamination, vertical migration, and vapor migration potential, and multiply this sum by the factor value for structure containment. Select the highest product for any area of subsurface contamination and assign this value as the potential for exposure factor value for the component. Enter this value in Table 5–11.

5.2.1.1.3 *Calculation of likelihood of exposure factor category value.* If observed exposure is established for the site, assign the observed exposure factor value of 550 as the likelihood of exposure factor category value for the site. Otherwise, assign the potential for exposure factor value for the component as the likelihood of exposure value. Enter the value assigned in Table 5–11.

5.2.1.2 *Waste characteristics.* Evaluate waste characteristics based on two factors: toxicity/degradation and hazardous waste quantity.

5.2.1.2.1 *Toxicity/degradation.* For each hazardous substance, assign a toxicity factor value, a degradation factor value and a combined toxicity/degradation factor value as specified in sections 2.2.3, 2.4.1.2 and 5.2.1.2.1.1 through 5.2.1.2.1.3.

5.2.1.2.1.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in sections 2.2.2 and 2.4.1.1.

5.2.1.2.1.2 *Degradation.* Assign a degradation factor value to each hazardous substance as follows:

- For any hazardous substance that meets the criteria for an observed exposure, or if a NAPL is present in the subsurface below an area of observed exposure or area of subsurface contamination at a depth less than or equal to 30 feet, assign that substance a degradation factor value of 1.
- For all other situations, assign a degradation factor value using Table 5–18. Assign the depth to contamination as directed in section 5.2.1.1.2.2, except if evidence indicates that biologically active soil is not present throughout the depth beneath any regularly occupied structure. In this situation, subtract any thickness of non-biologically active soil from the estimated depth to contamination.

TABLE 5–18—DEGRADATION FACTOR VALUE TABLE

Depth to contamination (feet)[a]	Half-life		
	>100 Days	>30 days and ≤100 days	≤30 days
<10	1	1	1
10 to ≤30	1	1	0.1
>30	1	0.5	0.1

[a] When determining the depth to contamination do not include layers of non-biologically-active soil, nor subsurface intervals with channelized flow (*e.g.,* karst, lava tubes, open fractures, and manmade preferential pathways as directed in section 5.2.1.1.2.2).

Calculate the half-life for each hazardous substance that meets subsurface intrusion observed release criteria as follows:

The half-life of a substance in the subsurface is defined for HRS purposes as the time required to reduce the initial concentration of the substance in the subsurface by one-half as a result of the combined decay processes of two components: Biodegradation and hydrolysis.

Estimate the half-life ($t_{1/2}$) of a hazardous substance as follows:

$$t_{1/2} = \frac{1}{1/h + 1/b}$$

Where:

h=Hydrolysis half-life.

b=Biodegradation half-life.

If either of these component half-lives cannot be estimated for the hazardous substance from available data, delete that component half-life from the above equation.

If no half-life information is available for a hazardous substance and the substance is not already assigned a value of 1, unless information indicates otherwise, assign a value of 1.

5.2.1.2.1.3 *Calculation of toxicity/degradation factor value*. Assign each substance a toxicity/degradation value by multiplying the toxicity factor value by the degradation factor value. Use the hazardous substance with the highest combined toxicity/degradation value to assign the factor value to the toxicity/degradation factor for the subsurface intrusion threat. Enter this value in Table 5–11.

5.2.1.2.2 *Hazardous waste quantity*. Assign a hazardous waste quantity factor value as specified in section 2.4.2. Consider only those regularly occupied structures or subunits with a non-zero structure containment value. Also include all regularly occupied structures or subunits that have had mitigation systems installed as part of a removal or other temporary response action. If sufficient structure-specific concentration data is available and state of the science shows there is no unacceptable risk of exposure to populations in a regularly occupied structure or subunit in an area of subsurface contamination, that structure or subunit is not included in the hazardous waste quantity evaluation. In estimating the hazardous waste quantity, use Tables 2–5 and 5–19 and:

- For Tier A, hazardous constituent quantity, use the mass of constituents found in the regularly occupied structure(s) where the observed exposure has been identified.
  - —For multi-subunit structures, when calculating Tier A, use the mass of constituents found in the regularly occupied subunit space(s) where the observed exposure has been identified.
- For Tier B, hazardous wastestream quantity, use the flow-through volume of the regularly occupied structures where the observed exposure has been identified.
  - —For multi-subunit structures, when calculating Tier B, use the flow-through volume of the regularly occupied subunit spaces where the observed exposure has been identified.
- For Tier C, volume, use the volume divisor listed in Tier C of Table 5–19. Volume is calculated for those regularly occupied structures located within areas of observed exposure with observed or inferred intrusion and within areas of subsurface contamination.
  - —In evaluating the volume measure for these listed areas of observed exposure and areas of subsurface contamination based on a gaseous/vapor intrusion or the potential for gaseous/vapor intrusion, consider the following:
    - ■ Calculate the volume of each regularly occupied structure based on actual data. If unknown, use a ceiling height of 8 feet.
    - ■ For multi-subunit structures, when calculating Tier C, calculate volume for those subunit spaces with observed or inferred exposure and all other regularly occupied subunit spaces on that level, unless available information indicates otherwise. If the structure has multiple stories, also include the volume of all regularly occupied subunit spaces below the floor with an observed exposure and one story above, unless evidence indicates otherwise.
    - ■ For multi-subunit structures within an area of subsurface contamination and no observed or inferred exposure, consider only the volume of the regularly occupied subunit spaces on the lowest story, unless available information indicates otherwise.
- For Tier D, area, if volume is unknown, use the area divisor listed in Tier D of Table 5–19 for those regularly occupied structures within areas of observed exposure with observed or inferred intrusion and within areas of subsurface contamination.
  - —In evaluating the area measure for these listed areas of observed exposure and areas of subsurface contamination, calculate the area of each regularly occupied structure (including multi-subunit structures) or subunit based on actual footprint area data.
    - ■ If the actual footprint area of the structure(s) is unknown, use an area of 1,740 square feet for each structure (or subunit space).
    - ■ For multi-subunit structures, when calculating Tier D, calculate area for those subunit spaces with observed or inferred exposure and all other regularly occupied subunit spaces on that level, unless available information indicates otherwise. If the structure has multiple stories, also include the area of all regularly occupied subunit spaces below the floor with an observed exposure and one story above, unless evidence indicates otherwise.
    - ■ For multi-subunit structures within an area of subsurface contamination and no observed or inferred exposure, consider only the area of the regularly occupied subunit spaces on the lowest story, unless available information indicates otherwise.

TABLE 5–19—HAZARDOUS WASTE QUANTITY EVALUATION EQUATIONS FOR SUBSURFACE INTRUSION COMPONENT

Tier	Measure	Units	Equation for assigning value[a]
A	Hazardous Constituent Quantity (C)	Lb	C
B[b]	Hazardous Wastestream Quantity (W)	Lb	W/5,000
C[b,c]	Volume (V).		
	Regularly occupied structure(s) in areas of observed exposure or subsurface contamination.	yd^3	V/2.5
D[b,d]	Area (A).		
	Regularly occupied structure(s) in areas of observed exposure or subsurface contamination.	ft^2	A/13

[a] Do not round to the nearest integer.

[b] Convert volume to mass when necessary: 1 ton=2,000 pounds=1 cubic yard=4 drums=200 gallons.

[c] Calculate volume of each regularly occupied structure or subunit space in areas of observed exposure and areas of subsurface contamination—Assume 8-foot ceiling height unless actual value is known.

[d] Calculate area of the footprint of each regularly occupied structure in areas of observed exposure and areas of subsurface contamination. If the footprint area of a regularly occupied structure is unknown, use 1,740 square feet as the footprint area of the structure or subunit space.

For the subsurface intrusion component, if the hazardous constituent quantity is adequately determined for all areas of observed exposure, assign the value from Table 2–6 as the hazardous waste quantity factor value. If the hazardous constituent quantity is not adequately determined for one or more areas of observed exposure or if one or more areas of subsurface contamination are present, assign either the value from Table 2–6 or assign a factor value as follows:

- If any target for the subsurface intrusion component is subject to Level I or Level II concentrations (see section 2.5), assign either the value from Table 2–6 or a value of 100, whichever is greater, as the hazardous waste quantity factor value for this component.
- If none of the targets for the subsurface intrusion component is subject to Level I or Level II concentrations and if there has been a removal action that does not permanently interrupt target exposure from subsurface intrusion, and if an area of subsurface contamination exists, assign a factor value as follows:
  - —Determine the values from Table 2–6 with and without consideration of the removal action.
  - —If the value that would be assigned from Table 2–6 without consideration of the removal action would be 100 or greater, assign either the value from Table 2–6 with consideration of the removal action or a value of 100, whichever is greater, as the hazardous waste quantity factor value for the component.
  - —If the value that would be assigned from Table 2–6 without consideration of the removal action would be less than 100, assign a value of 10 as the hazardous waste quantity factor value for the component.
- Otherwise, if none of the targets for the subsurface intrusion component is subject to Level I or Level II concentrations and there has not been a removal action, assign a value from Table 2–6 or a value of 10, whichever is greater.

Enter the value assigned in Table 5–11.

5.2.1.2.3 *Calculation of waste characteristics factor category value.* Multiply the toxicity/degradation and hazardous waste quantity factor values, subject to a maximum product of 1 × 10^8. Based on this product, assign a value from Table 2–7 (section 2.4.3.1) to the waste characteristics factor category. Enter this value in Table 5–11.

5.2.1.3 *Targets.* Evaluate the targets factor category for the subsurface intrusion threat based on three factors: Exposed individual, population, and resources in regularly occupied structures with structure containment factors greater than 0. Evaluate only those targets within areas of observed exposure and areas of subsurface contamination (see section 5.2.0).

In evaluating the targets factor category for the subsurface intrusion threat, count only the following as targets:

- Exposed individual—a person living, attending school or day care, or working in a regularly occupied structure with observed exposure or in a structure within an area of observed exposure or within an area of subsurface contamination.
- Population—exposed individuals in a regularly occupied structure within an area of observed exposure or within an area of subsurface contamination.
- Resources—located within an area of observed exposure or within an area of subsurface contamination as specified in section 5.2.1.3.3.

If a formerly occupied structure has been vacated due to subsurface intrusion attributable to the site, count the initial targets as if they were still residing in the structure. In addition, if a removal or temporary response action has occurred that has not completely mitigated the release, count the initial targets as if the removal or temporary response action has not permanently interrupted target exposure from subsurface intrusion. Evaluate those targets based on conditions at the time of removal of temporary response action.

For populations residing in or working in a multi-subunit structure with multiple stories in an area of observed exposure or area of subsurface contamination, count these targets as follows:

- If there is no observed exposure within the structure, include in the evaluation only those targets, if any, in the lowest occupied level. If sufficient structure-specific concentration data is available and state of the science shows there is no unacceptable risk of exposure to targets in the lowest level, those targets are not included in the evaluation.
- If there is an observed exposure in any level, include in the evaluation those targets in that level, the level above and all levels below. (The weighting of these targets is specified in Section 5.2.1.3.2.) If sufficient structure-specific concentration data is available and state of the science shows there is no unacceptable risk of exposure to targets in the level above where the observed exposure has been documented, those targets are not included in the evaluation.

5.2.1.3.1 *Exposed individual.* Evaluate this factor based on whether there is an exposed individual, as specified in sections 2.5.1, 2.5.2 and 5.2.1.3, who is subject to Level I or Level II concentrations.

First, determine those regularly occupied structures or partitioned subunit(s) within structures in an area of observed exposure subject to Level I concentrations and those subject to Level II concentrations as specified as follows (see section 5.2.0):

- Level I Concentrations: For contamination resulting from subsurface intrusion, compare the hazardous substance concentrations in any sample meeting the observed exposure by chemical analysis criteria to the appropriate benchmark. Use the health-based benchmarks from Table 5–20 to determine the level of contamination.
  - —If the sample is from a structure with no subunits and the concentration equals or exceeds the appropriate benchmark, assign Level I concentrations to the entire structure.
  - —If the sample is from a subunit within a structure and the concentration from that subunit equals or exceeds the appropriate benchmark, assign Level I concentrations to that subunit.
- Level II Concentrations: Structures, or subunits within structures, with one or more samples that meet observed exposure by chemical analysis criteria but do not equal or exceed the appropriate benchmark; structures, or subunits, that have an observed exposure by direct observation; and structures inferred to be in an area of observed exposure based on samples meeting observed exposure, are assigned Level II concentrations.
  - —For all regularly occupied structures, or subunits in such structures, in an area of observed exposure that are not assigned Level I concentrations, assign Level II concentrations.

Then assign a value to the exposed individual factor as follows:

- Assign a value of 50 if there is at least one exposed individual in one or more regularly occupied structures subject to Level I concentrations.
- Assign a value of 45 if there are no Level I exposed individuals, but there is at least one exposed individual in one or more regularly occupied structures subject to Level II concentrations.
- Assign a value of 20 if there is no Level I or Level II exposed individual but there is at least one individual in a regularly occupied structure within an area of subsurface contamination. Enter the value assigned in Table 5–11.

5.2.1.3.2 *Population.* Evaluate population based on three factors: Level I concentrations, Level II concentrations, and population within an area of subsurface contamination. Determine which factors apply as specified in section 5.2.1.3.1, using the health-based benchmarks from Table 5–20. Evaluate populations subject to Level I and Level II concentrations as specified in section 2.5.

TABLE 5–20—HEALTH-BASED BENCHMARKS FOR HAZARDOUS SUBSTANCES IN THE SUBSURFACE INTRUSION COMPONENT

Screening concentration for cancer corresponding to that concentration that corresponds to the 10^{-6} individual cancer risk using the inhalation unit risk. For oral exposures use the oral cancer slope factor.
Screening concentration for noncancer toxicological responses corresponding to the reference dose (RfD) for oral exposure and the reference concentration (RfC) for inhalation exposures.

Count only those persons meeting the criteria for population as specified in section 5.2.1.3. In estimating the number of individuals in structures in an area of observed exposure or area of subsurface contamination if the actual number of residents is not known, multiply each residence by the average number of persons per residence for the county in which the residence is located.

5.2.1.3.2.1 *Level I concentrations.* Assign the population subject to Level I concentrations as follows:

1. Identify all exposed individuals regularly present in an eligible structure with a structure containment value greater than zero, or if the structure has subunits, identify those regularly present in each subunit,

located in an area of observed exposure subject to Level I concentrations as described in sections 5.2.0 and 5.2.1.3.1. Identify only once per structure those exposed individuals that are using more than one eligible subunit of the same structure (*e.g.*, using a common or shared area and other parts of the same structure).

2. For each structure or subunit count the number of individuals residing in or attending school or day care in the structure or subunit.

3. Count the number of full-time and part-time workers in the structure or subunit(s) subject to Level I concentrations. If information is unavailable to classify a worker as full- or part-time, evaluate that worker as being full-time. Divide the number of full-time workers by 3 and the number of part-time workers by 6, and then sum these products with the number of other individuals for each structure or subunit.

4. Sum this combined value for all structures, or subunits, within areas of observed exposure and multiply this sum by 10.

Assign the resulting product as the combined population factor value subject to Level I concentrations for the site. Enter this value in line 9a of Table 5–11.

5.2.1.3.2.2 *Level II concentrations.* Assign the population subject to Level II concentrations as follows:

1. Identify all exposed individuals regularly present in an eligible structure with a structure containment value greater than zero, or if the structure has subunits, identify those regularly present in each subunit, located in an area of observed exposure subject to Level II concentrations as described in sections 5.2.0 and 5.2.1.3.1. Identify only once per structure those exposed individuals that are using more than one eligible subunit of the same structure (*e.g.*, using a common or shared area and other parts of the same structure).

2. Do not include exposed individuals already counted under the Level I concentrations factor.

3. For each structure or subunit(s), count the number of individuals residing in or attending school or day care in the structure, or subunit, subject to Level II concentrations.

4. Count the number of full-time and part-time workers in the structure or subunit(s) subject to Level II concentrations. If information is unavailable to classify a worker as full- or part-time, evaluate that worker as being full-time. Divide the number of full-time workers by 3 and the number of part-time workers by 6, and then sum these products with the number of other individuals for each structure or subunit.

5. Sum the combined population value for all structures within the areas of observed exposure for the site.

Assign this sum as the combined population factor value subject to Level II concentrations for this site. Enter this value in line 9b of Table 5–11.

5.2.1.3.2.3 *Population within area(s) of subsurface contamination.* Assign the population in area(s) of subsurface contamination factor value as follows. If sufficient structure-specific concentration data is available and state of the science shows there is no unacceptable risk of exposure to populations in a regularly occupied structure in an area of subsurface contamination, those populations are not included in the evaluation. (see sections 5.2.0 and 5.2.1.3.1):

1. Identify the regularly occupied structures with a structure containment value greater than zero and the eligible population associated with the structures or portions of structures in each area of subsurface contamination:

- For each regularly occupied structure or portion of a structure in an area of subsurface contamination, sum the number of all individuals residing in or attending school or day care, in the structure or portion of the structure in the area of subsurface contamination.
- Count the number of full-time and part-time workers regularly present in each structure or portion of a structure in an area of subsurface contamination. If information is unavailable to classify a worker as full- or part-time, evaluate that worker as being full-time. Divide the number of full-time workers by 3 and the number of part-time workers by 6. Sum these products with the number of individuals residing in or attending school or day care in the structure.
- Use this sum as the population for the structure.

2. Estimate the depth or distance to contamination at each regularly occupied structure within an area of subsurface contamination based on available sampling data, and categorize each eligible structure based on the depth or distance to contamination and sample media as presented in Table 5–21. Weight the population in each structure using the appropriate weighting factors in Table 5–21. If samples from multiple media are available, use the sample that results in the highest weighting factor.

3. Sum the weighted population in all structures within the area(s) of subsurface contamination and assign this sum as the population within an area of subsurface contamination factor value. Enter this value in line 9c of Table 5–11.

TABLE 5–21—WEIGHTING FACTOR VALUES FOR POPULATIONS WITHIN AN AREA OF SUBSURFACE CONTAMINATION

Eligible populations[a] in structures[b] within an area of subsurface contamination	Population weighting factor
Samples From Within Structures or in Crawl Spaces	
1. Population in a structure with levels of contamination in a semi-enclosed or enclosed crawl space sample meeting observed release criteria or Population in a subunit of a multi-story structure within an area of subsurface contamination located directly above a level in an area of observed exposure or a gaseous indoor air sample meeting observed release criteria or Population within a structure where a mitigation system has been installed as part of a removal or other temporary response action.	0.9
2. Population in a structure where levels of contaminants meeting observed release criteria are inferred based on semi-enclosed or enclosed crawl space samples in surrounding structures, and a NAPL is present in those samples	0.8
3. Population in a structure where levels of contaminants meeting observed release criteria are inferred based on semi-enclosed or enclosed crawl space samples in surrounding structures, but no NAPL is present	0.4
Subsurface Samples From Less Than or Equal to 5 Feet From a Foundation	
4. Population in a structure where levels of contaminants meeting observed release criteria are found or inferred based on any sampling media at or within five feet horizontally or vertically of the structure foundation, and a NAPL is present within that depth	0.8
5. Population in a structure where levels of contaminants meeting observed release criteria are found or inferred based on any sampling media at or within five feet horizontally or vertically of the structure foundation, but no NAPL is present within that depth	0.4
Subsurface Samples From Greater Than 5 Feet But Less Than or Equal to 30 Feet Depth	
6. Population in a structure where levels of contaminants meeting observed release criteria are found or inferred based on any underlying non-ground water subsurface sample at a depth greater than 5 feet but less than or equal to 30 feet from a structure foundation and a NAPL is present within that depth	0.4
7. Population in a structure where levels of contaminants meeting observed release criteria are found or inferred based on any underlying non-ground water subsurface sample at a depth greater than 5 feet but less than or equal to 30 feet, but no NAPL is present within that depth	0.2
8. Population in a structure where levels of contaminants meeting observed release criteria are found or inferred based on underlying ground water samples greater than 5 feet from the structure foundation but less than or equal to 30 feet, and a NAPL is present in those samples	0.2
9. Population in a structure where levels of contaminants meeting observed release criteria are found or inferred based on underlying ground water samples greater than 5 feet from the structure foundation but less than or equal to 30 feet, but no NAPL is present in those samples	0.1
Subsurface Samples From Greater Than 30 Feet Depth	
10. Population in a structure where levels of contaminants meeting observed release criteria are found or inferred based on any underlying sample at depths greater than 30 feet	0.1

[a] Eligible populations include residents (including individuals living in, or attending school or day care in the structure), and workers in regularly occupied structures (see HRS Section 5.2.1.3).

[b] Eligible structures may include single- or multi-tenant structures where eligible populations reside, attend school or day care, or work. These structures may also be mixed use structures.

5.2.1.3.2.4 *Calculation of population factor value.* Sum the factor values for Level I concentrations, Level II concentrations, and population within the area(s) of subsurface contamination. Assign this sum as the population factor value. Enter this value in line 9d of Table 5–11.

5.2.1.3.3 *Resources.* Evaluate the resources factor as follows:

- Assign a value of 5 if a resource structure (*e.g.*, library, church, tribal facility) is present and regularly occupied within either an area of observed exposure or area of subsurface contamination.
- Assign a value of 0 if there is no resource structure within an area of observed exposure or area of subsurface contamination.

Enter the value assigned in Table 5–11.

5.2.1.3.4 *Calculation of targets factor category value.* Sum the values for the exposed individual, population, and resources factors. Do not round to the nearest integer. Assign this sum as the targets factor category value for the subsurface intrusion component. Enter this value in Table 5–11.

5.2.2 *Calculation of subsurface intrusion component score.* Multiply the factor category values for likelihood of exposure, waste characteristics, and targets and round the product to the nearest integer. Divide the product by 82,500. Assign the resulting value, subject to a maximum of 100, as the subsurface intrusion component score and enter this score in Table 5–11.

5.3 *Calculation of the soil exposure and subsurface intrusion pathway score.* Sum the soil exposure component score and subsurface intrusion component score. Assign the resulting value, subject to a maximum of 100, as the soil exposure and subsurface intrusion pathway score (S_{sessi}). Enter this score in Table 5–11.

6.0 Air Migration Pathway

Evaluate the air migration pathway based on three factor categories: likelihood of release, waste characteristics, and targets. Figure 6–1 indicates the factors included within each factor category.

Determine the air migration pathway score (S_a) in terms of the factor category values as follows:

$$S_a = \frac{(LR)(WC)(T)}{SF}$$

where:

LR = Likelihood of release factor category value.

WC = Waste characteristics factor category value.

T = Targets factor category value.

SF = Scaling factor.

Table 6–1 outlines the specific calculation procedure.

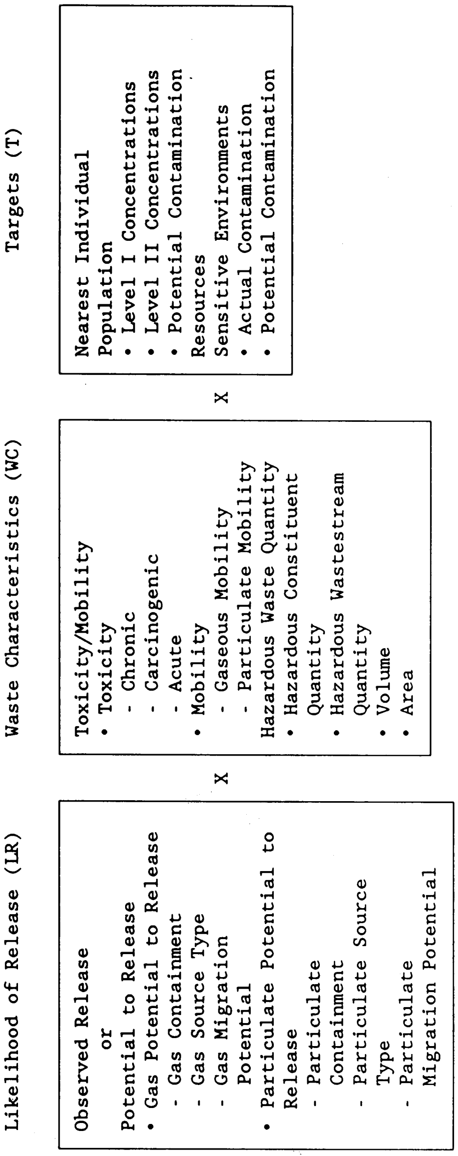


FIGURE 6-1
OVERVIEW OF AIR MIGRATION PATHWAY

TABLE 6–1—AIR MIGRATION PATHWAY SCORESHEET

Factor categories and factors	Maximum value	Value assigned
Likelihood of Release		
1. Observed Release	550	___
2. Potential to Release:		
2a. Gas Potential to Release	500	___
2b. Particulate Potential to Release	500	___
2c. Potential to Release (higher of lines 2a and 2b)	500	___

TABLE 6–1—AIR MIGRATION PATHWAY SCORESHEET—Continued

Factor categories and factors	Maximum value	Value assigned
3. Likelihood of Release (higher of lines 1 and 2c)	550	____
Waste Characteristics		
4. Toxicity/Mobility	(a)	____
5. Hazardous Waste Quantity	(a)	____
6. Waste Characteristics	100	____
Targets		
7. Nearest Individual	50	____
8. Population:		
8a. Level I Concentrations	(b)	____
8b. Level II Concentrations	(b)	____
8c. Potential Contamination	(b)	____
8d. Population (lines 8a + 8b + 8c)	(b)	____
9. Resources	5	____
10. Sensitive Environments		
10a. Actual Contamination	(c)	____
10b. Potential Contamination	(c)	____
10c. Sensitive Environments (lines 10a + 10b)	(c)	____
11. Targets (lines 7 + 8d + 9 + 10c)	(b)	____
Air Migration Pathway Score		
12. Pathway Score (S_a) [(lines 3 × 6 × 11)/82,500] [d]	100	____

[a] Maximum value applies to waste characteristics category.

[b] Maximum value not applicable.

[c] No specific maximum value applies to factor. However, pathway score based solely on sensitive environments is limited to maximum of 60.

[d] Do not round to nearest integer.

6.1 *Likelihood of Release*. Evaluate the likelihood of release factor category in terms of an observed release factor or a potential to release factor.

6.1.1 *Observed release*. Establish an observed release to the atmosphere by demonstrating that the site has released a hazardous substance to the atmosphere. Base this demonstration on either:

- Direct observation—a material (for example, particulate matter) that contains one or more hazardous substances has been seen entering the atmosphere directly. When evidence supports the inference of a release of a material that contains one or more hazardous substances by the site to the atmosphere, demonstrated adverse effects accumulated with that release may be used to establish an observed release.
- Chemical analysis—an analysis of air samples indicates that the concentration of ambient hazardous substance(s) has increased significantly above the background concentration for the site (see section 2.3). Some portion of the significant increase must be attributable to the site to establish the observed release.

If an observed release can be established, assign an observed release factor value of 550, enter this value in table 6–1, and proceed to section 6.1.3. If an observed release cannot be established, assign an observed release factor value of 0, enter this value in table 6–1, and proceed to section 6.1.2.

6.1.2 *Potential to release*. Evaluate potential to release only if an observed release cannot be established. Determine the potential to release factor value for the site by separately evaluating the gas potential to release and the particulate potential to release for each source at the site. Select the highest potential to release value (either gas or particulate) calculated for the sources evaluated and assign that value as the site potential to release factor value as specified below.

6.1.2.1 *Gas potential to release*. Evaluate gas potential to release for those sources that contain gaseous hazardous substances—that is, those hazardous substances with a vapor pressure greater than or equal to 10^{-9} torr.

Evaluate gas potential to release for each source based on three factors: gas containment, gas source type, and gas migration potential. Calculate the gas potential to release value as illustrated in table 6–2. Combine sources with similar characteristics into a single source in evaluating the gas potential to release factors.

TABLE 6–2—GAS POTENTIAL TO RELEASE EVALUATION

Source	Source type[a]	Gas containment factor value[b]	Gas source type factor value[c]	Gas migration potential factor value[d]	Sum	Gas source value
		A	B	C	(B + C)	A(B + C)
1..						
2..						
3..						
4..						
5..						
6..						
7..						
8..						
Gas Potential to Release Factor (Select the Highest Gas Source Value)						

[a] Enter a Source Type listed in table 6–4.
[b] Enter Gas Containment Factor Value from section 6.1.2.1.1.
[c] Enter Gas Source Type Factor Value from section 6.1.2.1.2.
[d] Enter Gas Migration Potential Factor Value from section 6.1.2.1.3.

6.1.2.1.1 *Gas containment.* Assign each source a value from table 6–3 for gas containment. Use the lowest value from table 6–3 that applies to the source, except: assign a value of 10 if there is evidence of biogas release or if there is an active fire within the source.

TABLE 6–3—GAS CONTAINMENT FACTOR VALUES

Gas containment description	Assigned value
All situations except those specifically listed below	10
Evidence of biogas release	10[a]
Active fire within source	10[a]
Gas collection/treatment system functioning, regularly inspected, maintained, and completely covering source	0
Source substantially surrounded by engineering windbreak and no other containment specifically described in this table applies	7
Source covered with essentially impermeable, regularly inspected, maintained cover	0
Uncontaminated soil cover >3 feet:	
• Source substantially vegetated with little exposed soil	0
• Source lightly vegetated with much exposed soil	3
• Source substantially devoid of vegetation	7
Uncontaminated soil cover ≥1 foot and ≥3 feet:	
• Source heavily vegetated with essentially no exposed soil.	
—Cover soil type resistant to gas migration[b]	3
—Cover soil type not resistant to gas migration[b] or unknown	7
• Source substantially vegetated with little exposed soil and cover soil type resistant to gas migration[b]	7
• Other	10
Uncontaminated soil cover <1 foot:	
• Source heavily vegetated with essentially no exposed soil and cover soil type resistant to gas migration[b]	7
• Other	10
Totally or partially enclosed within structurally intact building and no other containment specifically described in this table applies	7
Source consists solely of intact, sealed containers:	
• Totally protected from weather by regularly inspected, maintained cover	0
• Other	3

[a] This value must be used if applicable.
[b] Consider moist fine-grained and saturated coarse-grained soils resistant to gas migration. Consider all other soils nonresistant.

6.1.2.1.2 *Gas source type.* Assign a value for gas source type to each source as follows:

- Determine if the source meets the minimum size requirement based on the source hazardous waste quantity value (see section 2.4.2.1.5). If the source receives a source hazardous waste quantity value of 0.5 or more, consider the source to meet the minimum size requirement.
- If the source meets the minimum size requirement, assign it a value from table 6–4 for gas source type.
- If the source does not meet the minimum size requirement, assign it a value of 0 for gas source type.

If no source at the site meets the minimum size requirement, assign each source at the site a value from table 6–4 for gas source type.

TABLE 6–4—SOURCE TYPE FACTOR VALUES

Source type	Assigned value	
	Gas	Particulate
Active fire area	14	30
Burn pit	19	22
Containers or tanks (buried/below-ground):		
• Evidence of biogas release	33	22
• No evidence of biogas release	11	22
Containers or tanks, not elsewhere specified	28	14
Contaminated soil (excluding land treatment)	19	22
Landfarm/land treatment	28	22
Landfill:		
• Evidence of biogas release	33	22
• No evidence of biogas release	11	22
Pile:		
• Tailings pile	6	28
• Scrap metal or junk pile	6	17
• Trash pile	6	6
• Chemical waste pile	11	28
• Other waste piles	17	28
Surface impoundments (buried/backfilled):		
• Evidence of biogas release	33	22
• No evidence of biogas release	11	22
Surface impoundment (not buried/backfilled):		
• Dry	19	22
• Other	28	0
Other types of sources, not elsewhere specified	0	0

6.1.2.1.3 *Gas migration potential.* Evaluate this factor for each source as follows:

- Assign a value for gas migration potential to each of the gaseous hazardous substances associated with the source (see section 2.2.2) as follows:
  - –Assign values from table 6–5 for vapor pressure and Henry's constant to each hazardous substance. If Henry's constant cannot be determined for a hazardous substance, assign that hazardous substance a value of 2 for the Henry's constant component.
  - –Sum the two values assigned to the hazardous substance.
  - –Based on this sum, assign the hazardous substance a value from table 6–6 for gas migration potential.
- Assign a value for gas migration potential to each source as follows:
  - –Select three hazardous substances associated with the source:
    - –If more than three gaseous hazardous substances can be associated with the source, select three that have the highest gas migration potential values.
    - –If fewer than three gaseous hazardous substances can be associated with a source, select all of them.
  - –Average the gas migration potential values assigned to the selected hazardous substances.
  - –Based on this average value, assign the source a gas migration potential value from table 6–7.

TABLE 6–5—VALUES FOR VAPOR PRESSURE AND HENRY'S CONSTANT

Vapor pressure (Torr)	Assigned value
Greater than 10	3
Greater than 10^{-3} to 10	2
10^{-5} to 10^{-3}	1
Less than 10^{-5}	0

Henry's constant (atm-m^3/mol)	Assigned value
Greater than 10^{-3}	3
Greater than 10^{-5} to 10^{-3}	2
10^{-7} to 10^{-5}	1
Less than 10^{-7}	0

TABLE 6–6—GAS MIGRATION POTENTIAL VALUES FOR A HAZARDOUS SUBSTANCE

Sum of values for vapor pressure and Henry's constant	Assigned value
0	0
1 or 2	6
3 or 4	11
5 or 6	17

TABLE 6–7—GAS MIGRATION POTENTIAL VALUES FOR THE SOURCE

Average of gas migration potential values for three hazardous substances[a]	Assigned value
0 to <3	0
3 to <8	6
8 to <14	11
14 to 17	17

[a] If fewer than three hazardous substances can be associated with the source, compute the average based only on those hazardous substances that can be associated.

6.1.2.1.4 *Calculation of gas potential to release value.* Determine the gas potential to release value for each source as illustrated in table 6–2. For each source, sum the gas source type factor value and gas migration potential factor value and multiply this sum by the gas containment factor value. Select the highest product calculated for the sources evaluated and assign it as the gas potential to release value for the site. Enter this value in table 6–1.

6.1.2.2 *Particulate potential to release.* Evaluate particulate potential to release for those sources that contain particulate hazardous substances—that is, those hazardous substances with a vapor pressure less than or equal to 10^{-1} torr.

Evaluate particulate potential to release for each source based on three factors: particulate containment, particulate source type, and particulate migration potential.

Calculate the particulate potential to release value as illustrated in table 6–8. Combine sources with similar characteristics into a single source in evaluating the particulate potential to release factors.

6.1.2.2.1 *Particulate containment.* Assign each source a value from table 6–9 for particulate containment. Use the lowest value from table 6–9 that applies to the source.

6.1.2.2.2 *Particulate source type.* Assign a value for particulate source type to each source in the same manner as specified for gas sources in section 6.1.2.1.2.

6.1.2.2.3 *Particulate migration potential.* Based on the site location, assign a value from Figure 6–2 for particulate migration potential. Assign this same value to each source at the site.

TABLE 6–8—PARTICULATE POTENTIAL TO RELEASE EVALUATION

Source	Source type [a]	Particulate containment factor value [b]	Particulate type factor value [c]	Particulate migration potential factor value [d]	Sum	Particulate source value
		A	B	C	(B + C)	A (B + C)
1..						
2..						
3..						
4..						
5..						
6..						
7..						
8..						

Particulate Potential to Release Factor Value (Select Highest Particulate Source Value)

[a] Enter a Source Type listed in table 6–4.

[b] Enter Particulate Containment Factor Value from section 6.1.2.2.1.

[c] Enter Particulate Source Type Factor Value from section 6.1.2.2.2.

[d] Enter Particulate Migration Potential Factor Value from section 6.1.2.2.3.

TABLE 6–9—PARTICULATE CONTAINMENT FACTOR VALUES

Particulate containment description	Assigned value
All situations except those specifically listed below	10
Source contains only particulate hazardous substances totally covered by liquids	0
Source substantially surrounded by engineered windbreak and no other containment specifically described in this table applies	7
Source covered with essentially impermeable, regularly inspected, maintained cover	0
Uncontaminated soil cover >3 feet:	
• Source substantially vegetated with little or no exposed soil	0
• Source lightly vegetated with much exposed soil	3
• Source substantially devoid of vegetation	7
Uncontaminated soil cover ≥1 foot and ≤3 feet:	
• Source heavily vegetated with essentially no exposed soil:	
—Cover soil type resistant to gas migration [a]	3
—Cover soil type not resistant to gas migration [a] or unknown	7
• Source substantially vegetated with little exposed soil and cover soil type resistant to gas migration [a]	7
• Other	10
Uncontaminated soil cover <1 foot:	
• Source heavily vegetated with essentially no exposed soil and cover soil type resistant to gas migration [a]	7
• Other	10
Totally or partially enclosed within structurally intact building and no other containment specifically described in this table applies	7
Source consists solely of containers:	
• All containers contain only liquids	0
• All containers intact, sealed, and totally protected from weather by regularly inspected, maintained cover	0
• All containers intact and sealed	3
• Other	10

[a] Consider moist fine-grained and saturated coarse-grained soils resistant to gas migration. Consider all other soils nonresistant.

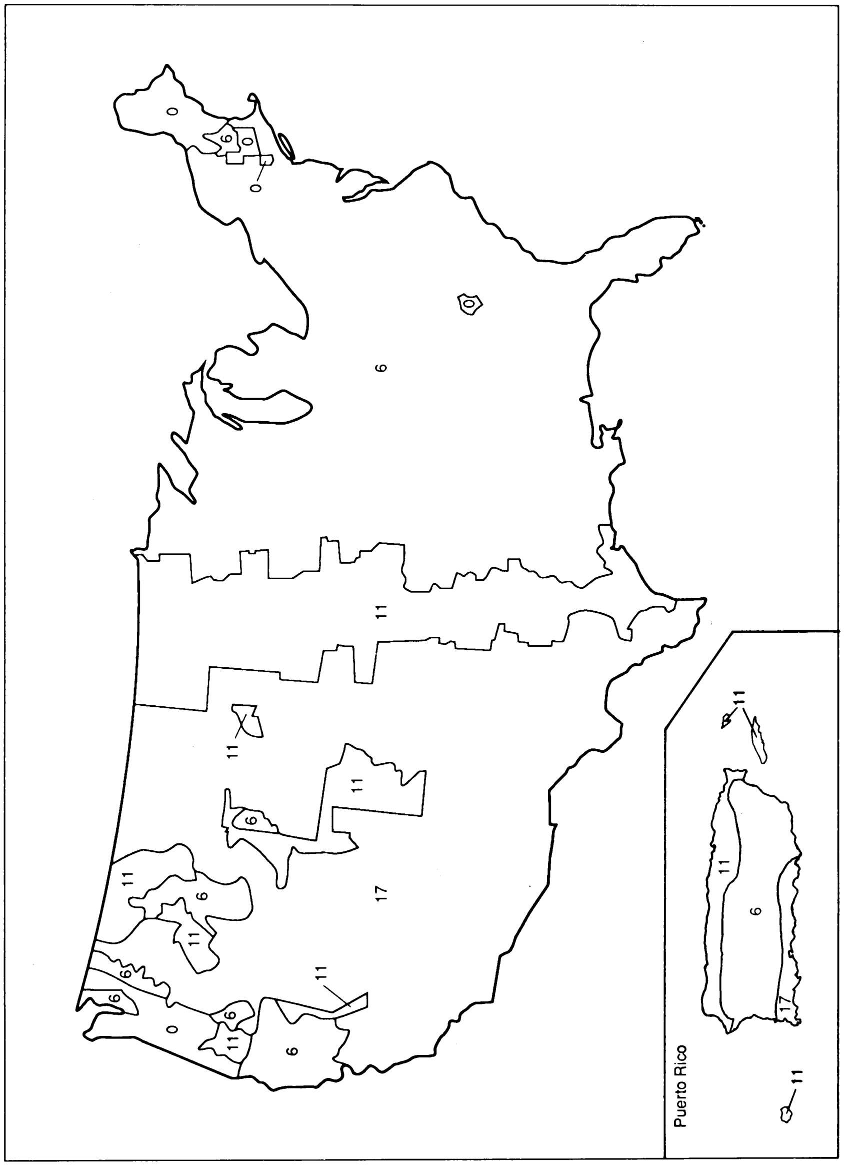


FIGURE 6-2
PARTICULATE MIGRATION POTENTIAL FACTOR VALUES

FIGURE 6–2—PARTICULATE MIGRATION POTENTIAL FACTOR VALUES—CONCLUDED

Location	Particulate migration potential assigned value
Hawaiian Islands	
Hilo, Hawaii	0
Honolulu, Oahu	17
Kahului, Maui	17
Lanai	17
Lihue, Kauai	11
Molokai	17
Pacific Islands	
Guam	6
Johnston Island	17
Koror Island	0
Kwajalein Island	6
Mujuro, Marshall Islands	0
Pago Pago, American Samoa	0
Ponape Island	0
Truk, Caroline Islands	0
Wake Island	17
Yap Island	0
Alaska	
Anchorage	17
Annette	0
Barrow	17
Barter Island	17
Bethel	17
Bettles	17
Big Delta	17
Cold Bay	6
Fairbanks	17
Gulkana	17
Homer	11
Juneau	0
King Salmon	11
Kodiak	0
Kutzebue	17
McGrath	17
Nome	11
St. Paul Island	11
Talkeetna	6
Unalakleet	17
Valdez	0
Yakutat	0
American Virgin Islands	
St. Croix	17
St. John	11
St. Thomas	11
Puerto Rico	
Arecibo	6
Coloso	6
Fajardo	11
Humacao	6
Isabela Station	11
Ponce	17
San Juan	11

For site locations not on Figure 6–2, and for site locations near the boundary points on Figure 6–2, assign a value as follows. First, calculate a Thornthwaite P-E index using the following equation:

$$PE = \sum_{i=1}^{12} 115\left[P_i/\left(T_i - 10\right)\right]^{10/9}$$

where:

PE = Thornthwaite P-E index.

P_i = Mean monthly precipitation for month i, in inches.

T_i = Mean monthly temperature for month i, in degrees Fahrenheit; for any month having a mean monthly temperature less than 28.4 °F, use 28.4 °F.

Based on the calculated Thornthwaite P-E index, assign a source particulate migration potential value to the site from table 6–10. Assign this same value to each source at the site.

TABLE 6–10—PARTICULATE MIGRATION POTENTIAL VALUES

Thornthwaite P-E Index	Assigned value
Greater than 150	0
85 to 150	6
50 to less than 85	11
Less than 50	17

6.1.2.2.4 *Calculation of particulate potential to release value.* Determine the particulate potential to release value for each source as illustrated in table 6–8. For each source, sum its particulate source type factor value and particulate migration potential factor value and multiply this sum by its particulate containment factor value. Select the highest product calculated for the sources evaluated and assign it as the particulate potential to release value for the site. Enter the value in table 6–1.

6.1.2.3 *Calculation of potential to release factor value for the site.* Select the higher of the gas potential to release value assigned in section 6.1.2.1.4 and the particulate potential to release value assigned in section 6.1.2.2.4. Assign the value selected as the site potential to release factor value. Enter this value in table 6–1.

6.1.3 *Calculation of likelihood of release factor category value.* If an observed release is established, assign the observed release factor value of 550 as the likelihood of release factor category value. Otherwise, assign the site potential to release factor value as the likelihood of release factor category value. Enter the value in table 6–1.

6.2 *Waste characteristics.* Evaluate the waste characteristics factor category based on two factors: toxicity/mobility and hazardous waste quantity. Evaluate only those hazardous substances available to migrate from the sources at the site to the atmosphere. Such hazardous substances include:

- Hazardous substances that meet the criteria for an observed release to the atmosphere.
- All gaseous hazardous substances associated with a source that has a gas containment factor value greater than 0 (see section 2.2.2, 2.2.3, and 6.1.2.1.1).
- All particulate hazardous substances associated with a source that has a particulate

containment factor value greater than 0 (see section 2.2.2, 2.2.3, and 6.1.2.2.1).

6.2.1 *Toxicity/mobility*. For each hazardous substance, assign a toxicity factor value, a mobility factor value, and a combined toxicity/mobility factor value as specified below. Select the toxicity/mobility factor value for the air migration pathway as specified in section 6.2.1.3.

6.2.1.1 *Toxicity*. Assign a toxicity factor value to each hazardous substance as specified in section 2.4.1.1.

6.2.1.2 *Mobility*. Assign a mobility factor value to each hazardous substance as follows:

- Gaseous hazardous substance.

–Assign a mobility factor value of 1 to each gaseous hazardous substance that meets the criteria for an observed release to the atmosphere.

–Assign a mobility factor value from table 6–11, based on vapor pressure, to each gaseous hazardous substance that does not meet the criteria for an observed release.

- Particulate hazardous substance.

–Assign a mobility factor value of 0.02 to each particulate hazardous substance that meets the criteria for an observed release to the atmosphere.

–Assign a mobility factor value from Figure 6–3, based on the site's location, to each particulate hazardous substance that does not meet the criteria for an observed release. (Assign all such particulate hazardous substances this same value.)

–For site locations not on Figure 6–3 and for site locations near the boundary points on Figure 6–3, assign a mobility factor value to each particulate hazardous substance that does not meet the criteria for an observed release as follows:

–Calculate a value M:

$M = 0.0182 (U^3/[PE]^2)$

where:

U = Mean average annual wind speed (meters per second).

PE = Thornthwaite P-E index from section 6.1.2.2.3.

–Based on the value M, assign a mobility factor value from table 6–12 to each particulate hazardous substance.

- Gaseous and particulate hazardous substances.

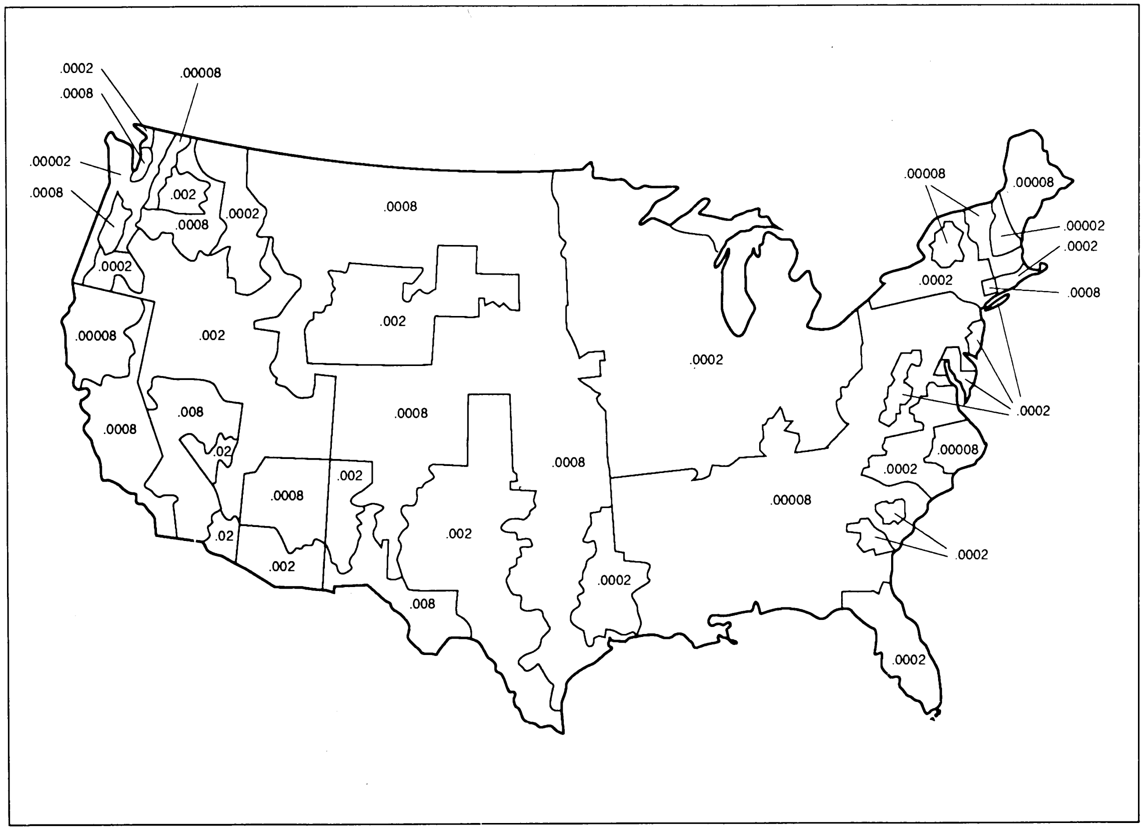
–For a hazardous substance potentially present in both gaseous and particulate forms, select the higher of the factor values for gas mobility and particulate mobility for that substance and assign that value as the mobility factor value for the hazardous substance.

6.2.1.3 *Calculation of toxicity/mobility factor value*. Assign each hazardous substance a toxicity/mobility factor value from table 6–13, based on the values assigned to the hazardous substance for the toxicity and mobility factors. Use the hazardous substance with the highest toxicity/mobility factor value to assign the value to the toxicity/mobility factor for the air migration pathway. Enter this value in table 6–1.

TABLE 6–11—GAS MOBILITY FACTOR VALUES

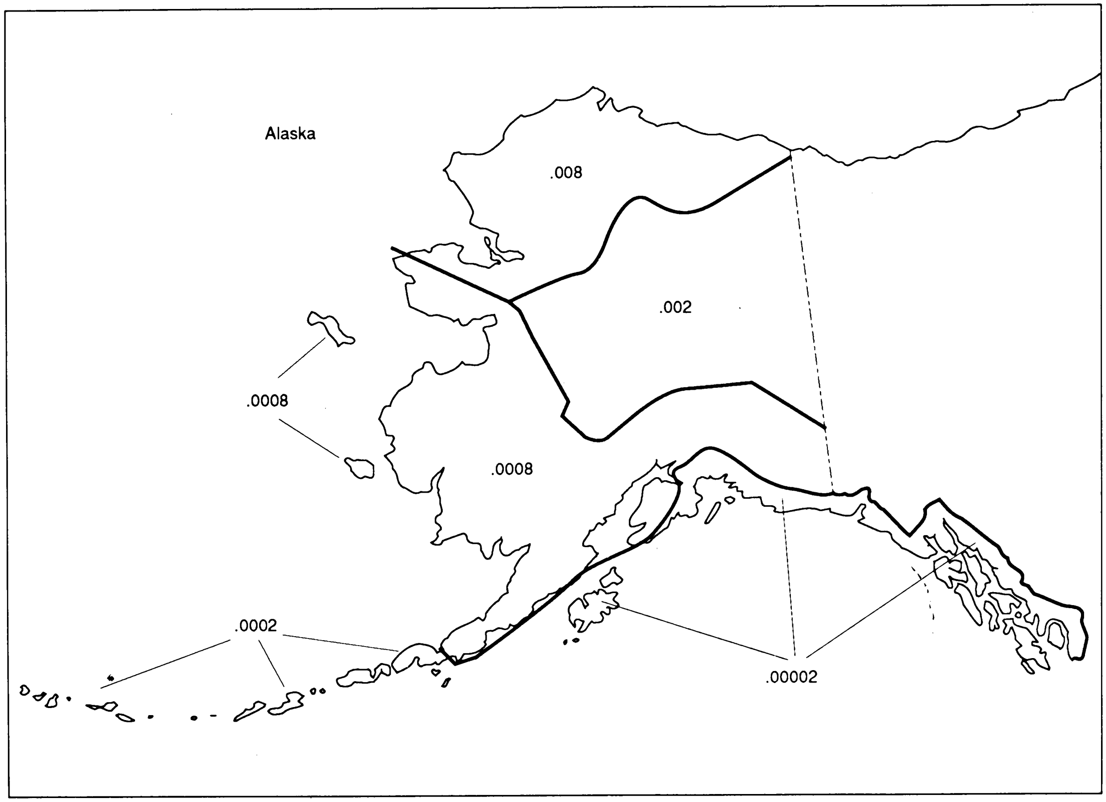
Vapor pressure (Torr)	Assigned value [a]
Greater than 10^{-1}	1.0
Greater than 10^{-3} to 10^{-1}	0.2
Greater than 10^{-5} to 10^{-3}	0.02
Greater than 10^{-7} to 10^{-5}	0.002
Less than or equal to 10^{-7}	0.0002

[a] Do not round to nearest integer.



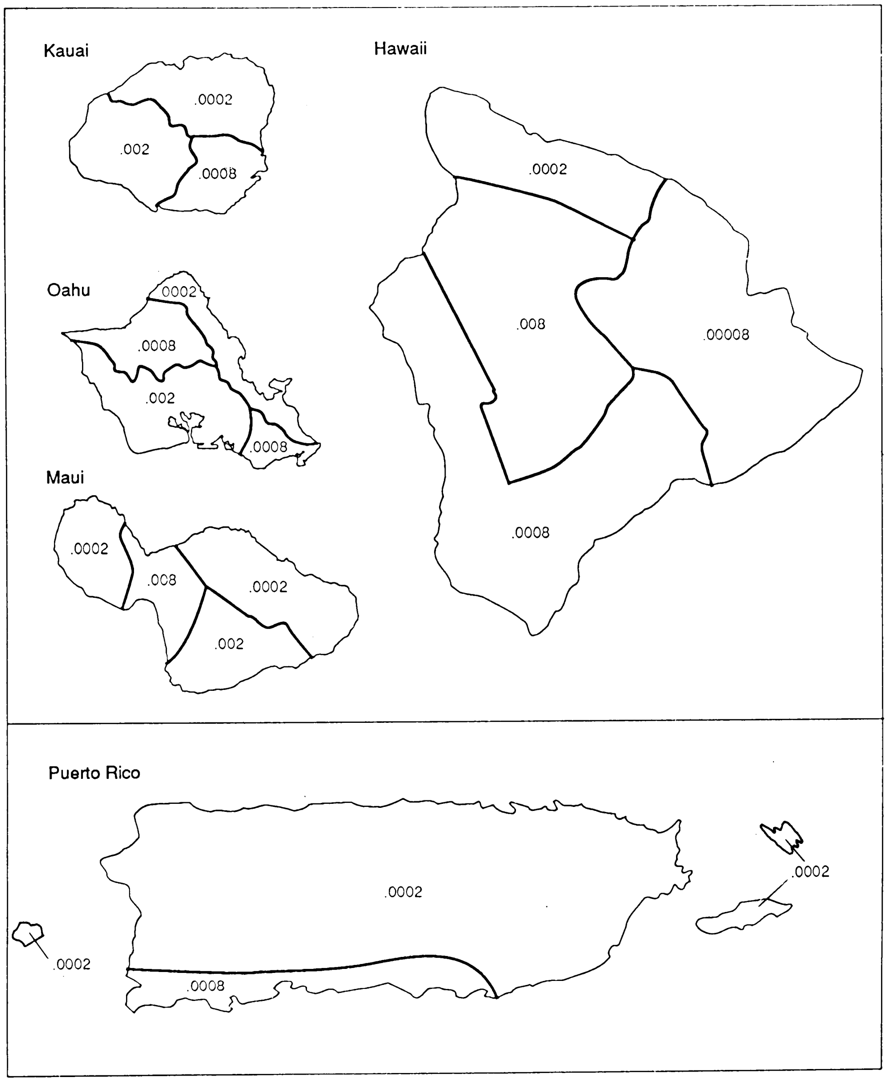
[a] Do not round to nearest integer.

FIGURE 6-3
PARTICULATE MOBILITY FACTOR VALUES[a]



[a] Do not round to nearest integer.

FIGURE 6-3
PARTICULATE MOBILITY FACTOR VALUES[a]
(CONTINUED)



[a] Do not round to nearest integer.

FIGURE 6-3
PARTICULATE MOBILITY FACTOR VALUES[a]
(CONTINUED)

FIGURE 6–3—PARTICULATE MOBILITY FACTOR VALUES—CONCLUDED

Location	Particulated mobility assigned value
Pacific Islands	
Guam	0.0002
Johnston Island	0.002
Koror Island	0.00008
Kwajalein Island	0.0002
Mujuro, Marshall Islands	0.00008
Pago Pago, American Samoa	0.00008
Ponape Island	0.00002
Truk, Caroline Islands	0.00008
Wake Island	0.002
Yap Island	0.00008
American Virgin Islands	
St. Croix	0.0008
St. John	0.0002
St. Thomas	0.0002

TABLE 6–12—PARTICULATE MOBILITY FACTOR VALUES

M	Assigned value[a]
Greater than 1.4×10^{-2}	0.02
Greater than 4.4×10^{-3} to 1.4×10^{-2}	0.008
Greater than 1.4×10^{-3} to 4.4×10^{-3}	0.002
Greater than 4.4×10^{-4} to 1.4×10^{-3}	0.0008
Greater than 1.4×10^{-4} to 4.4×10^{-4}	0.0002
Greater than 4.4×10^{-5} to 1.4×10^{-4}	0.00008
Less than or equal to 4.4×10^{-5}	0.00002

[a] Do not round to nearest integer.

TABLE 6–13—TOXICITY/MOBILITY FACTOR VALUES[a]

Mobility factor value	Toxicity factor value					
	10,000	1,000	100	10	1	0
1.0	10,000	1,000	100	10	1	0
0.2	2,000	200	20	2	0.2	0
0.02	200	20	2	0.2	0.02	0
0.008	80	8	0.8	0.08	0.008	0
0.002	20	2	0.2	0.02	0.002	0
0.0008	8	0.8	0.08	0.008	0.0008	0
0.0002	2	0.2	0.02	0.002	0.0002	0
0.00008	0.8	0.08	0.008	0.0008	0.00008	0
0.00002	0.2	0.02	0.002	0.0002	0.00002	0

[a] Do not round to nearest integer.

6.2.2 *Hazardous waste quantity.* Assign a hazardous waste quantity factor value for the air migration pathway as specified in section 2.4.2. Enter this value in table 6–1.

6.2.3 *Calculation of waste characteristics factor category value.* Multiply the toxicity/mobility factor value and the hazardous waste quantity factor value, subject to a maximum product of 1×10^8. Based on this product, assign a value from table 2–7 (section 2.4.3.1) to the waste characteristics factor category. Enter this value in table 6–1.

6.3 *Targets.*

Evaluate the targets factor category based on four factors: nearest individual, population, resources, and sensitive environments. Include only those targets (for example, individuals, sensitive environments) located within the 4-mile target distance limit, except: if an observed release is established beyond the 4-mile target distance limit, include those additional targets that are specified below in this section and in section 6.3.4.

Evaluate the nearest individual and population factors based on whether the target populations are subject to Level I concentrations, Level II concentrations, or potential contamination. Determine which applies to a target population as follows.

If no samples meet the criteria for an observed release to air and if there is no observed release by direct observation, consider the entire population within the 4-mile target distance limit to be subject to potential contamination.

If one or more samples meet the criteria for an observed release to air or if there is an observed release by direct observation, evaluate the population as follows:

- Determine the most distant sample location that meets the criteria for Level I concentrations as specified in sections 2.5.1 and 2.5.2 and the most distant location (that is, sample location or direct observation location) that meets the criteria for Level II concentrations. Use the health-based benchmarks from table 6–14 in determining the level of contamination for sample locations. If the most distant Level II location is closer to a source than the most distant Level I sample location, do not consider the Level II location.
- Determine the single most distant location (sample location or direct observation location) that meets the criteria for Level I or Level II concentrations.

- If this single most distant location is within the 4-mile target distance limit, identify the distance categories from table 6–15 in which the selected Level I concentrations sample and Level II concentrations sample (or direct observation location) are located:
  - –Consider the target population anywhere within this furthest Level I distance category, or anywhere within a distance category closer to a source at the site, as subject to Level I concentrations.
  - –Consider the target population located beyond any Level I distance categories, up to and including the population anywhere within the furthest Level II distance category, as subject to Level II concentrations.
  - –Consider the remainder of the target population within the 4-mile target distance limit as subject to potential contamination.
- If the single most distant location is beyond the 4-mile target distance limit, identify the distance at which the selected Level I concentrations sample and Level II concentrations sample (or direct observation location) are located:
  - –If the Level I sample location is within the 4-mile target distance limit, identify the target population subject to Level I concentrations as specified above.
  - –If the Level I sample location is beyond the 4-mile target distance limit, consider the target population located anywhere within a distance from the sources at the site equal to the distance to this sample location to be subject to Level I concentrations and include them in the evaluation.
  - –Consider the target population located beyond the Level I target population, but located anywhere within a distance from the sources at the site equal to the distance to the selected Level II location, to be subject to Level II concentrations and include them in the evaluation.
  - –Do not include any target population as subject to potential contamination.

TABLE 6–14—HEALTH-BASED BENCHMARKS FOR HAZARDOUS SUBSTANCES IN AIR

- Concentration corresponding to National Ambient Air Quality Standard (NAAQS).
- Concentration corresponding to National Emission Standards for Hazardous Air Pollutants (NESHAPs).
- Screening concentration for cancer corresponding to that concentration that corresponds to the 10^{-6} individual cancer risk for inhalation exposures.
- Screening concentration for noncancer toxicological responses corresponding to the Reference Concentration (RfC) for inhalation exposures.

TABLE 6–15—AIR MIGRATION PATHWAY DISTANCE WEIGHTS

Distance category (miles)	Assigned distance weight[a]
0	1.0
Greater than 0 to ¼	0.25
Greater than ¼ to ½	0.054
Greater than ½ to 1	0.016
Greater than 1 to 2	0.0051
Greater than 2 to 3	0.0023
Greater than 3 to 4	0.0014
Greater than 4	0

[a] Do not round to nearest integer.

6.3.1 *Nearest individual.* Assign the nearest individual factor a value as follows:

- If one or more residences or regularly occupied buildings or areas is subject to Level I concentrations as specified in section 6.3, assign a value of 50.
- If not, but if one or more a residences or regularly occupied buildings or areas is subject to Level II concentrations, assign a value of 45.
- If none of the residences and regularly occupied buildings and areas is subject to Level I or Level II concentrations, assign a value to this factor based on the shortest distance to any residence or regularly occupied building or area, as measured from any source at the site with an air migration containment factor value greater than 0. Based on this shortest distance, assign a value from table 6–16 to the nearest individual factor.

Enter the value assigned in table 6–1.

TABLE 6–16—NEAREST INDIVIDUAL FACTOR VALUES

Distance to nearest individual (miles)	Assigned value
Level I concentrations[a]	50
Level II concentrations[a]	45
0 to ⅛	20
Greater than ⅛ to ¼	7
Greater than ¼ to 1/2	2
Greater than ½ to 1	1
Greater than 1	0

[a] Distance does not apply.

6.3.2 *Population.* In evaluating the population factor, count residents, students, and workers regularly present within the target distance limit. Do not count transient populations such as customers and travelers passing through the area.

In estimating residential population, when the estimate is based on the number of residences, multiply each residence by the average number of persons per residence for the county in which the residence is located.

6.3.2.1 *Level of contamination.* Evaluate the population factor based on three factors: Level I concentrations, Level II concentrations, and potential contamination.

Evaluate the population subject to Level I concentrations (see section 6.3) as specified in section 6.3.2.2, the population subject to Level II concentrations as specified in section 6.3.2.3, and the population subject to potential contamination as specified in section 6.3.2.4.

For the potential contamination factor, use population ranges in evaluating the factor as specified in section 6.3.2.4. For the Level I and Level II concentrations factors, use the population estimate, not population ranges, in evaluating both factors.

6.3.2.2 *Level I concentrations.* Sum the number of people subject to Level I concentrations. Multiply this sum by 10. Assign the product as the value for this factor. Enter this value in table 6–1.

6.3.2.3 *Level II concentrations.* Sum the number of people subject to Level II concentrations. Do not include those people already counted under the Level I concentrations factor. Assign this sum as the value for this factor. Enter this value in table 6–1.

6.3.2.4 *Potential contamination.* Determine the number of people within each distance category of the target distance limit (see table 6–15) who are subject to potential contamination. Do not include those people already counted under the Level I and Level II concentrations factors.

Based on the number of people present within a distance category, assign a distance-weighted population value for that distance category from table 6–17. (Note that the distance-weighted population values in table 6–17 incorporate the distance weights from table 6–15. Do not multiply the values from table 6–17 by these distance weights.)

Calculate the potential contamination factor value (PI) as follows:

$$PI = \frac{1}{10}\sum_{i=1}^{n} W_i$$

where:

W_i = Distance-weighted population from table 6–17 for distance category i.

n = Number of distance categories.

If PI is less than 1, do not round it to the nearest integer; if PI is 1 or more, round to the nearest integer. Enter this value in table 6–1.

6.3.2.5 *Calculation of population factor value.* Sum the factor values for Level I concentrations, Level II concentrations, and potential contamination. Do not round this sum to the nearest integer. Assign this sum as the population factor value. Enter this value in table 6–1.

TABLE 6–17—DISTANCE-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FACTOR FOR AIR PATHWAY [a]

Distance category (miles)	Number of people within the distance category												
	0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,001 to 3,000,000
On a source	0	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455
Greater than 0 to ¼	0	1	4	13	41	131	408	1,304	4,081	13,034	40,812	130,340	408,114
Greater than ¼ to ½	0	0.2	0.9	3	9	28	88	282	882	2,815	8,815	28,153	88,153
Greater than ½ to 1	0	0.06	0.3	0.9	3	8	26	83	261	834	2,612	8,342	26,119
Greater than 1 to 2	0	0.02	0.09	0.3	0.8	3	8	27	83	266	833	2,659	8,326
Greater than 2 to 3	0	0.009	0.04	0.1	0.4	1	4	12	38	120	375	1,199	3,755
Greater than 3 to 4	0	0.005	0.02	0.07	0.2	0.7	2	7	23	73	229	730	2,285

[a] Round the number of people present within a distance category to nearest integer. Do not round the assigned distance-weighted population value to nearest integer.

6.3.3 *Resources.* Evaluate the resources factor as follows:

- Assign a value of 5 if one or more of the following resources are present within one-half mile of a source at the site having an air migration containment factor value greater than 0:
  - –Commercial agriculture.
  - –Commercial silviculture.
  - –Major or designated recreation area.
- Assign a value of 0 if none of these resources is present.

Enter the value assigned in table 6–1.

6.3.4 *Sensitive environments.* Evaluate sensitive environments based on two factors: actual contamination and potential contamination. Determine which factor applies as follows.

If no samples meet the criteria for an observed release to air and if there is no observed release by direct observation, consider all sensitive environments located, partially or wholly, within the target distance limit to be subject to potential contamination.

If one or more samples meet the criteria for an observed release to air or if there is an observed release by direct observation, determine the most distant location (that is, sample location or direct observation location) that meets the criteria for an observed release:

- If the most distant location meeting the criteria for an observed release is within the 4-mile target distance limit, identify the distance category from table 6–15 in which it is located:
  - –Consider sensitive environments located, partially or wholly, anywhere within this distance category or anywhere within a distance category closer to a source at the site as subject to actual contamination.
  - –Consider all other sensitive environments located, partially or wholly, within the target distance limit as subject to potential contamination.
- If the most distant location meeting the criteria for an observed release is beyond the 4-mile target distance limit, identify the distance at which it is located:
  - –Consider sensitive environments located, partially or wholly, anywhere within a distance from the sources at the site equal to the distance to this location to be subject to actual contamination and include all such sensitive environments in the evaluation.
  - –Do not include any sensitive environments as subject to potential contamination.

6.3.4.1 *Actual contamination.* Determine those sensitive environments subject to actual contamination (*i.e.*, those located partially or wholly within a distance category subject to actual contamination). Assign value(s) from table 4–23 (section 4.1.4.3.1.1) to each sensitive environment subject to actual contamination.

For those sensitive environments that are wetlands, assign an additional value from table 6–18. In assigning a value from table 6–18, include only those portions of wetlands located within distance categories subject to actual contamination. If a wetland is located partially in a distance category subject to actual contamination and partially in one subject to potential contamination, then solely for purposes of table 6–18, count the portion in the distance category subject to potential contamination under the potential contamination factor in section 6.3.4.2. Determine the total acreage of wetlands within those distance categories subject to actual contamination and assign a value from table 6–18 based on this total acreage.

Calculate the actual contamination factor value (EA) as follows:

$$EA = WA + \sum_{i=1}^{n} S_i$$

where:

WA = Value assigned from table 6–18 for wetlands in distance categories subject to actual contamination.

S_i = Value(s) assigned from table 4–23 to sensitive environment i.

n = Number of sensitive environments subject to actual contamination.

Enter the value assigned in table 6–1.

TABLE 6–18—WETLANDS RATING VALUES FOR AIR MIGRATION PATHWAY [a]

Wetland area (acres)	Assigned value
Less than 1	0
1 to 50	25
Greater than 50 to 100	75
Greater than 100 to 150	125
Greater than 150 to 200	175
Greater than 200 to 300	250
Greater than 300 to 400	350
Greater than 400 to 500	450
Greater than 500	500

[a] Wetlands as defined in 40 CFR section 230.3.

6.3.4.2 *Potential contamination.* Determine those sensitive environments located, partially or wholly, within the target distance limit that are subject to potential contamination. Assign value(s) from table 4–23 to each sensitive environment subject to potential contamination. Do not include those sensitive environments already counted for table 4–23 under the actual contamination factor.

For each distance category subject to potential contamination, sum the value(s) assigned from table 4–23 to the sensitive environments in that distance category. If a sensitive environment is located in more than one distance category, assign the sensitive environment only to that distance category having the highest distance weighting value from table 6–15.

For those sensitive environments that are wetlands, assign an additional value from table 6–18. In assigning a value from table 6–18, include only those portions of wetlands located within distance categories subject to potential contamination, as specified in section 6.3.4.1. Treat the wetlands in each separate distance category as separate sensitive environments solely for purposes of applying table 6–18. Determine the total acreage of wetlands within each of these distance categories and assign a separate value from table 6–18 for each distance category.

Calculate the potential contamination factor value (EP) as follows:

$$EP = \frac{1}{10}\sum_{j=1}^{m}\left(\left[W_j + S_j\right]D_j\right)$$

$$S_j = \sum_{i=1}^{n} S_{ij}$$

S_{ij} = Value(s) assigned from table 4–23 to sensitive environment in distance category j.

n = Number of sensitive environments subject to potential contamination.

W_j = Value assigned from table 6–18 for wetland area in distance category j.

D_j = Distance weight from table 6–15 for distance category j.

m = Number of distance categories subject to potential contamination.

If EP is less than 1, do not round it to the nearest integer; if EP is 1 or more, round to the nearest integer. Enter the value assigned in table 6–1.

6.3.4.3 *Calculation of sensitive environments factor value.* Sum the factor values for actual contamination and potential contamination. Do not round this sum, designated as EB, to the nearest integer.

Because the pathway score based solely on sensitive environments is limited to a maximum of 60, use the value EB to determine the value for the sensitive environments factor as follows:

- Multiply the values assigned to likelihood of release (LR), waste characteristics (WC), and EB. Divide the product by 82,500.

–If the result is 60 or less, assign the value EB as the sensitive environments factor value.

–If the result exceeds 60, calculate a value EC as follows:

$$EC = \frac{(60)(82{,}500)}{(LR)(WC)}$$

Assign the value EC as the sensitive environments factor value. Do not round this value to the nearest integer.

Enter the value assigned for the sensitive environments factor in table 6–1.

6.3.5 *Calculation of targets factor category value.* Sum the nearest individual, population, resources, and sensitive environments factor values. Do not round this sum to the nearest integer. Assign this sum as the targets factor category value. Enter this value in table 6–1.

6.4 *Calculation of air migration pathway score.* Multiply the values for likelihood of release, waste characteristics, and targets, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum value of 100, as the air migration pathway score (S_a). Enter this score in table 6–1.

7.0 Sites Containing Radioactive Substances.

In general, radioactive substances are hazardous substances under CERCLA and should be considered in HRS scoring. Releases of certain radioactive substances are, however, excluded from the definition of ‘‘release’’ in section 101(22) of CERCLA, as amended, and should not be considered in HRS scoring.

Evaluate sites containing radioactive substances using the instructions specified in sections 2 through 6, supplemented by the instructions in this section. Those factors denoted with a ‘‘yes’’ in table 7–1 are evaluated differently for sites containing radioactive substances than for sites containing only nonradioactive hazardous substances, while those denoted with a ‘‘no’’ are not evaluated differently and are not addressed in this section.

TABLE 7–1—HRS FACTORS EVALUATED DIFFERENTLY FOR RADIONUCLIDES

Ground water pathway	Status [a]	Surface water pathway	Status [a]	Soil exposure component of SESSI pathway	Status [a]	Subsurface intrusion component of SESSI pathway	Status [a]	Air pathway	Status [a]
Likelihood of Release		Likelihood of Release		Likelihood of Exposure		Likelihood of Exposure		Likelihood of Release	
Observed Release	Yes	Observed Release	Yes	Observed Contamination.	Yes	Observed Exposure.	Yes	Observed Release	Yes.
Potential to Release	No	Potential to Release.	No	Attractiveness/Accessibility to Nearby Residents.	No	Potential for Exposure.	Yes	Gas Potential to Release.	No.
Containment	No	Overland Flow Containment.	No	Area of Contamination.	No	Structure Containment.	No	Gas Containment	No.
Net Precipitation	No	Runoff	No	....	....	Depth to Contamination.	Yes	Gas Source Type	No.
Depth to Aquifer	No	Distance to Surface water.	No	....	....	Vertical migration	No	Gas Migration Potential.	No.
Travel Time	No	Flood Frequency	No	....	....	Vapor Migration Potential.	No	Particulate Potential to Release.	No.
		Flood Containment.	No	....	....	Area of Observed Exposure.	No	Particulate Containment.	No.
						Area of Subsurface Contamination.	No	Particulate Source Type.	No.
								Particulate Migration Potential.	No.
Waste Characteristics		Waste Characteristics		Waste Characteristics		Waste Characteristics		Waste Characteristics	
Toxicity	Yes	Toxicity/Ecotoxicity	Yes/Yes	Toxicity	Yes	Toxicity/Degradation.	Yes/Yes	Toxicity	Yes.
Mobility	No	Persistence/Mobility.	Yes/No	Hazardous Waste Quantity.	Yes	Hazardous Waste Quantity.	Yes	Mobility	No.
Hazardous Waste Quantity	Yes	Bioaccumulation Potential.	No	....	....	....	....	Hazardous Waste Quantity.	Yes.
		Hazardous Waste Quantity.	Yes.						
Targets		Targets		Targets		Targets		Targets	
Nearest Well	Yes [b]	Nearest Intake	Yes [b]	Resident Individual.	Yes [b]	Exposed Individual	Yes [b]	Nearest Individual	Yes.[b]
Population	Yes [b]	Drinking Water Population.	Yes [b]	Resident Population.	Yes [b]	Population	Yes [b]	Population	Yes.[b]
Resources	No	Resources	No	Workers	No	Resources	No	Resources	No.

TABLE 7–1—HRS FACTORS EVALUATED DIFFERENTLY FOR RADIONUCLIDES—Continued

Ground water pathway	Status[a]	Surface water pathway	Status[a]	Soil exposure component of SESSI pathway	Status[a]	Subsurface intrusion component of SESSI pathway	Status[a]	Air pathway	Status[a]
Targets		Targets		Targets		Targets		Targets	
Wellhead Protection Area	No	Sensitive Environments.	Yes[b]	Resources	No			Sensitive Environments.	No.
		Human Food Chain Individual.	Yes[b]	Terrestrial Sensitive Environments.	No.				
		Human Food Chain Population.	Yes[b]	Nearby Individual	No				
				Population Within 1 Mile.	No.				

a—Factors evaluated differently are denoted by “yes”; factors not evaluated differently are denoted by “no”.

b—Difference is in the determination of Level I and Level II concentrations.

In general, sites containing mixed radioactive and other hazardous substances involve more evaluation than sites containing only radionuclides. For sites containing mixed radioactive and other hazardous substances, HRS factors are evaluated based on considerations of both the radioactive substances and the other hazardous substances in order to derive a single set of factor values for each factor category in each of the four pathways. Thus, the HRS score for these sites reflects the combined potential hazards posed by both the radioactive and other hazardous substances.

Section 7 is organized by factor category, similar to sections 3 through 6. Pathway-specific differences in evaluation criteria are specified under each factor category, as appropriate. These differences apply largely to the soil exposure and subsurface intrusion pathway and to sites containing mixed radioactive and other hazardous substances. All evaluation criteria specified in sections 2 through 6 must be met, except where modified in section 7.

7.1 *Likelihood of release/likelihood of exposure.* Evaluate likelihood of release for the three migration pathways and likelihood of exposure for the soil exposure and subsurface intrusion pathway as specified in sections 2 through 6, except: establish an observed release, observed contamination, and/or observed exposure as specified in section 7.1.1. When an observed release or exposure cannot be established for a migration pathway or the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, evaluate potential to release as specified in section 7.1.2. When observed contamination cannot be established, do not evaluate the soil exposure component of the soil exposure and subsurface intrusion pathway.

7.1.1 *Observed release/observed contamination/observed exposure.* For radioactive substances, establish an observed release for each migration pathway by demonstrating that the site has released a radioactive substance to the pathway (or watershed or aquifer, as appropriate); establish observed contamination or observed exposure for the soil exposure and subsurface intrusion pathway as indicated below. Base these demonstrations on one or more of the following, as appropriate to the pathway being evaluated:

- Direct observation:

—For each migration pathway, a material that contains one or more radionuclides has been seen entering the atmosphere, surface water, or ground water, as appropriate, or is known to have entered ground water or surface water through direct deposition, or

—For the surface water migration pathway, a source area containing radioactive substances has been flooded at a time that radioactive substances were present and one or more radioactive substances were in contact with the flood waters.

—For the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, a material that contains one or more radionuclides has been observed entering a regularly occupied structure via the subsurface or is known to have entered a regularly occupied structure via the subsurface. Also, when evidence supports the inference of subsurface intrusion of a material that contains one or more radionuclides by the site into a regularly occupied structure, demonstrated adverse effects associated with that release may also be used to establish observed exposure by direct observation.

- Analysis of radionuclide concentrations in samples appropriate to the pathway (that is, ground water, soil, air, indoor air, soil gas, surface water, benthic, or sediment samples):

—For radionuclides that occur naturally and for radionuclides that are ubiquitous in the environment:

■ Measured concentration (in units of activity, for example, pCi per kilogram [pCi/kg], pCi per liter [pCi/L], pCi per cubic meter [pCi/m3]) of a given radionuclide in the sample are at a level that:

○ Equals or exceeds a value 2 standard deviations above the mean site-specific background concentration for that radionuclide in that type of sample, or

○ Exceeds the upper-limit value of the range of regional background concentration values for that specific radionuclide in that type of sample.

■ Some portion of the increase must be attributable to the site to establish the observed release (or observed contamination or observed exposure), and

■ For the soil exposure component of the soil exposure and subsurface intrusion pathway only, the radionuclide must also be present at the surface or covered by 2 feet or less of cover material (for example, soil) to establish observed contamination.

—For man-made radionuclides without ubiquitous background concentrations in the environment:

■ Measured concentration (in units of activity) of a given radionuclide in a sample equals or exceeds the sample quantitation limit for that specific radionuclide in that type of media and is attributable to the site.

■ However, if the radionuclide concentration equals or exceeds its sample quantitation limit, but its release can also be attributed to one or more neighboring sites, then the measured concentration of that radionuclide must also equal or exceed a value either 2 standard deviations above the mean concentration of that radionuclide contributed by those neighboring sites or 3 times its background concentration, whichever is lower.

- ■ If the sample quantitation limit cannot be established:
  - ○ If the sample analysis was performed under the EPA Contract Laboratory Program, use the EPA contract-required quantitation limit (CRQL) in place of the sample quantitation limit in establishing an observed release (or observed contamination or observed exposure).
  - ○ If the sample analysis is not performed under the EPA Contract Laboratory Program, use the detection limit in place of the sample quantitation limit.
- ■ For the soil exposure component of the soil exposure and subsurface intrusion pathway only, the radionuclide must also be present at the surface or covered by 2 feet or less of cover material (for example, soil) to establish observed contamination.

• Gamma radiation measurements (applies only to observed contamination or observed exposure in the soil exposure and subsurface intrusion pathway):

—The gamma radiation exposure rate, as measured in microroentgens per hour (µR/hr) using a survey instrument held 1 meter above the ground surface or floor or walls of a structure (or 1 meter away from an aboveground source for the soil exposure component), equals or exceeds 2 times the site-specific background gamma radiation exposure rate.

—Some portion of the increase must be attributable to the site to establish observed contamination or observed exposure. The gamma-emitting radionuclides do not have to be within 2 feet of the surface of the source.

For the three migration pathways and for the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, if an observed release or observed exposure can be established for the pathway (or component, threat, aquifer, or watershed, as appropriate), assign the pathway (or component, threat, aquifer, or watershed) an observed release or observed exposure factor value of 550 and proceed to section 7.2. If an observed release or observed exposure cannot be established, assign an observed release or observed exposure factor value of 0 and proceed to section 7.1.2.

For the soil exposure component of the soil exposure and subsurface intrusion pathway, if observed contamination can be established, assign the likelihood of exposure factor for resident population a value of 550 if there is an area of observed contamination in one or more locations listed in section 5.1.1; evaluate the likelihood of exposure factor for nearby population as specified in section 5.1.2.1; and proceed to section 7.2. If observed contamination cannot be established, do not evaluate the soil exposure component of the soil exposure and subsurface intrusion pathway.

At sites containing mixed radioactive and other hazardous substances, evaluate observed release (or component, observed contamination or observed exposure) separately for radionuclides as described in this section and for other hazardous substances as described in sections 2 through 6.

For the three migration pathways and the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, if an observed release or observed exposure can be established based on either radionuclides or other hazardous substances, or both, assign the pathway (or threat, aquifer, or watershed) an observed release or observed exposure factor value of 550 and proceed to section 7.2. If an observed release or observed exposure cannot be established based on either radionuclides or other hazardous substances, assign an observed release or observed exposure factor value of 0 and proceed to section 7.1.2.

For the soil exposure component of the soil exposure and subsurface intrusion pathway, if observed contamination can be established based on either radionuclides or other hazardous substances, or both, assign the likelihood of exposure factor for resident population a value of 550 if there is an area of observed contamination in one or more locations listed in section 5.1.1; evaluate the likelihood of exposure factor for nearby population as specified in section 5.1.2.1; and proceed to section 7.2. If observed contamination cannot be established based on either radionuclides or other hazardous substances, do not evaluate the soil exposure component of the soil exposure and subsurface intrusion pathway.

7.1.2 Potential to release/potential for exposure. For the three migration pathways and the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, evaluate potential to release or potential for exposure for sites containing radionuclides in the same manner as specified for sites containing other hazardous substances. Base the evaluation on the physical and chemical properties of the radionuclides, not on their level of radioactivity. For the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, if the potential for exposure is based on the presence of gamma emitting radioactive substances, assign a potential for exposure factor value of 500 only if the contamination is found within 2 feet beneath a regularly occupied structure, otherwise assign a potential for exposure factor value of 0.

For sites containing mixed radioactive and other hazardous substances, evaluate potential to release or potential for exposure considering radionuclides and other hazardous substances together. Evaluate potential to release for each migration pathway and the potential for exposure for the subsurface intrusion component of the soil exposure and subsurface intrusion pathway as specified in sections 3 through 6, as appropriate.

7.2 *Waste characteristics.* For radioactive substances, evaluate the human toxicity factor, the ecosystem toxicity factor, the surface water persistence factor, and the hazardous waste quantity factor as specified in the following sections. Evaluate all other waste characteristic factors as specified in sections 2 through 6.

7.2.1 Human Toxicity. For radioactive substances, evaluate the human toxicity factor as specified below, not as specified in section 2.4.1.1.

Assign human toxicity factor values to those radionuclides available to the pathway based on quantitative dose-response parameters for cancer risks as follows:

- Evaluate radionuclides only on the basis of carcinogenicity and assign all radionuclides to weight-of-evidence category A, or weight-of-evidence category ''Carcinogenic to Humans''.
- Assign a human toxicity factor value from Table 7–2 to each radionuclide based on its slope factor (also referred to as a cancer potency factor).
  - —For each radionuclide, use the higher of the slope factors for inhalation and ingestion to assign the factor value.
  - —If only one slope factor is available for the radionuclide use it to assign the toxicity factor value.
  - —If no slope factor is available for the radionuclide, assign that radionuclide a toxicity factor value of 0 and use other radionuclides for which a slope factor is available to evaluate the pathway.
- If all radionuclides available to a particular pathway are assigned a human toxicity factor value of 0 (that is, no slope factor is available for all the radionuclides), use a default human toxicity factor value of 1,000 as the human toxicity factor value for all radionuclides available to the pathway.

At sites containing mixed radioactive and other hazardous substances, evaluate the toxicity factor separately for the radioactive and other hazardous substances and assign each a separate toxicity factor value. This applies regardless of whether the radioactive and other hazardous substances are physically separated, combined chemically, or simply mixed together. Assign toxicity factor values to the radionuclides as specified above and to the other hazardous substances as specified in section 2.4.1.1.

At sites containing mixed radioactive and other hazardous substances, if all radionuclides available to a particular pathway are assigned a human toxicity factor value of 0, use a default human toxicity factor value of 1,000 for all those radionuclides even if nonradioactive hazardous substances available to the pathway are assigned human toxicity factor values greater than 0. Similarly, if all nonradioactive hazardous substances available to the pathway are assigned a human toxicity factor value of 0, use a default human toxicity factor value of 100 for all these nonradioactive hazardous substances even if radionuclides available to the pathway are assigned human toxicity factor values greater than 0.

7.2.2 Ecosystem toxicity. For the surface water environmental threat (see sections 4.1.4 and 4.2.4). assign an ecosystem toxicity factor value to radionuclides (alone or combined chemically or mixed with other hazardous substances) using the same slope factors and procedures specified for the human toxicity factor in section 7.2.1, except: use a default of 100, not 1,000, if all radionuclides eligible to be evaluated for ecosystem toxicity receive an ecosystem toxicity factor value of 0.

TABLE 7–2—TOXICITY FACTOR VALUES FOR RADIONUCLIDES

Cancer slope factor[a] (SF) $(pCi)^{-1}$	Assigned value
$3 \times 10^{-11} \leq SF$	10,000
$3 \times 10^{-12} \leq SF < 3 \times 10^{-11}$	1,000
$SF < 3 \times 10^{-12}$	100
SF not available for the radionuclide	0

[a] Radionuclide slope factors are estimates of age-averaged, individual lifetime total excess cancer risk per picocurie of radionuclide inhaled or ingested.

At sites containing mixed radioactive and other hazardous substances, evaluate the ecosystem toxicity factor separately for the radioactive and other hazardous substances and assign each a separate ecosystem toxicity factor value. This applies regardless of whether the radioactive and other hazardous substances are physically separated, combined chemically, or simply mixed together. Assign ecosystem toxicity factor values to the radionuclides as specified above and to the other hazardous substances as specified in sections 4.1.4.2.1.1 and 4.2.4.2.1.1. If all radionuclides available to a particular pathway are assigned an ecosystem toxicity factor value of 0, use a default ecosystem toxicity factor value of 100 for all these radionuclides even if nonradioactive hazardous substances available to the pathway are assigned ecosystem toxicity factor values greater than 0. Similarly, if all nonradioactive hazardous substances available to the pathway are assigned an ecosystem toxicity factor value of 0, use a default ecosystem toxicity factor value of 100 for all these nonradioactive hazardous substances even if radionuclides available to the pathway are assigned ecosystem toxicity factor values greater than 0.

7.2.3 *Persistence/Degradation.* In determining the surface water persistence factor for radionuclides, evaluate this factor based solely on half-life; do not include sorption to sediments in the evaluation as is done for nonradioactive hazardous substances. Assign a persistence factor value from Table 4–10 (section 4.1.2.2.1.2) to each radionuclide based on half-life ($t_{1/2}$) calculated as follows:

$$t_{1/2} = \frac{1}{\frac{1}{r}+\frac{1}{v}}$$

Where:

r = Radioactive half-life.
V = Volatilization half-life.

If the volatilization half-life cannot be estimated for a radionuclide from available data, delete it from the equation. Select the portion of Table 4–10 to use in assigning the persistence factor value as specified in section 4.1.2.2.1.2.

At sites containing mixed radioactive and other hazardous substances, evaluate the persistence factor separately for each radionuclide and for each nonradioactive hazardous substance, even if the available data indicate that they are combined chemically. Assign a persistence factor value to each radionuclide as specified in this section and to each nonradioactive hazardous substance as specified in section 4.1.2.2.1.2. When combined chemically, assign a single persistence factor value based on the higher of the two values assigned (individually) to the radioactive and nonradioactive components.

In determining the subsurface intrusion degradation factor for radionuclides, when evaluating this factor based solely on half-life, assign a degradation factor value from section 5.2.1.2.1.2 to each radionuclide based on half-life ($t_{1/2}$) calculated as follows:

$$t_{1/2} = \frac{1}{\frac{1}{r}}$$

Where:

r = Radioactive half-life.

If no radioactive half-life information is available for a radionuclide and the substance is not already assigned a value of 1, unless information indicates otherwise, assign a value of 1.

At sites containing mixed radioactive and other hazardous substances, evaluate the degradation factor separately for each radionuclide and for each nonradioactive hazardous substance, even if the available data indicate that they are combined chemically. Assign a degradation factor value to each radionuclide as specified in this section and to each nonradioactive hazardous substance as specified in section 5.2.1.2.1.2. If no radioactive half-life information is available for a radionuclide and the substance is not already assigned a value of 1, unless information indicates otherwise, assign a value of 1. Similarly, if no half-life information is available for a nonradioactive substance, and the substance is not already assigned a value of 1, unless information indicates otherwise, assign a value of 1. When combined chemically, assign a single persistence or degradation factor value based on the higher of the two values assigned (individually) to the radioactive and nonradioactive components.

7.2.4 *Selection of substance potentially posing greatest hazard.* For the subsurface intrusion component of the soil exposure and subsurface intrusion pathway and each migration pathway (or threat, aquifer, or watershed, as appropriate), select the radioactive substance or nonradioactive hazardous substance that potentially poses the greatest hazard based on its toxicity factor value, combined with the applicable mobility, persistence, degradation and/or bioaccumulation (or ecosystem bioaccumulation) potential factor values. Combine these factor values as specified in sections 2 through 6. For the soil exposure component of the soil exposure and subsurface intrusion pathway, base the selection on the toxicity factor alone (see sections 2 and 5).

7.2.5 *Hazardous waste quantity.* To calculate the hazardous waste quantity factor value for sites containing radioactive substances, evaluate source hazardous waste quantity (see section 2.4.2.1) using only the following two measures in the following hierarchy (these measures are consistent with

Tiers A and B for nonradioactive hazardous substances in sections 2.4.2.1.1 and 2.4.2.1.2):

- Radionuclide constituent quantity (Tier A).
- Radionuclide wastestream quantity (Tier B).

7.2.5.1 *Source hazardous waste quantity for radionuclides.* For each migration pathway, assign a source hazardous waste quantity value to each source having a containment factor value greater than 0 for the pathway being evaluated. For the soil exposure component of the soil exposure and subsurface intrusion pathway, assign a source hazardous waste quantity value to each area of observed contamination, as applicable to the threat being evaluated. For the subsurface intrusion component, assign a source hazardous waste quantity value to each regularly occupied structure located within areas of observed exposure or areas of subsurface contamination. Allocate hazardous substances and hazardous wastestreams to specific sources (or areas of observed contamination, areas of observed exposure or areas of subsurface contamination) as specified in sections 2.4.2 and 5.2.0.

7.2.5.1.1 *Radionuclide constituent quantity (Tier A).* Evaluate radionuclide constituent quantity for each source (or area of observed contamination or area of observed exposure) based on the activity content of the radionuclides allocated to the source (or area of observed contamination or area of observed exposure) as follows:

- Estimate the net activity content (in curies) for the source (or area of observed contamination or area of observed exposure) based on:

—Manifests, or

—Either of the following equations, as applicable:

$$N = 9.1x10^{-7}(V)\sum_{i=1}^{n} AC_i$$

Where:

N = Estimated net activity content (in curies) for the source (or area of observed contamination or area of observed exposure).

V = Total volume of material (in cubic yards) in a source (or area of observed contamination or area of observed exposure) containing radionuclides.

AC_i = Activity concentration above the respective background concentration (in pCi/g) for each radionuclide i allocated to the source (or area of observed contamination or area of observed exposure).

n = Number of radionuclides allocated to the source (or area of observed contamination or area of observed exposure) above the respective background concentrations.

or,

$$N = 3.8x10^{-12}(V)\sum_{i=1}^{n} AC_i$$

Where:

N = Estimated net activity content (in curies) for the source (or area of observed contamination or area of observed exposure).

V = Total volume of material (in gallons) in a source (or area of observed contamination or area of observed exposure) containing radionuclides.

AC_i = Activity concentration above the respective background concentration (in pCi/1) for each radionuclide i allocated to the source (or area of observed contamination or area of observed exposure).

n = Number of radionuclides allocated to the source (or area of observed contamination or area of observed exposure) above the respective background concentrations.

—Estimate volume for the source (or volume for the area of observed contamination or area of observed exposure) based on records or measurements.

—For the soil exposure component of the soil exposure and subsurface intrusion pathway, in estimating the volume for areas of observed contamination, do not include more than the first 2 feet of depth, except:

for those types of areas of observed contamination listed in Tier C of Table 5–2 (section 5.1.1.2.2), include the entire depth, not just that within 2 feet of the surface.

—For the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, in estimating the volume for areas of observed exposure, only use the volume of air in the regularly occupied structures where observed exposure has been documented.

- Convert from curies of radionuclides to equivalent pounds of nonradioactive hazardous substances by multiplying the activity estimate for the source (or area of observed contamination or area of observed exposure) by 1,000.
- Assign this resulting product as the radionuclide constituent quantity value for the source (or area of observed contamination or area of observed exposure).

If the radionuclide constituent quantity for the source (or area of observed contamination or area of observed exposure) is adequately determined (that is, the total activity of all radionuclides in the source and releases from the source [or in the area of observed contamination or area of observed exposure] is known or is estimated with reasonable confidence), do not evaluate the radionuclide wastestream quantity measure in section 7.2.5.1.2. Instead, assign radionuclide wastestream quantity a value of 0 and proceed to section 7.2.5.1.3. If the radionuclide constituent quantity is not adequately determined, assign the source (or area of observed contamination or area of observed exposure) a value for radionuclide constituent quantity based on the available data and proceed to section 7.2.5.1.2.

7.2.5.1.2 Radionuclide wastestream quantity (Tier B). Evaluate radionuclide wastestream quantity for the source (or area of observed contamination, area of observed exposure, or area of subsurface contamination) based on the activity content of radionuclide wastestreams allocated to the source (or area of observed contamination, area of observed exposure, or area of subsurface contamination) as follows:

- Estimate the total volume (in cubic yards or in gallons) of wastestreams containing radionuclides allocated to the source (or area of observed contamination, area of observed exposure, or area of subsurface contamination).
- Divide the volume in cubic yards by 0.55 (or the volume in gallons by 110) to convert to the activity content expressed in terms of equivalent pounds of nonradioactive hazardous substances.
- Assign the resulting value as the radionuclide wastestream quantity value for the source (or area of observed contamination, area of observed exposure, or area of subsurface contamination).
- For the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, estimate the total wastestream volume for all regularly occupied structures that have a containment value >0 and that are located within areas of observed exposure with observed or inferred intrusion, and within areas of subsurface contamination. Calculate the volume of each regularly occupied structure based on actual data. If unknown, use a ceiling height of 8 feet.

7.2.5.1.3 Calculation of source hazardous waste quantity value for radionuclides. Select the higher of the values assigned to the source (or area of observed contamination, area of observed exposure, and/or area of subsurface contamination) for radionuclide constituent quantity and radionuclide wastestream quantity. Assign this value as the source hazardous waste quantity value for the source (or area of observed contamination, area of observed exposure, or area of subsurface contamination). Do not round to the nearest integer.

7.2.5.2 Calculation of hazardous waste quantity factor value for radionuclides. Sum the source hazardous waste quantity values assigned to all sources (or areas of observed contamination, areas of observed exposure, or areas of subsurface contamination) for the pathway being evaluated and round this sum to the nearest integer, except: if the sum is greater than 0, but less than 1, round it to 1. Based on this value, select a hazardous waste quantity factor value for this pathway from Table 2–6 (section 2.4.2.2).

For a migration pathway, if the radionuclide constituent quantity is adequately determined (see section 7.2.5.1.1) for all sources (or all portions of sources and releases remaining after a removal action), assign the value from Table 2–6 as the hazardous waste quantity factor value for the pathway. If the radionuclide constituent quantity is not adequately determined for one or more sources (or one or more portions of sources or releases remaining after a removal action), assign a factor value as follows:

- If any target for that migration pathway is subject to Level I or Level II concentrations (see section 7.3), assign either the value from Table 2–6 or a value of 100, whichever is greater, as the hazardous waste quantity factor value for that pathway.
- If none of the targets for that pathway is subject to Level I or Level II concentrations, assign a factor value as follows:

—If there has been no removal action, assign either the value from Table 2–6 or a value of 10, whichever is greater, as the hazardous waste quantity factor value for that pathway.

—If there has been a removal action:

■ Determine values from Table 2–6 with and without consideration of the removal action.

- ■ If the value that would be assigned from Table 2–6 without consideration of the removal action would be 100 or greater, assign either the value from Table 2–6 with consideration of the removal action or a value of 100, whichever is greater, as the hazardous waste quantity factor value for the pathway.
- ■ If the value that would be assigned from Table 2–6 without consideration of the removal action would be less than 100, assign a value of 10 as the hazardous waste quantity factor value for the pathway.

For the soil exposure component of the soil exposure and subsurface intrusion pathway, if the radionuclide constituent quantity is adequately determined for all areas of observed contamination, assign the value from Table 2–6 as the hazardous waste quantity factor value. If the radionuclide constituent quantity is not adequately determined for one or more areas of observed contamination, assign either the value from Table 2–6 or a value of 10, whichever is greater, as the hazardous waste quantity factor value.

For the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, if the radionuclide constituent quantity is adequately determined for all areas of observed exposure, assign the value from Table 2–6 as the hazardous waste quantity factor value. If the radionuclide constituent quantity is not adequately determined for one or more areas of observed exposure, assign either the value from Table 2–6 or a value of 10, whichever is greater, as the hazardous waste quantity factor value.

7.2.5.3 Calculation of hazardous waste quantity factor value for sites containing mixed radioactive and other hazardous substances. For each source (or area of observed contamination, area of observed exposure, or area of subsurface contamination) containing mixed radioactive and other hazardous substances, calculate two source hazardous waste quantity values—one based on radionuclides as specified in sections 7.2.5.1 through 7.2.5.1.3 and the other based on the nonradioactive hazardous substances as specified in sections 2.4.2.1 through 2.4.2.1.5, and sections 5.1.1.2.2, 5.1.2.2.2 and 5.2.1.2.2 (that is, determine each value as if the other type of substance was not present). Sum the two values to determine a combined source hazardous waste quantity value for the source (or area of observed contamination, area of observed exposure, or area of subsurface contamination). Do not round this value to the nearest integer.

Use this combined source hazardous waste quantity value to calculate the hazardous waste quantity factor value for the pathway as specified in section 2.4.2.2, except: if either the hazardous constituent quantity or the radionuclide constituent quantity, or both, are not adequately determined for one or more sources (or one or more portions of sources or releases remaining after a removal action) or for one or more areas of observed contamination or areas of observed exposure, as applicable, assign the value from Table 2–6 or the default value applicable for the pathway, whichever is greater, as the hazardous waste quantity factor value for the pathway.

7.3 Targets. For radioactive substances, evaluate the targets factor category as specified in section 2.5 and sections 3 through 6, except: Establish Level I and Level II concentrations at sampling locations as specified in sections 7.3.1 and 7.3.2 and establish weighting factors for populations associated with an area of subsurface contamination in the subsurface intrusion component of the soil exposure and subsurface intrusion pathway as specified in section 7.3.3.

For all pathways (components and threats), use the same target distance limits for sites containing radioactive substances as is specified in sections 3 through 6 for sites containing nonradioactive hazardous substances. At sites containing mixed radioactive and other hazardous substances, include all sources (or areas of observed contamination, areas of observed exposure, or areas of subsurface contamination) at the site in identifying the applicable targets for the pathway.

7.3.1 *Level of contamination at a sampling location.* Determine whether Level I or Level II concentrations apply at a sampling location (and thus to the associated targets) as follows:

- Select the benchmarks from section 7.3.2 applicable to the pathway (or component or threat) being evaluated.
- Compare the concentrations of radionuclides in the sample (or comparable samples) to their benchmark concentrations for the pathway (or component or threat) as specified in section 7.3.2. Treat comparable samples as specified in section 2.5.1.
- Determine which level applies based on this comparison.
- If none of the radionuclides eligible to be evaluated for the sampling location have an applicable benchmark, assign Level II to the actual contamination at that sampling location for the pathway (or component or threat).
- In making the comparison, consider only those samples, and only those radionuclides in the sample, that meet the criteria for an observed release (or observed contamination or observed exposure) for the pathway, except: Tissue samples from aquatic human food chain organisms may also be used for the human food chain threat of the surface water pathway as specified in sections 4.1.3.3 and 4.2.3.3.

7.3.2 *Comparison to benchmarks.* Use the following media specific benchmarks (expressed in activity units, for example,pCi/l for water, pCi/kg for soil and for aquatic human food chain organisms, and pCi/m3 for air) for making the comparisons for the indicated pathway (or threat):

- Maximum Contaminant Levels (MCLs)—ground water migration pathway and drinking water threat in surface water migration pathway.
- Uranium Mill Tailings Radiation Control Act (UMTRCA) standards—soil exposure component of the soil exposure and subsurface intrusion pathway only.
- Screening concentration for cancer corresponding to that concentration that corresponds to the 10^{-6} individual cancer risk for inhalation exposures (air migration pathway and subsurface intrusion component of the soil exposure and subsurface intrusion pathway) or for oral exposures (ground water migration pathway; drinking water or human food chain threats in surface water migration pathway; and soil exposure and subsurface intrusion pathway).

—For the soil exposure component of the soil exposure and subsurface intrusion pathway, include two screening concentrations for cancer—one for ingestion of surface materials and one for external radiation exposures from gamma-emitting radionuclides in surface materials.

Select the benchmark(s) applicable to the pathway (component or threat) being evaluated. Compare the concentration of each radionuclide from the sampling location to its benchmark concentration(s) for that pathway (component or threat). Use only those samples and only those radionuclides in the sample that meet the criteria for an observed release (or observed contamination or observed exposure) for the pathway, except: Tissue samples from aquatic human food chain organisms may be used as specified in sections 4.1.3.3 and 4.2.3.3. If the concentration of any applicable radionuclide from any sample equals or exceeds its benchmark concentration, consider the sampling location to be subject to Level I concentrations for that pathway (component or threat). If more than one benchmark applies to the radionuclide, assign Level I if the radionuclide concentration equals or exceeds the lowest applicable benchmark concentration. In addition, for the soil exposure and subsurface intrusion pathway, assign Level I concentrations at the sampling location if measured gamma radiation exposure rates equal or exceed 2 times the background level (see section 7.1.1).

If no radionuclide individually equals or exceeds its benchmark concentration, but more than one radionuclide either meets the criteria for an observed release (or observed contamination or observed exposure) for the sample or is eligible to be evaluated for a tissue sample (see sections 4.1.3.3 and 4.2.3.3), calculate a value for index I for these radionuclides as specified in section 2.5.2. If I equals or exceeds 1, assign Level I to the sampling location. If I is less than 1, assign Level II.

At sites containing mixed radioactive and other hazardous substances, establish the level of contamination for each sampling location considering radioactive substances and nonradioactive hazardous substances separately. Compare the concentration of each radionuclide and each nonradioactive hazardous substance from the sampling location to its respective benchmark concentration(s). Use only those samples and only those substances in the sample that meet the criteria for an observed release (or observed contamination or observed exposure) for the pathway except: Tissue samples from aquatic human food chain organisms may be used as specified in sections 4.1.3.3 and 4.2.3.3. If the concentration of one or more applicable radionuclides or other hazardous substances from any sample equals or exceeds its benchmark concentration, consider the sampling location to be subject to Level I concentrations. If more than one benchmark applies to a radionuclide or other hazardous substance, assign Level I if the concentration of the radionuclide or other hazardous substance equals or exceeds its lowest applicable benchmark concentration.

If no radionuclide or other hazardous substance individually exceed a benchmark concentration, but more than one radionuclide or other hazardous substance either meets the criteria for an observed release (or observed contamination or observed exposure) for the sample or is eligible to be evaluated for a tissue sample, calculate an index I for both types of substances as specified in section 2.5.2. Sum the index I values for the two types of substances. If the value, individually or combined, equals or exceeds 1, assign Level I to the sample location. If it is less than 1, calculate an index J for the nonradioactive hazardous substances as specified in section 2.5.2. If J equals or exceeds 1, assign Level I to the sampling location. If J is less than 1, assign Level II.

7.3.3 Weighting of targets within an area of subsurface contamination. For the subsurface intrusion component of the soil exposure and subsurface intrusion pathway, assign a weighting factor as specified in section 5.2.1.3.2.3 except when a structure in an area of subsurface contamination is delineated or inferred to be delineated by gamma radiation exposure rates meeting observed release criteria with a depth to contamination of 2 feet or less. For those populations residing, working, or attending school or day care in a structure delineated or inferred to be delineated by gamma radiation exposure rates meeting observed release criteria with a depth to contamination of 2 feet or less, assign a weighting factor of 0.9.

[55 FR 51583, Dec. 14, 1990, as amended at 82 FR 2779, Jan. 9, 2017; 83 FR 38037, Aug. 3, 2018]

APPENDIX B TO PART 300—NATIONAL PRIORITIES LIST

TABLE 1—GENERAL SUPERFUND SECTION

State	Site name	City/County	Notes(a)
AK	Salt Chuck Mine	Outer Ketchikan County.	
AL	Alabama Plating Company, Inc.	Vincent.	
AL	American Brass	Headland.	
AL	Ciba-Geigy Corp. (McIntosh Plant)	McIntosh.	
AL	Interstate Lead Co. (ILCO)	Leeds.	
AL	Olin Corp. (McIntosh Plant)	McIntosh.	
AL	Stauffer Chemical Co. (Cold Creek Plant)	Bucks.	
AL	Stauffer Chemical Co. (LeMoyne Plant)	Axis.	
AL	T.H. Agriculture & Nutrition (Montgomery)	Montgomery	P
AL	Triana/Tennessee River	Limestone/Morgan.	
AR	Arkwood, Inc	Omaha.	
AR	Cedar Chemical Corporation	West Helena	S
AR	MacMillan Ring Free Oil	Norphlet.	
AR	Mid-South Wood Products	Mena.	
AR	Midland Products	Ola/Birta.	
AR	Mountain Pine Pressure Treating, Inc	Plainview.	
AR	Ouachita Nevada Wood Treater	Reader..	
AR	Popile, Inc	El Dorado.	
AR	Vertac, Inc.	Jacksonville.	
AZ	Apache Powder Co.	St. David.	
AZ	Hassayampa Landfill	Hassayampa.	
AZ	Indian Bend Wash Area	Scottsdale/Tempe/Phoenix	P
AZ	Iron King Mine—Humboldt Smelter	Dewey-Humboldt.	
AZ	Litchfield Airport Area	Goodyear/Avondale.	
AZ	Motorola, Inc. (52nd Street Plant)	Phoenix.	
AZ	Tucson International Airport Area	Tucson.	
CA	Advanced Micro Devices, Inc	Sunnyvale.	
CA	Advanced Micro Devices, Inc. (Bldg. 915)	Sunnyvale.	
CA	Aerojet General Corp	Rancho Cordova.	
CA	Alark Hard Chrome	Riverside.	
CA	AMCO Chemical	Oakland.	
CA	Applied Materials	Santa Clara.	
CA	Argonaut Mine	Jackson.	
CA	Atlas Asbestos Mine	Fresno County.	
CA	Blue Ledge Mine	Rogue River—Siskiyou National Forest.	
CA	Brown & Bryant, Inc (Arvin Plant)	Arvin.	
CA	CTS Printex, Inc.	Mountain View.	
CA	Casmalia Resources	Casmalia.	
CA	Coast Wood Preserving	Ukiah.	
CA	Copper Bluff Mine	Hoopa.	
CA	Cooper Drum Company	South Gate..	
CA	Crazy Horse Sanitary Landfill	Salinas.	
CA	Del Amo	Los Angeles.	
CA	Fairchild Semiconductor Corp. (Mt View)	Mountain View.	
CA	Fairchild Semiconductor Corp. (S San Jose)	South San Jose.	
CA	Fresno Municipal Sanitary Landfill	Fresno.	
CA	Frontier Fertilizer	Davis.	
CA	Halaco Engineering Company	Oxnard.	
CA	Hewlett-Packard (620–640 Page Mill Road)	Palo Alto.	
CA	Industrial Waste Processing	Fresno.	
CA	Intel Corp. (Mountain View Plant)	Mountain View.	
CA	Intel Magnetics	Santa Clara.	
CA	Intersil Inc./Siemens Components	Cupertino.	
CA	Iron Mountain Mine	Redding.	
CA	J.H. Baxter & Co	Weed.	
CA	Jervis B. Webb	South Gate.	
CA	Klau/Buena Vista Mine	San Luis Obispo County.	
CA	Koppers Co., Inc. (Oroville Plant)	Oroville.	
CA	Lava Cap Mine	Nevada City.	
CA	Leviathan Mine	Alpine County..	
CA	Lorentz Barrel & Drum Co	San Jose.	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
CA	McColl	Fullerton.	
CA	McCormick & Baxter Creosoting Co	Stockton.	
CA	Modesto Ground Water Contamination	Modesto.	
CA	Monolithic Memories	Sunnyvale.	
CA	Montrose Chemical Corp	Torrance.	
CA	National Semiconductor Corp	Santa Clara.	
CA	New Idria Mercury Mine	Idria.	
CA	Newmark Ground Water Contamination	San Bernardino.	
CA	Omega Chemical Corporation	Whittier.	
CA	Operating Industries, Inc., Landfill	Monterey Park.	
CA	Orange County North Basin	Orange County.	
CA	Pacific Coast Pipe Lines	Fillmore	P
CA	Pemaco Maywood	Maywood.	
CA	Purity Oil Sales, Inc	Malaga.	
CA	Raytheon Corp	Mountain View.	
CA	Rockets, Fireworks, and Flares (RFF)	Rialto.	
CA	San Fernando Valley (Area 1)	Los Angeles.	
CA	San Fernando Valley (Area 2)	Los Angeles/Glendale.	
CA	San Fernando Valley (Area 3)	Glendale.	
CA	San Fernando Valley (Area 4)	Los Angeles.	
CA	San Gabriel Valley (Area 1)	El Monte.	
CA	San Gabriel Valley (Area 2)	Baldwin Park Area.	
CA	San Gabriel Valley (Area 3)	Alhambra.	
CA	San Gabriel Valley (Area 4)	La Puente.	
CA	Selma Treating Co	Selma.	
CA	South Bay Asbestos Area	Alviso.	
CA	Southern Avenue Industrial Area	South Gate.	
CA	Spectra-Physics, Inc	Mountain View.	
CA	Stringfellow	Glen Avon Heights	S
CA	Sulphur Bank Mercury Mine	Clear Lake.	
CA	Synertek, Inc. (Building 1)	Santa Clara.	
CA	TRW Microwave, Inc (Building 825)	Sunnyvale.	
CA	Teledyne Semiconductor	Mountain View.	
CA	United Heckathorn Co	Richmond.	
CA	Valley Wood Preserving, Inc	Turlock.	
CA	Waste Disposal, Inc	Santa Fe Springs.	
CA	Watkins-Johnson Co. (Stewart Division)	Scotts Valley.	
CA	Westinghouse Elecetric Corp. (Sunnyvale)	Sunnyvale.	
CO	Bonita Peak Mining District	San Juan County.	
CO	Broderick Wood Products	Denver.	
CO	California Gulch	Leadville	P
CO	Captain Jack Mill	Ward.	
CO	Central City-Clear Creek	Idaho Springs.	
CO	Chemical Sales Co	Denver.	
CO	Colorado Smelter	Pueblo.	
CO	Denver Radium Site	Denver	P
CO	Eagle Mine	Minturn/Redcliff	P
CO	Lincoln Park	Canon City.	
CO	Lowry Landfill	Arapahoe County.	
CO	Marshall Landfill	Boulder County	S
CO	Nelson Tunnel/Commodore Waste Rock	Creede.	
CO	Standard Mine	Gunnison National Forest.	
CO	Summitville Mine	Rio Grande County.	
CO	Uravan Uranium Project (Union Carbide)	(former town of) Uravan	P*
CO	Vasquez Boulevard and I–70	Denver	P
CT	Barkhamsted-New Hartford Landfill	Barkhamsted.	
CT	Beacon Heights Landfill	Beacon Falls.	
CT	Durham Meadows	Durham.	
CT	Gallup's Quarry	Plainfield.	
CT	Kellogg-Deering Well Field	Norwalk.	
CT	Laurel Park, Inc	Naugatuck Borough	S
CT	Linemaster Switch Corp	Woodstock.	
CT	Precision Plating Corp	Vernon.	
CT	Raymark Industries, Inc	Stratford	A
CT	Scovill Industrial Landfill	Waterbury.	
CT	Solvents Recovery Service New England	Southington.	
CT	Yaworski Waste Lagoon	Canterbury.	
DE	Army Creek Landfill	New Castle County.	
DE	Blades Groundwater	Blades.	
DE	Delaware City PVC Plant	Delaware City.	
DE	Delaware Sand & Gravel Landfill	New Castle County.	
DE	Dover Gas Light Co	Dover.	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
DE	East Basin Road Groundwater	New Castle.	
DE	E.I.Du Pont de Nemours (Newport Landfill)	Newport.	
DE	Georgetown North Groundwater	Georgetown.	
DE	Halby Chemical Co	New Castle.	
DE	Harvey & Knott Drum, Inc	Kirkwood.	
DE	Hockessin Groundwater	Hockessin.	
DE	Koppers Co., Inc. (Newport Plant)	Newport.	
DE	NCR Corp. (Millsboro Plant)	Millsboro.	
DE	Newark South Ground Water Plume	Newark.	
DE	Standard Chlorine of Delaware, Inc	Delaware City.	
DE	Tybouts Corner Landfill	New Castle County	P
FL	Agrico Chemical Co	Pensacola.	
FL	Airco Plating Co	Miami.	
FL	Alaric Area Ground Water Plume	Tampa.	
FL	American Creosote Works (Pensacola Plt)	Pensacola.	
FL	Anodyne, Inc	North Miami Beach.	
FL	Arkla Terra Property	Thonotosassa..	
FL	Cabot/Koppers	Gainesville.	
FL	Chevron Chemical Co. (Ortho Division)	Orlando.	
FL	City Industries, Inc	Orlando.	
FL	Continental Cleaners	Miami.	
FL	Escambia Wood—Pensacola	Pensacola	P
FL	Flash Cleaners	Pompano Beach.	
FL	Florida Petroleum Reprocessors	Fort Lauderdale.	
FL	Florida Steel Corp	Indiantown.	
FL	General Dynamics Longwood	Longwood..	
FL	Harris Corp. (Palm Bay Plant)	Palm Bay.	
FL	Helena Chemical Co. (Tampa Plant)	Tampa.	
FL	Hollingsworth Solderless Terminal	Fort Lauderdale.	
FL	JJ Seifert Machine	Ruskin.	
FL	Kerr-McGee Chemical Corp-Jacksonville	Jacksonville.	
FL	Landia Chemical Company	Lakeland.	
FL	MRI Corp (Tampa)	Tampa.	
FL	Madison County Sanitary Landfill	Madison.	
FL	Miami Drum Services	Miami.	
FL	Peak Oil Co./Bay Drum Co	Tampa.	
FL	Pepper Steel & Alloys, Inc	Medley.	
FL	Petroleum Products Corp	Pembroke Park.	
FL	Pickettville Road Landfill	Jacksonville.	
FL	Piper Aircraft/Vero Beach Water & Sewer	Vero Beach.	
FL	Post and Lumber Preserving Co. Inc	Quincy.	
FL	Raleigh Street Dump	Tampa.	
FL	Reeves Southeast Galvanizing Corp	Tampa.	
FL	Sanford Dry Cleaners	Sanford.	
FL	Sapp Battery Salvage	Cottondale.	
FL	Sherwood Medical Industries	Deland.	
FL	Solitron Microwave	Port Salerno.	
FL	Southern Solvents, Inc	Tampa.	
FL	Stauffer Chemical Co. (Tampa)	Tampa.	
FL	Stauffer Chemical Co. (Tarpon Springs)	Tarpon Springs.	
FL	Sydney Mine Sludge Ponds	Brandon.	
FL	Taylor Road Landfill	Seffner.	
FL	Tower Chemical Co	Clermont.	
FL	Trans Circuit, Inc.	Lake Park.	
FL	United Metals, Inc	Marianna.	
FL	Wingate Road Municipal Incinerator Dump	Fort Lauderdale.	
FL	Zellwood Ground Water Contamination	Zellwood.	
GA	Alternate Energy Resources	Augusta.	
GA	Armstrong World Industries	Macon.	
GA	Brunswick Wood Preserving	Brunswick.	
GA	Camilla Wood Preserving Company	Camilla.	
GA	Diamond Shamrock Corp. Landfill	Cedartown.	
GA	Firestone Tire & Rubber Co. (Albany Plant)	Albany.	
GA	Hercules 009 Landfill	Brunswick.	
GA	LCP Chemicals Georgia	Brunswick	S
GA	Macon Naval Ordnance Plant	Macon.	
GA	Marzone Inc./Chevron Chemical Co	Tifton.	
GA	Mathis Brothers Landfill	Kensington.	
GA	Peach Orchard Road PCE Ground Water Plume	Augusta.	
GA	T.H. Agriculture & Nutrition (Albany)	Albany.	
GA	Westside Lead	Atlanta.	
GA	Woolfolk Chemical Works, Inc	Fort Valley.	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
GU	Ordot Landfill	Guam	S
HI	Del Monte Corp. (Oahu Plantation)	Honolulu County	P
IA	Des Moines TCE	Des Moines.	
IA	Fairfield Coal Gasification Plant	Fairfield.	
IA	Highway 3 PCE	Le Mars.	
IA	Lawrence Todtz Farm	Camanche.	
IA	Mason City Coal Gasification Plant	Mason City.	
IA	Midwest Manufacturing/North Farm	Kellogg	P
IA	PCE Former Dry Cleaner	Atlantic.	
IA	Peoples Natural Gas Co	Dubuque.	
IA	Railroad Avenue Groundwater Contamination	Des Moines.	
IA	Shaw Avenue Dump	Charles City	P
IA	Vogel Paint & Wax Co	Orange City.	
ID	Bunker Hill Mining & Metallurgical	Smelterville.	
ID	Eastern Michaud Flats Contamination	Pocatello.	
ID	Kerr-McGee Chemical Corp. (Soda Springs)	Soda Springs.	
ID	Monsanto Chemical Co. (Soda Springs)	Soda Springs.	
IL	Acme Solvent Reclaiming (Morristown Plant)	Morristown.	
IL	Adams County Quincy Landfills 2&3	Quincy.	
IL	Amoco Chemicals (Joliet Landfill)	Joliet.	
IL	ASARCO Taylor Springs	Taylor Springs.	
IL	Bautsch-Gray Mine	Galena.	
IL	Beloit Corp	Rockton	*P
IL	Byron Salvage Yard	Byron.	
IL	Central Illinois Public Service Co	Taylorville.	
IL	Chemetco	Madison County.	
IL	Cross Brothers Pail Recycling (Pembroke)	Pembroke Township.	
IL	DePue/New Jersey Zinc/Mobil ChemCorp	DePue.	
IL	Eagle Zinc Co Div T L Diamond	Hillsboro.	
IL	Estech General Chemical Company	Calumet City.	
IL	Galesburg/Koppers Co	Galesburg.	
IL	H.O.D. Landfill	Antioch.	
IL	Hegeler Zinc	Danville.	
IL	Indian Refinery—Texaco Lawrenceville	Lawrenceville.	
IL	Interstate Pollution Control, Inc	Rockford.	
IL	Jennison-Wright Corporation	Granite City.	
IL	Johns-Manville Corp	Waukegan.	
IL	Kerr-McGee (Kress Creek/W Branch DuPage)	DuPage County.	
IL	Kerr-McGee (Residential Areas)	West Chicago/DuPage County.	
IL	Lake Calumet Cluster	Chicago.	
IL	LaSalle Electric Utilities	LaSalle.	
IL	Lenz Oil Service, Inc	Lemont.	
IL	Matthiessen and Hegeler Zinc Company	LaSalle.	
IL	MIG/Dewane Landfill	Belvidere.	
IL	NL Industries/Taracorp Lead Smelter	Granite City.	
IL	Old American Zinc Plant	Fairmont City.	
IL	Ottawa Radiation Areas	Ottawa.	
IL	Outboard Marine Corp	Waukegan	S
IL	Pagel's Pit	Rockford.	
IL	Parsons Casket Hardware Co	Belvidere.	
IL	Sandoval Zinc Company	Sandoval.	
IL	Schroud Property	Chicago	
IL	Southeast Rockford Gd Wtr Contamination	Rockford	P
IL	Tri-County Landfill/Waste Mgmt Illinois	South Elgin.	
IL	Velsicol Chemical Corp. (Illinois)	Marshall.	
IL	Wauconda Sand & Gravel	Wauconda	P
IL	Woodstock Municipal Landfill	Woodstock.	
IL	Yeoman Creek Landfill	Waukegan.	
IN	American Chemical Service, Inc	Griffith.	
IN	Beck's Lake	South Bend.	
IN	Broadway Street Corridor Groundwater Contamination	Anderson.	
IN	Cam-Or Inc	Westville..	
IN	Cliff Drive Groundwater Contamination	Logansport.	
IN	Conrail Rail Yard (Elkhart)	Elkhart.	
IN	Continental Steel Corp	Kokomo.	
IN	Douglas Road/Uniroyal, Inc., Landfill	Mishawaka.	
IN	Elm Street Ground Water Contamination	Terre Haute.	
IN	Envirochem Corp	Zionsville.	
IN	Fisher-Calo	LaPorte.	
IN	Fort Wayne Reduction Dump	Fort Wayne	P
IN	Franklin Street Groundwater Contamination	Spencer.	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
IN	Galen Myers Dump/Drum Salvage	Osceola.	
IN	Garden City Ground Water Plume	Garden City.	
IN	Gary Development Company	Gary.	
IN	Himco Dump	Elkhart	P
IN	Jacobsville Neighborhood Soil Contamination	Evansville.	
IN	Keystone Corridor Ground Water Contamination	Indianapolis.	
IN	Kokomo Contaminated Ground Water Plume	Kokomo.	
IN	Lake Sandy Jo (M&M Landfill)	Gary	P
IN	Lakeland Disposal Service, Inc	Claypool.	
IN	Lane Street Ground Water Contamination	Elkhart..	
IN	Lusher Street Ground Water Contamination	Elkhart.	
IN	MIDCO I	Gary.	
IN	MIDCO II	Gary.	
IN	Main Street Well Field	Elkhart.	
IN	Marion (Bragg) Dump	Marion.	
IN	Ninth Avenue Dump	Gary.	
IN	North 5th Street Groundwater Contamination	Goshen.	
IN	North Shore Drive	Elkhart.	
IN	Northside Sanitary Landfill, Inc	Zionsville.	
IN	Pike and Mulberry Streets PCE Plume	Martinsville.	
IN	Prestolite Battery Division	Vincennes.	
IN	Reilly Tar & Chemical (Indianapolis Plant)	Indianapolis.	
IN	Seymour Recycling Corp	Seymour	S
IN	Tippecanoe Sanitary Landfill, Inc	Lafayette.	
IN	U.S. Smelter & Lead Refining Inc	East Chicago	P
IN	Wayne Waste Oil	Columbia City.	
KS	57th and North Broadway Streets Site	Wichita Heights.	
KS	Ace Services	Colby.	
KS	Caney Residential Yards	Caney.	
KS	Chemical Commodities, Inc	Olathe.	
KS	Cherokee County	Cherokee County.	
KS	Cherokee Zinc—Weir Smelter	Weir.	
KS	Doepke Disposal (Holliday)	Johnson County.	
KS	Former United Zinc & Associated Smelters	Iola.	
KS	Obee Road	Hutchinson.	
KS	Pester Refinery Co	El Dorado.	
KS	Plating, Inc	Great Bend.	
KS	Strother Field Industrial Park	Cowley County.	
KS	Wright Ground Water Contamination	Wright.	
KY	B.F. Goodrich	Calvert City.	
KY	Caldwell Lace Leather Co., Inc	Auburn.	
KY	Distler Brickyard	West Point.	
KY	Distler Farm	Jefferson County.	
KY	Fort Hartford Coal Co. Stone Quarry	Olaton.	
KY	Green River Disposal, Inc	Maceo.	
KY	Maxey Flats Nuclear Disposal	Hillsboro.	
KY	National Electric Coil/Cooper Industries	Dayhoit.	
KY	Smith's Farm	Brooks.	
KY	Tri-City Disposal Co	Shepherdsville.	
LA	Agriculture Street Landfill	New Orleans	P
LA	American Creosote DeRidder	DeRidder.	
LA	American Creosote Works, Inc (Winnfield)	Winnfield.	
LA	Bayou Bonfouca	Slidell.	
LA	Colonial Creosote	Bogalusa.	
LA	Combustion, Inc	Denham Springs.	
LA	Delta Shipyard	Houma.	
LA	EVR-Wood Treating/Evangeline Refining Company	Jennings.	
LA	Madisonville Creosote Works	Madisonville.	
LA	Marion Pressure Treating	Marion.	
LA	Petro-Processors of Louisiana Inc	Scotlandville.	
LA	SBA Shipyard	Jennings.	
MA	Atlas Tack Corp	Fairhaven.	
MA	Baird & McGuire	Holbrook.	
MA	BJAT LLC	Franklin.	
MA	Blackburn & Union Privileges	Walpole.	
MA	Charles-George Reclamation Landfill	Tyngsborough.	
MA	Creese &Cook Tannery (Former)	Danvers.	
MA	Groveland Wells	Groveland.	
MA	Haverhill Municipal Landfill	Haverhill.	
MA	Hocomonco Pond	Westborough.	
MA	Industri-Plex	Woburn	P
MA	Iron Horse Park	Billerica.	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
MA	Lower Neponset River	Boston/Milton.	
MA	Microfab, Inc. (Former)	Amesbury.	
MA	New Bedford Site	New Bedford	S
MA	Nuclear Metals, Inc	Concord..	
MA	Nyanza Chemical Waste Dump	Ashland.	
MA	Olin Chemical	Wilmington.	
MA	PSC Resources	Palmer.	
MA	Re-Solve, Inc	Dartmouth.	
MA	Rose Disposal Pit	Lanesboro.	
MA	Silresim Chemical Corp	Lowell.	
MA	Sullivan's Ledge	New Bedford.	
MA	Sutton Brook Disposal Area	Tewksbury..	
MA	W.R. Grace & Co Inc (Acton Plant)	Acton.	
MA	Walton &Lonsbury Inc.	Attleboro.	
MA	Wells G&H	Woburn.	
MD	Bear Creek Sediments	Baltimore County.	
MD	Bush Valley Landfill	Abingdon.	
MD	Central Chemical	Hagerstown.	
MD	Dwyer Property Ground Water Plume	Elkton.	
MD	Kane & Lombard Street Drums	Baltimore.	
MD	Limestone Road	Cumberland.	
MD	Ordnance Products, Inc.	Cecil County.	
MD	Sand, Gravel & Stone	Elkton.	
MD	Sauer Dump	Dundalk.	
MD	Spectron, Inc	Elkton.	
MD	Woodlawn County Landfill	Woodlawn.	
ME	Callahan Mine	Brooksville.	
ME	Eastern Surplus	Meddybemps.	
ME	Eastland Woolen Mill	Corinna	P
ME	Keddy Mill	Windham.	
ME	Leeds Metal	Leeds.	
ME	Saco Municipal Landfill	Saco.	
ME	West Site/Hows Corners	Plymouth.	
ME	Winthrop Landfill	Winthrop.	
MI	Adam's Plating	Lansing.	
MI	Aircraft Components (D & L Sales)	Benton Harbor	A
MI	Albion-Sheridan Township Landfill	Albion.	
MI	Allied Paper/Portage Ck/Kalamazoo River	Kalamazoo.	
MI	American Anodco, Inc	Ionia.	
MI	Auto Ion Chemicals, Inc	Kalamazoo.	
MI	Bendix Corp./Allied Automotive	St. Joseph.	
MI	Bofors Nobel, Inc	Muskegon.	
MI	Butterworth #2 Landfill	Grand Rapids.	
MI	Cannelton Industries, Inc	Saulte Saint Marie.	
MI	Chem Central	Wyoming Township.	
MI	Clare Water Supply	Clare.	
MI	DSC McLouth Steel Gibraltar Plant	Gibraltar.	
MI	Electrovoice	Buchanan.	
MI	Forest Waste Products	Otisville.	
MI	G&H Landfill	Utica.	
MI	Grand Traverse Overall Supply Co	Greilickville.	
MI	Gratiot County Golf Course	St. Louis.	
MI	Gratiot County Landfill	St. Louis	S
MI	H. Brown Co., Inc	Grand Rapids.	
MI	Hedblum Industries	Oscoda.	
MI	Hi-Mill Manufacturing Co	Highlan.	
MI	Ionia City Landfill	Ionia.	
MI	J & L Landfill	Rochester Hills.	
MI	K&L Avenue Landfill	Oshtemo Township.	
MI	Kaydon Corp	Muskegon.	
MI	Kentwood Landfill	Kentwood.	
MI	Kysor Industrial Corp	Cadillac.	
MI	Liquid Disposal, Inc	Utica.	
MI	McGraw Edison Corp	Albion.	
MI	McLouth Steel Corp	Trenton.	
MI	Metamora Landfill	Metamora.	
MI	Michigan Disposal (Cork Street Landfill)	Kalamazoo.	
MI	Michner Plating—Mechanic Street	Jackson.	
MI	Motor Wheel	Lansing	P
MI	Muskegon Chemical Co	Whitehall.	
MI	North Bronson Industrial Area	Bronson.	
MI	Northernaire Plating	Cadillac.	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
MI	Organic Chemicals, Inc	Grandville.	
MI	Ott/Story/Cordova Chemical Co	Dalton Township.	
MI	Packaging Corp. of America	Filer City.	
MI	Parsons Chemical Works, Inc	Grand Ledge.	
MI	Peerless Plating Co	Muskegon.	
MI	Petoskey Municipal Well Field	Petoskey.	
MI	Rasmussen's Dump	Green Oak Township.	
MI	Rockwell International Corp. (Allegan)	Allegan.	
MI	Rose Township Dump	Rose Township.	
MI	Roto-Finish Co., Inc	Kalamazoo.	
MI	SCA Independent Landfill	Muskegon Heights.	
MI	Shiawassee River	Howell.	
MI	South Macomb Disposal (Landfills 9 & 9A)	Macomb Township.	
MI	Southwest Ottawa County Landfill	Park Township.	
MI	Sparta Landfill	Sparta Township.	
MI	Spartan Chemical Co	Wyoming.	
MI	Springfield Township Dump	Davisburg.	
MI	State Disposal Landfill, Inc	Grand Rapids.	
MI	Sturgis Municipal Wells	Sturgis.	
MI	Tar Lake	Antrim	P
MI	Ten-Mile Drain	St. Clair Shores..	
MI	Thermo-Chem, Inc	Muskegon.	
MI	Torch Lake	Houghton	P
MI	U.S. Aviex	Howard Township.	
MI	Velsicol Chemical Corp. (Michigan)	St. Louis.	
MI	Verona Well Field	Battle Creek.	
MI	Wash King Laundry	Pleasant Plains Twp.	
MN	Baytown Township Ground Water Plume	Baytown Township.	
MN	Burlington Northern (Brainerd/Baxter)	Brainerd/Baxter.	
MN	FMC Corp. (Fridley Plant)	Fridley.	
MN	Freeway Sanitary Landfill	Burnsville.	
MN	General Mills/Henkel Corp	Minneapolis.	
MN	Highway 100 and County Road 3 Groundwater Plume	St. Louis Park and Edina.	
MN	Joslyn Manufacturing and Supply Co	Brooklyn Center	P
MN	Koppers Coke	St. Paul.	
MN	Kurt Manufacturing Co	Fridley.	
MN	Lehillier/Mankato Site	Lehillier/Mankato.	
MN	Long Prairie Ground Water Contamination	Long Prairie.	
MN	MacGillis & Gibbs/Bell Lumber & Pole C	New Brighton.	
MN	Oakdale Dump	Oakdale.	
MN	Perham Arsenic Site	Perham.	
MN	Reilly Tar&Chem (St. Louis Park Plant)	St. Louis Park	S
MN	Ritari Post & Pole	Sebeka.	
MN	South Andover Site	Andover	P
MN	Southeast Hennepin Area Groundwater and Vapor	Minneapolis.	
MN	South Minneapolis Residential Soil Contamination	Minneapolis	P
MN	Spring Park Municipal Well Field	Spring Park.	
MN	St. Louis River Site	St. Louis County.	
MN	St. Regis Paper Co	Cass Lake.	
MN	Waite Park Wells	Waite Park.	
MO	Armour Road	North Kansas City.	
MO	Bee Cee Manufacturing Co	Malden.	
MO	Big River Mine Tailings/St. Joe Minerals	Desloge.	
MO	Compass Plaza Well TCE	Rogersville.	
MO	Conservation Chemical Co	Kansas City.	
MO	Ellisville Site	Ellisville	P
MO	Fulbright Landfill	Springfield.	
MO	Lee Chemical	Libert.	
MO	Madison County Mines	Fredericktown.	
MO	Minker/Stout/Romaine Creek	Imperial.	
MO	Missouri Electric Works	Cape Girardeau	P
MO	Newton County Mine Tailings	Newton County.	
MO	Newton County Wells	Newton County.	
MO	Oak Grove Village Well	Oak Grove Village.	
MO	Oronogo-Duenweg Mining Belt	Jasper County.	
MO	Pools Prairie	Neosho.	
MO	Quality Plating	Sikeston.	
MO	Riverfront	New Haven	P
MO	Solid State Circuits, Inc	Republic.	
MO	Southwest Jefferson County Mining	Jefferson County..	
MO	Sporlan Valve Plant #1	Washington.	
MO	St. Louis Airport/HIS/Futura Coatings Co	St. Louis County.	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
MO	Syntex Facility	Verona.	
MO	Valley Park TCE	Valley Park.	
MO	Vienna Wells	Vienna..	
MO	Washington County Lead District—Furnace Creek	Caledonia.	
MO	Washington County Lead District—Old Mines	Old Mines.	
MO	Washington County Lead District—Potosi	Potosi.	
MO	Washington County Lead District—Richwoods	Richwoods.	
MO	Westlake Landfill	Bridgeton.	
MS	American Creosote Works, Inc	Louisville.	
MS	Chemfax, Inc	Gulfport	P
MS	Hercules Inc	Hattiesburg.	
MS	Kerr-McGee Chemical Corp—Columbus	Columbus.	
MS	Mississippi Phosphates Corporation	Pascagoula.	
MS	Picayune Wood Treating	Picayune.	
MS	Rockwell International Wheel & Trim	Grenada.	
MS	Sonford Products	Flowood.	
MS	Southeastern Wood Preserving	Canton.	
MT	ACM Smelter and Refinery	Cascade County.	
MT	Anaconda Aluminum Co Columbia Falls Reduction Plant	Columbia Falls.	
MT	Anaconda Co. Smelter	Anaconda	P
MT	Barker Hughesville Mining District	Barker.	
MT	Basin Mining Area	Basin.	
MT	Billings PCE	Billings.	
MT	Carpenter Snow Creek Mining District	Neihart.	
MT	East Helena Site	East Helena.	
MT	Flat Creek IMM	Superior..	
MT	Idaho Pole Co	Bozeman	P
MT	Libby Asbestos	Libby	P
MT	Libby Ground Water Contamination	Libby.	
MT	Lockwood Solvent Ground Water Plume	Billings.	
MT	Milltown Reservoir Sediments	Milltown.	
MT	Montana Pole and Treating	Butte.	
MT	Mouat Industries	Columbus	P
MT	Silver Bow Creek/Butte Area	Sil Bow/Deer Lodge.	
MT	Upper Tenmile Creek Mining Area	Lewis and Clark.	
NC	ABC One Hour Cleaners	Jacksonville.	
NC	Aberdeen Contaminated Ground Water	Aberdeen.	
NC	Aberdeen Pesticide Dumps	Aberdeen.	
NC	Barber Orchard	Waynesville.	
NC	Benfield Industries, Inc.	Hazelwood.	
NC	Blue Ridge Plating	Arden.	
NC	Bypass 601 Ground Water Contamination	Concord	P
NC	Cape Fear Wood Preserving	Fayetteville.	
NC	Carolina Transformer Co	Fayetteville.	
NC	Celanese Corp. (Shelby Fiber Operations)	Shelby/Cleveland	P
NC	Charles Macon Lagoon & Drum Storage	Cordova.	
NC	Chemtronics, Inc	Swannanoa.	
NC	Cristex Drum	Oxford.	
NC	CTS of Asheville, Inc.	Asheville.	
NC	Davis Park Road TCE	Gastonia.	
NC	FCX, Inc. (Statesville Plant)	Statesville.	
NC	FCX, Inc. (Washington Plant)	Washington.	
NC	GMH Electronics	Roxboro..	
NC	Geigy Chemical Corp. (Aberdeen Plant)	Aberdeen.	
NC	General Electric Co/Shepherd Farm	East Flat Rock	P
NC	Hemphill Road TCE	Gastonia.	
NC	Holcomb Creosote Co	Yadkinville.	
NC	Horton Iron and Metal	Wilmington.	
NC	JFD Electronics/Channel Master	Oxford.	
NC	Jadco-Hughes Facility	Belmont.	
NC	Kerr-McGee Chemical Corp-Navassa	Navassa	P
NC	Koppers Co., Inc. (Morrisville Plant)	Morrisville	P
NC	NC State University (Lot 86,Farm Unit #1)	Raleigh.	
NC	National Starch & Chemical Corp	Salisbury.	
NC	North Belmont PCE	North Belmont.	
NC	Ore Knob Mine	Ashe County..	
NC	Potter's Septic Tank Service Pits	Maco.	
NC	Ram Leather Care	Charlotte.	
NC	Sigmon's Septic Tank	Statesville.	
NC	Ward Transformer	Raleigh..	
NC	Wright Chemical Corporation	Riegelwood.	
NE	10th Street Site	Columbus.	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
NE	Bruno Co-op Association/Associated Prop	Bruno.	
NE	Cleburn Street Well	Grand Island	P
NE	Garvey Elevator	Hastings.	
NE	Hastings Ground Water Contamination	Hastings.	
NE	Iowa-Nebraska Light & Power Co	Norfolk.	
NE	Lindsay Manufacturing Co	Lindsay.	
NE	Nebraska Ordnance Plant (Former)	Mead.	
NE	Ogallala Ground Water Contamination	Ogallala.	
NE	Old HWY 275 and N 288th Street	Valley.	
NE	Omaha Lead	Omaha/Douglas	P
NE	Parkview Well	Grand Island.	
NE	PCE—Carriage Cleaners	Bellevue.	
NE	PCE Southeast Contamination	York.	
NE	PCE/TCE Northeast Contamination	York.	
NE	Sherwood Medical Co	Norfolk.	
NE	West Highway 6 & Highway 281	Hastings.	
NH	Auburn Road Landfill	Londonderry.	
NH	Beede Waste Oil	Plaistow.	
NH	Chlor-Alkali Facility (Former)	Berlin.	
NH	Coakley Landfill	North Hampton.	
NH	Collins & Aikman Plant (Former)	Farmington.	
NH	Dover Municipal Landfill	Dover.	
NH	Fletcher's Paint Works & Storage	Milford.	
NH	Kearsarge Metallurgical Corp	Conway.	
NH	Keefe Environmental Services	Epping.	
NH	Mottolo Pig Farm	Raymond.	
NH	New Hampshire Plating Co	Merrimack.	
NH	Ottati & Goss/Kingston Steel Drum	Kingston.	
NH	Savage Municipal Water Supply	Milford.	
NH	Somersworth Sanitary Landfill	Somersworth.	
NH	South Municipal Water Supply Well	Peterborough.	
NH	Sylvester	NashuaS.	
NH	Tibbetts Road	Barrington.	
NH	Tinkham Garage	Londonderry.	
NH	Troy Mills Landfill	Troy.	
NJ	A. O. Polymer	Sparta/Sussex	P
NJ	American Cyanamid Co.	Bound Brook	P
NJ	Asbestos Dump	Millington	P
NJ	Atlantic Resources Corporation	Sayreville.	
NJ	Bog Creek Farm	Howell Township.	
NJ	Brick Township Landfill	Brick Township.	
NJ	Bridgeport Rental & Oil Services	Bridgeport.	
NJ	Brook Industrial Park	Bound Brook.	
NJ	Burnt Fly Bog	Marlboro Township.	
NJ	CPS/Madison Industries	Old Bridge Township.	
NJ	Caldwell Trucking Co	Fairfield.	
NJ	Chemical Control	Elizabeth.	
NJ	Chemical Insecticide Corp	Edison Township.	
NJ	Chemical Leaman Tank Lines, Inc	Bridgeport.	
NJ	Chemsol, Inc	Piscataway.	
NJ	Ciba-Geigy Corp	Toms River.	
NJ	Cinnaminson Ground Water Contamination	Cinnaminson Township.	
NJ	Combe Fill South Landfill	Chester Township.	
NJ	Cornell Dubilier Electronics Inc	South Plainfield.	
NJ	Cosden Chemical Coatings Corp	Beverly.	
NJ	Curcio Scrap Metal, Inc	Saddle Brook Township.	
NJ	Curtis Specialty Papers, Inc	Milford..	
NJ	D'Imperio Property	Hamilton Township.	
NJ	Dayco Corp./L.E Carpenter Co	Wharton Borough.	
NJ	De Rewal Chemical Co	Kingwood Township.	
NJ	Diamond Alkali Co	Newark.	
NJ	Diamond Head Oil Refinery Div	Kearny.	
NJ	Dover Municipal Well 4	Dover Township.	
NJ	Ellis Property	Evesham Township.	
NJ	Emmell's Septic Landfill	Galloway Township.	
NJ	Evor Phillips Leasing	Old Bridge Township.	
NJ	Ewan Property	Shamong Township.	
NJ	Fair Lawn Well Field	Fair Lawn.	
NJ	Former Kil-Tone Company	Vineland.	
NJ	Franklin Burn	Franklin Township.	
NJ	Fried Industries	East Brunswick Township.	
NJ	Garfield Ground Water Contamination	Garfield.	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
NJ	GEMS Landfill	Gloucester Township.	
NJ	Garden State Cleaners Co	Minotola.	
NJ	Global Sanitary Landfill	Old Bridge Township.	
NJ	Goose Farm	Plumstead Township.	
NJ	Helen Kramer Landfill	Mantua Township.	
NJ	Hercules, Inc. (Gibbstown Plant)	Gibbstown.	
NJ	Higgins Disposal	Kingston.	
NJ	Higgins Farm	Franklin Township.	
NJ	Horseshoe Road	Sayreville.	
NJ	Iceland Coin Laundry Area Ground Water Plume	Vineland.	
NJ	Imperial Oil Co., Inc./Champion Chemicals	Morganville.	
NJ	JIS Landfill	Jamesburg/S. Brnswck.	
NJ	Kauffman & Minteer, Inc	Jobstown.	
NJ	Kin-Buc Landfill	Edison Township.	
NJ	King of Prussia	Winslow Township.	
NJ	LCP Chemicals Inc	Linden.	
NJ	Landfill & Development Co	Mount Holly.	
NJ	Lang Property	Pemberton Township.	
NJ	Lightman Drum Company	Winslow Township.	
NJ	Lipari Landfill	Pitman.	
NJ	Lone Pine Landfill	Freehold Township.	
NJ	Lower Hackensack River	Bergen and Hudson Counties.	
NJ	Mansfield Trail Dump	Byram Township.	
NJ	Martin Aaron, Inc	Camden.	
NJ	Matlack, Inc.	Woolwich Township.	
NJ	Maywood Chemical Co	Maywood/Rochelle Park.	
NJ	Matteo & Sons, Inc.	Thorofare.	
NJ	Metaltec/Aerosystems	Franklin Borough.	
NJ	Monitor Devices/Intercircuits Inc	Wall Township.	
NJ	Montgomery Township Housing Development	Montgomery Township.	
NJ	Myers Property	Franklin Township.	
NJ	NL Industries	Pedricktown.	
NJ	Nascolite Corp	Millville.	
NJ	Orange Valley Regional Ground Water Contamination	West Orange/Orange.	
NJ	Pierson's Creek	Newark.	
NJ	Pioneer Metal Finishing Inc	Franklinville.	
NJ	PJP Landfill	Jersey City.	
NJ	Pohatcong Valley Ground Water Contaminat	Warren County.	
NJ	Price Landfill	Pleasantville	S
NJ	Puchack Well Field	Pennsauken Township..	
NJ	Quanta Resources	Edgewater.	
NJ	Radiation Technology, Inc	Rockaway Township.	
NJ	Raritan Bay Slag	Old Bridge Township/ Sayreville..	
NJ	Ringwood Mines/Landfill	Ringwood.	
NJ	Riverside Industrial Park	Newark.	
NJ	Rockaway Borough Well Field	Rockaway Township.	
NJ	Rockaway Township Wells	Rockaway.	
NJ	Rocky Hill Municipal Well	Rocky Hill Borough.	
NJ	Roebling Steel Co	Florence.	
NJ	Rolling Knolls Landfill	Chatham Township.	
NJ	Scientific Chemical Processing	Carlstadt.	
NJ	Sharkey Landfill	Parsippany/Troy Hls.	
NJ	Sherwin-Williams/Hilliards Creek	Gibbsboro.	
NJ	Shieldalloy Corp	Newfield Borough.	
NJ	South Jersey Clothing Co	Minotola.	
NJ	Standard Chlorine	Kearny.	
NJ	Swope Oil & Chemical Co	Pennsauken.	
NJ	Syncon Resins	South Kearny.	
NJ	U.S. Radium Corp	Orange	P
NJ	Unimatic Manufacturing Corporation	Fairfield.	
NJ	United States Avenue Burn	Gibbsboro.	
NJ	Universal Oil Products (Chemical Division	East Rutherford.	
NJ	Ventron/Velsicol	Wood Ridge Borough.	
NJ	Vineland Chemical Co., Inc	Vineland.	
NJ	Waldick Aerospace Devices, Inc	Wall Township.	
NJ	Welsbach & General Gas Mantle (Camden)	Camden and Gloucester City.	
NJ	White Chemical Corp	Newark	A
NJ	White Swan Cleaners/Sun Cleaners Area Ground Water Contamination.	Wall Township.	
NJ	Williams Property	Swainton.	
NJ	Woodbrook Road Dump	South Plainfield..	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
NJ	Woodland Route 532 Dump	Woodland Township.	
NJ	Woodland Route 72 Dump	Woodland Township.	
NJ	Zschiegner Refining	Howell Township..	
NM	AT&SF Albuquerque	Albuquerque	P
NM	Chevron Questa Mine	Questa.	
NM	Eagle Picher Carefree Battery	Socorro.	
NM	Fruit Avenue Plume	Albuquerque.	
NM	Grants Chlorinated Solvents Plume	Grants.	
NM	Griggs & Walnut Ground Water Plume	Las Cruces..	
NM	Homestake Mining Co	Milan.	
NM	Jackpile-Paguate Uranium Mine	Laguna Pueblo.	
NM	Lea and West Second Street	Roswell.	
NM	McGaffey and Main Groundwater Plume	Roswell.	
NM	North Railroad Avenue Plume	Espanola.	
NM	Prewitt Abandoned Refinery	Prewitt	P
NM	South Valley	Albuquerque	P
NM	United Nuclear Corp	Church Rock.	
NV	Carson River Mercury Site	Lyon/Churchill Cnty.	
NY	American Thermostat Co	South Cairo.	
NY	Applied Environmental Services	Glenwood Landing.	
NY	Arsenic Mine	Kent	A
NY	Black River PCBs	Jefferson County.	
NY	Brewster Well Field	Putnam County.	
NY	Brillo Landfill	Victory.	
NY	Byron Barrel & Drum	Byron.	
NY	Carroll & Dubies Sewage Disposal	Port Jervis.	
NY	Cayuga County Ground Water Contamination	Cayuga County.	
NY	Circuitron Corp	East Farmingdale.	
NY	Claremont Polychemical	Old Bethpage.	
NY	Colesville Municipal Landfill	Town of Colesville.	
NY	Computer Circuits	Hauppauge.	
NY	Cortese Landfill	Village of Narrowsburg.	
NY	Crown Cleaners of Watertown, Inc	Carthage.	
NY	Dewey Loeffel Landfill	Nassau.	
NY	Diaz Chemical Corporation	Holley.	
NY	Eighteenmile Creek	Niagara County.	
NY	Endicott Village Well Field	Village of Endicott.	
NY	Facet Enterprises, Inc	Elmira.	
NY	Forest Glen Mobile Home Subdivision	Niagara Falls	A
NY	Fulton Avenue	North Hempstead..	
NY	GCL Tie & Treating Inc	Village of Sidney.	
NY	GE Moreau	South Glen Falls.	
NY	General Motors (Central Foundry Division)	Massena.	
NY	Genzale Plating Co	Franklin Square.	
NY	Goldisc Recordings, Inc	Holbrook.	
NY	Gowanus Canal	Brooklyn.	
NY	Haviland Complex	Town of Hyde Park.	
NY	Hertel Landfill	Plattekill.	
NY	Hooker (S Area)	Niagara Falls.	
NY	Hooker Chemical/Ruco Polymer Corp	Hicksville.	
NY	Hopewell Precision Area Contamination	Hopewell Junction.	
NY	Hudson River PCBs	Hudson River.	
NY	Islip Municipal Sanitary Landfill	Islip.	
NY	Johnstown City Landfill	Town of Johnstown.	
NY	Jones Chemicals, Inc	Caledonia.	
NY	Kentucky Avenue Well Field	Horseheads.	
NY	Lawrence Aviation Industries, Inc.	Port Jefferson Station.	
NY	Lehigh Valley Railroad	Le Roy.	
NY	Li Tungsten Corp	Glen Cove.	
NY	Liberty Industrial Finishing	Farmingdale.	
NY	Little Valley	Little Valley	A
NY	MacKenzie Chemical Works, Inc	Central Islip.	
NY	Magna Metals	Cortlandt Manor.	
NY	Malta Rocket Fuel Area	Malta.	
NY	Mattiace Petrochemical Co., Inc	Glen Cove.	
NY	Meeker Avenue Plume	Brooklyn.	
NY	Mercury Refining, Inc	Colonie.	
NY	Mohonk Road Industrial Plant	High Falls.	
NY	Nepera Chemical Co., Inc	Maybrook.	
NY	New Cassel/Hicksville Ground Water Contamination	New Cassel/Hicksville.	
NY	Newtown Creek	Brooklyn/Queens.	
NY	Niagara Mohawk Power Co (Saratoga Spings)	Saratoga Springs.	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
NY	Old Bethpage Landfill	Oyster Bay.	
NY	Old Roosevelt Field Contaminated Ground Water Area	Garden City..	
NY	Olean Well Field	Olean.	
NY	Onondaga Lake	Syracuse.	
NY	Peninsula Boulevard Ground Water Plume	Hewlett.	
NY	Pollution Abatement Services	Oswego	S
NY	Port Washington Landfill	Port Washington.	
NY	Preferred Plating Corp	Farmingdale.	
NY	Ramapo Landfill	Ramapo.	
NY	Richardson Hill Road Landfill/Pond	Sidney Center.	
NY	Robintech, Inc./National Pipe Co.	Town of Vestal	P
NY	Rosen Brothers Scrap Yard/Dump	Cortland.	
NY	Rowe Industries Gnd Water Contamination	Noyack/Sag Harbor.	
NY	Saint-Gobain Performance Plastics	Village of Hoosick Falls.	
NY	Sarney Farm	Amenia.	
NY	Sealand Restoration, Inc	Lisbon.	
NY	Shenandoah Road Ground Water Contamination	East Fishkill..	
NY	Sidney Landfill	Sidney.	
NY	Sinclair Refinery	Wellsville.	
NY	Smithtown Ground Water Contamination	Smithtown.	
NY	Solvent Savers	Lincklaen.	
NY	Stanton Cleaners Area Ground Water Contamination	Great Neck.	
NY	Tri-Cities Barrel Co., Inc	Port Crane.	
NY	Vestal Water Supply Well 1–1	Vestal.	
NY	Volney Municipal Landfill	Town of Volney.	
NY	Wappinger Creek	Dutchess County.	
NY	Wolff-Alport Chemical Company	Ridgewood.	
NY	York Oil Co	Moira.	
OH	Allied Chemical & Ironton Coke	Ironton	P
OH	Behr Dayton Thermal System VOC Plume	Dayton..	
OH	Big D Campground	Kingsville.	
OH	Chem-Dyne	Hamilton	S
OH	Copley Square Plaza	Copley.	
OH	Donnelsville Contaminated Aquifer	Donnelsville.	
OH	E.H. Schilling Landfill	Hamilton Township.	
OH	East Troy Contaminated Aquifer	Troy.	
OH	Fields Brook	Ashtabula.	
OH	Fultz Landfill	Jackson Township.	
OH	Industrial Excess Landfill	Uniontown.	
OH	Lammers Barrel	Beavercreek.	
OH	Little Scioto River	Marion County..	
OH	Miami County Incinerator	Troy.	
OH	Milford Contaminated Aquifer	Milford.	
OH	Nease Chemical	Salem.	
OH	New Carlisle Landfill	New Carlisle..	
OH	New Lyme Landfill	New Lyme.	
OH	North Sanitary Landfill	Dayton.	
OH	Old Mill	Rock Creek.	
OH	Ormet Corp	Hannibal.	
OH	Peters Cartridge Factory	Kings Mills	P
OH	Powell Road Landfill	Dayton.	
OH	Pristine, Inc	Reading.	
OH	Reilly Tar & Chemical (Dover Plant)	Dover.	
OH	Sanitary Landfill Co. (Industrial Waste)	Dayton.	
OH	Skinner Landfill	West Chester.	
OH	South Point Plant	South Point.	
OH	Summit National	Deerfield Township	P
OH	TRW, Inc. (Minerva Plant)	Minerva.	
OH	Valley Pike VOCs	Riverside.	
OH	Van Dale Junkyard	Marietta.	
OH	West Troy Contaminated Aquifer	Troy.	
OH	Zanesville Well Field	Zanesville.	
OK	Double Eagle Refinery Co.	Oklahoma City.	
OK	Eagle Industries	Midwest City.	
OK	Fourth Street Abandoned Refinery	Okalahoma City.	
OK	Hardage/Criner	Criner.	
OK	Henryetta Iron and Metal	Henryetta.	
OK	Hudson Refinery	Cushing.	
OK	Oklahoma Refining Co	Cyril.	
OK	Tar Creek (Ottawa County)	Ottawa County.	
OK	Wilcox Oil Company	Creek County.	
OR	Black Butte Mine	Cottage Grove.	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
OR	Formosa Mine	Douglas County.	
OR	McCormick & Baxter Creos. Co (Portland)	Portland.	
OR	North Ridge Estates	Klamath Falls	P
OR	Northwest Pipe & Casing/Hall Process Company	Clackamas.	
OR	Portland Harbor	Portland.	
OR	Reynolds Metals Company	Troutdale.	
OR	Taylor Lumber and Treating	Sheridan..	
OR	Teledyne Wah Chang	Albany.	
OR	Union Pacific Railroad Tie Treatment	The Dalles.	
OR	United Chrome Products, Inc	Corvallis.	
PA	A.I.W. Frank/Mid-County Mustang	Exton.	
PA	Avco Lycoming (Williamsport Division)	Williamsport.	
PA	Baghurst Drive	Harleysville.	
PA	Bally Ground Water Contamination	Bally Borough.	
PA	Bell Landfill	Terry Township.	
PA	Bendix Flight Systems Division	Bridgewater Township.	
PA	Berks Sand Pit	Longswamp Township.	
PA	Blosenski Landfill	West Caln Township.	
PA	Boarhead Farms	Bridgeton Township.	
PA	BoRit Asbetos	Ambler..	
PA	Breslube-Penn, Inc	Coraopolis.	
PA	Brown's Battery Breaking	Shoemakersville.	
PA	Butz Landfill	Stroudsburg.	
PA	Centre County Kepone	State College Borough	P
PA	Chem-Fab	Doylestown.	
PA	Commodore Semiconductor Group	Lower Providence Township.	
PA	Crater Resources/Keystone Coke/Alan Wood	Upper Merion Township.	
PA	Crossley Farm	Hereford Township.	
PA	Croydon TCE	Croydon.	
PA	CryoChem, Inc	Worman.	
PA	Delta Quarries & Disp./Stotler Landfill	Antis/Logan Twps.	
PA	Douglassville Disposal	Douglassville.	
PA	Drake Chemical	Lock Haven.	
PA	Dublin TCE Site	Dublin Borough.	
PA	East Mount Zion	Springettsbury Township.	
PA	Eastern Diversified Metals	Hometown.	
PA	Elizabethtown Landfill	Elizabethtown.	
PA	Fischer & Porter Co	Warminster.	
PA	Foote Mineral Co	East Whiteland Township.	
PA	Franklin Slag Pile (MDC)	Philadelphia.	
PA	Havertown PCP	Haverford.	
PA	Heleva Landfill	North Whitehall Township.	
PA	Hellertown Manufacturing Co	Hellertown.	
PA	Henderson Road	Upper Merion Township.	
PA	Hunterstown Road	Straban Township.	
PA	Industrial Lane	Williams Township.	
PA	Jacks Creek/Sitkin Smelting and Refinery	Maitland.	
PA	Jackson Ceramix	Falls Creek.	
PA	Keystone Sanitation Landfill	Union Township.	
PA	Kimberton Site	Kimberton Borough.	
PA	Lindane Dump	Harrison Township.	
PA	Lord-Shope Landfill	Girard Township.	
PA	Lower Darby Creek Area	Delaware/Philadelphia Counties..	
PA	MW Manufacturing	Valley Township.	
PA	Malvern TCE	Malvern.	
PA	Metal Banks	Philadelphia.	
PA	Metro Container Corporation	Trainer.	
PA	Mill Creek Dump	Erie.	
PA	Modern Sanitation Landfill	Lower Windsor Township.	
PA	North Penn—Area 1	Souderton.	
PA	North Penn—Area 12	Worcester.	
PA	North Penn—Area 2	Hatfield.	
PA	North Penn—Area 5	Montgomery Township.	
PA	North Penn Area 6	Lansdale	P
PA	North Penn—Area 7	North Wales.	
PA	Novak Sanitary Landfill	South Whitehall Township	P
PA	Occidental Chemical Corp./Firestone Tire	Lower Pottsgrove Township.	
PA	Ohio River Park	Neville Island.	
PA	Old City of York Landfill	Seven Valleys.	
PA	Old Wilmington Road Ground Water Contamination	Sadsburyville.	
PA	Osborne Landfill	Grove City.	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
PA	Palmerton Zinc Pile	Palmerton	P
PA	Paoli Rail Yard	Paoli.	
PA	Price Battery	Hamburg.	
PA	Raymark	Hatboro.	
PA	Revere Chemical Co	Nockamixon Township.	
PA	Rodale Manufacturing Co., Inc	Emmaus Borough.	
PA	Ryeland Road Arsenic	Heidelberg Township.	
PA	Saegertown Industrial Area	Saegertown.	P
PA	Safety Light Corporation	Bloomsburg.	
PA	Salford Quarry	Lower Salford Township..	
PA	Sharon Steel Corp. (Farrell Wks Disp Area)	Hickory Township.	
PA	Shriver's Corner	Straban Township.	
PA	Stanley Kessler	King of Prussia.	
PA	Tobyhanna Army Depot	Tobyhanna	P
PA	Tonolli Corp	Nesquehoning.	
PA	Tysons Dump	Upper Merion Twp.	
PA	UGI Columbia Gas Plant	Columbia.	
PA	Valmont TCE	Hazle Township and West Hazleton.	
PA	Walsh Landfill	Honeybrook Township.	
PA	Watson Johnson Landfill	Richland Township.	
PA	Westinghouse Electronic (Sharon Plant)	Sharon.	
PA	Westinghouse Elevator Co. Plant	Gettysburg.	
PA	Whitmoyer Laboratories	Jackson Township.	
PA	William Dick Lagoons	West Caln Township.	
PR	Cabo Rojo Ground Water Contamination	Cabo Rojo.	
PR	Cidra Ground Water Contamination	Cidra.	
PR	Corozal Well	Corozal.	
PR	Dorado Ground Water Contamination	Dorado.	
PR	Fibers Public Supply Wells	Jobos.	
PR	Juncos Landfill	Juncos.	
PR	Maunabo Area Ground Water Contamination	Maunabo.	
PR	Ochoa Fertilizer Co	Guánica.	
PR	Papelera Puertorriquena, Inc	Utuado..	
PR	Pesticide Warehouse I	Arecibo.	
PR	Pesticide Warehouse III	Manati..	
PR	PROTECO	Peñuelas.	
PR	San German Ground Water Contamination	San German.	
PR	Scorpio Recycling, Inc.	Candeleria Ward.	
PR	The Battery Recycling Company	Bo. Cambalache.	
PR	Upjohn Facility	Barceloneta.	
PR	Vega Alta Public Supply Wells	Vega Alta.	
PR	Vega Baja Solid Waste Disposal	Vega Baja.	
RI	Central Landfill	Johnston.	
RI	Centredale Manor Restoration Project	North Providence.	
RI	Davis Liquid Waste	Smithfield.	
RI	Landfill & Resource Recovery, Inc. (L&RR)	North Smithfield.	
RI	Peterson/Puritan, Inc	Lincoln/Cumberland	P
RI	Picillo Farm	Coventry	S
RI	Rose Hill Regional Landfill	South Kingston.	
RI	Stamina Mills, Inc	North Smithfield.	
RI	West Kingston Town Dump/URI Disposal	South Kingston.	
RI	Western Sand & Gravel	Burrillville.	
SC	Aqua-Tech Environmental Inc (Groce Labs)	Greer.	
SC	Barite Hill/Nevada Goldfields	McCormick..	
SC	Beaunit Corp. (Circular Knit & Dye)	Fountain Inn.	
SC	Brewer Gold Mine	Jefferson.	
SC	Burlington Industries Cheraw	Cheraw.	
SC	Carolawn, Inc	Fort Lawn.	
SC	Clearwater Finishing	Clearwater.	
SC	Elmore Waste Disposal	Greer.	
SC	Galey and Lord Plant	Society Hill.	
SC	Helena Chemical Co Landfill	Fairfax.	
SC	Kalama Specialty Chemicals	Beaufort.	
SC	Koppers Co., Inc (Charleston Plant)	Charleston	P
SC	Leonard Chemical Co., Inc	Rock Hill.	
SC	Lexington County Landfill Area	Cayce.	
SC	Macalloy Corporation	North Charleston	P
SC	Medley Farm Drum Dump	Gaffney.	
SC	Palmetto Wood Preserving	Dixiana.	
SC	Para-Chem Southern, Inc	Simpsonville	P
SC	Rock Hill Chemical Co	Rock Hill.	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
SC	SCRDI Bluff Road	Columbia	S
SC	SCRDI Dixiana	Cayce.	
SC	Sangamo Weston	Pickens	P
SC	Shuron Inc	Barnwell.	
SC	Townsend Saw Chain Co. Superfund Site	Pontiac	P
SC	US Finishing/Cone Mills	Greenville	P
SC	Wamchem, Inc	Burton.	
SD	Gilt Edge Mine	Lead.	
TN	Alamo Contaminated Ground Water	Alamo.	
TN	American Creosote Works, (Jackson Plant)	Jackson.	
TN	Arlington Blending & Packaging	Arlington.	
TN	Carrier Air Conditioning Co	Collierville.	
TN	Clinch River Corporation	Harriman.	
TN	Former Custom Cleaners	Memphis.	
TN	Mallory Capacitor Co	Waynesboro.	
TN	Murray-Ohio Dump	Lawrenceburg.	
TN	National Fireworks	Cordova.	
TN	Ross Metals Inc	Rossville.	
TN	Smalley-Piper	Collierville.	
TN	Smokey Mountain Smelters	Knox County..	
TN	Southside Chattanooga Lead	Chattanooga.	
TN	Velsicol Chemical Corp (Hardeman County)	Toone.	
TN	Walker Machine Products, Inc.	Collierville.	
TN	Wrigley Charcoal Plant	Wrigley.	
TX	ALCOA (Point Comfort)/Lavaca Bay	Point Comfort.	
TX	Attebury Grain Storage Facility	Happy..	
TX	Bandera Road Ground Water Plume	Leon Valley.	
TX	Brine Service Company	Corpus Christi.	
TX	Circle Court Ground Water Plume	Willow Park.	
TX	City of Perryton Well No. 2	Perryton.	
TX	Conroe Creosoting Company	Conroe.	
TX	Crystal Chemical Co	Houston.	
TX	Delfasco Forge	Grand Prairie.	
TX	Donna Reservoir and Canal System	Donna.	
TX	East 67th Street Ground Water Plume	Odessa.	
TX	Eldorado Chemical Co., Inc.	Live Oak.	
TX	Falcon Refinery	Ingleside.	
TX	French, Ltd	Crosby.	
TX	Garland Creosoting	Longview.	
TX	Geneva Industries/Fuhrmann Energy	Houston	P
TX	Gulfco Marine Maintenance	Freeport..	
TX	Hart Creosoting Company	Jasper.	
TX	Highlands Acid Pit	Highlands.	
TX	Highway 18 Ground Water	Kermit.	
TX	Jasper Creosoting Company Inc	Jasper County.	
TX	Jones Road Ground Water Plume	Harris County.	
TX	Koppers Co Inc (Texarkana Plant)	Texarkana.	
TX	Lane Plating Works, Inc	Dallas.	
TX	Main Street Ground Water Plume	Burnet.	
TX	Malone Service Company, Inc	Texas City..	
TX	Many Diversified Interests, Inc	Houston	P
TX	Midessa Ground Water Plume	Odessa.	
TX	Motco, Inc	La Marque	S
TX	North Cavalcade Street	Houston.	
TX	Northwest Odessa Groundwater	Odessa.	
TX	Odessa Chromium #1	Odessa.	
TX	Patrick Bayou	Deer Park.	
TX	Petro-Chemical Systems, (Turtle Bayou)	Liberty County.	
TX	RSR Corp	Dallas	P
TX	Rockwool Industries Inc	Bell County.	
TX	Sandy Beach Road Ground Water Plume	Azle.	
TX	San Jacinto River Waste Pits	Harris County.	
TX	Sheridan Disposal Services	Hempstead.	
TX	Sikes Disposal Pits	Crosby.	
TX	Sol Lynn/Industrial Transformers	Houston.	
TX	South Cavalcade Street	Houston.	
TX	Sprague Road Ground Water Plume	Odessa.	
TX	Star Lake Canal	Port Neches.	
TX	State Road 114 Ground Water Plume	Levelland.	
TX	Texarkana Wood Preserving Co	Texarkana.	
TX	Tex-Tin Superfund	Texas City, Galveston	P
TX	United Creosoting Co	Conroe.	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
TX	US Oil Recovery	Pasadena.	
TX	Van der Horst USA Corporation	Terrell.	
TX	West County Road 112 Ground Water	Midland.	
UT	Bountiful/Woods Cross 5th South PCE Plume	Bountiful/Woods Cross.	
UT	Five Points PCE Plume	Woods Cross/Bountiful.	
UT	Jacobs Smelters	Tooele County	P
UT	Portland Cement (Kiln Dust 2 & 3)	Salt Lake City.	
UT	U.S. Magnesium	Tooele County..	
UT	Utah Power & Light/American Barrel Co	Salt Lake City.	
UT	Wasatch Chemical Co. (Lot 6)	Salt Lake City.	
VA	Abex Corp	Portsmouth.	
VA	Arrowhead Associates/Scovill Corp	Montross.	
VA	Atlantic Wood Industries, Inc	Portsmouth.	
VA	Avtex Fibers, Inc	Front Royal.	
VA	Buckingham County Landfill	Buckingham.	
VA	Chisman Creek	York County.	
VA	Culpeper Wood Preservers, Inc	Culpeper.	
VA	Former Nansemond Ordnance Depot	Suffolk	P
VA	Greenwood Chemical Co	Newtown.	
VA	H & H Inc., Burn Pit	Farrington.	
VA	Hidden Lane Landfill	Sterling.	
VA	Kim-Stan Landfill	Selma.	
VA	L.A. Clarke & Son	Spotsylvania County.	
VA	Peck Iron and Metal	Portsmouth..	
VA	Rentokil, Inc. (Virginia Wood Preserving Division)	Richmond	P
VA	Saltville Waste Disposal Ponds	Saltville.	
VA	Saunders Supply Co	Chuckatuck.	
VA	U.S. Titanium	Piney River.	
VI	Tutu Wellfield	Tutu.	
VT	BFI Sanitary Landfill (Rockingham)	Rockingham.	
VT	Bennington Municipal Sanitary Landfill	Bennington.	
VT	Burgess Brothers Landfill	Woodford.	
VT	Commerce Street Plume	Williston.	
VT	Elizabeth Mine	Strafford..	
VT	Ely Copper Mine	Vershire.	
VT	Jard Company, Inc.	Bennington.	
VT	Old Springfield Landfill	Springfield.	
VT	Parker Sanitary Landfill	Lyndon.	
VT	Pike Hill Copper Mine	Corinth.	
VT	Pine Street Canal	Burlington	S
VT	Pownal Tannery	Pownal.	
WA	Boomsnub/Airco	Vancouver	S
WA	Bremerton Gasworks	Bremerton.	
WA	Centralia Municipal Landfill	Centralia.	
WA	Colbert Landfill	Colbert.	
WA	Commencement Bay, Near Shore/Tide Flats	Pierce County	P
WA	Commencement Bay, South Tacoma Channel	Tacoma	P
WA	FMC Corp. (Yakima Pit)	Yakima.	
WA	General Electric Co. (Spokane Shop)	Spokane.	
WA	Grain Handling Facility at Freeman	Freeman.	
WA	Greenacres Landfill	Spokane County.	
WA	Hamilton/Labree Roads Ground Water Contamination	Chehalis.	
WA	Harbor Island (Lead)	Seattle	P
WA	Hidden Valley Landfill (Thun Field)	Pierce County.	
WA	Kaiser Aluminum Mead Works	Mead.	
WA	Lakewood Site	Lakewood	P
WA	Lockheed West Seattle	Seattle.	
WA	Lower Duwamish Waterway	Seattle.	
WA	Makah Reservation Warmhouse Beach Dump	Neah Bay.	
WA	Mica Landfill	Mica.	
WA	Midnite Mine	Wellpinit..	
WA	Midway Landfill	Kent.	
WA	Moses Lake Wellfield Contamination	Moses Lake.	
WA	North Market Street	Spokane.	
WA	Oeser Co.	Bellingham.	
WA	Pacific Car & Foundry Co	Renton.	
WA	Pacific Sound Resources	Seattle.	
WA	Palermo Well Field Ground Water Contam	Tumwater.	
WA	Pasco Sanitary Landfill	Pasco.	
WA	Queen City Farms	Maple Valley	P
WA	Quendall Terminals	Renton.	
WA	Seattle Municipal Landfill (Kent Hghlnds)	Kent.	

TABLE 1—GENERAL SUPERFUND SECTION—Continued

State	Site name	City/County	Notes(a)
WA	Western Processing Co., Inc	Kent.	
WA	Wyckoff Co./Eagle Harbor	Bainbridge Island.	
WI	Algoma Municipal Landfill	Algoma.	
WI	Amcast Industrial Corporation	Cedarburg.	
WI	Ashland/Northern States Power Lakefront	Ashland.	
WI	Better Brite Plating Chrome & Zinc Shops	DePere.	
WI	City Disposal Corp. Landfill	Dunn.	
WI	Delavan Municipal Well #4	Delavan.	
WI	Hagen Farm	Stoughton.	
WI	Hechimovich Sanitary Landfill	Williamstown.	
WI	Hunts Disposal Landfill	Caledonia.	
WI	Janesville Ash Beds	Janesville.	
WI	Janesville Old Landfill	Janesville.	
WI	Kohler Co. Landfill	Kohler.	
WI	Lauer I Sanitary Landfill	Menomonee Falls.	
WI	Lemberger Landfill, Inc	Whitelaw.	
WI	Lemberger Transport & Recycling	Franklin Township.	
WI	Madison Metropolitan Sewerage District	Blooming Grove.	
WI	Master Disposal Service Landfill	Brookfield.	
WI	Mid-State Disposal, Inc. Landfill	Cleveland Township.	
WI	Moss-American(Kerr-McGee Oil Co.)	Milwaukee.	
WI	Muskego Sanitary Landfill	Muskego.	
WI	N.W. Mauthe Co., Inc	Appleton	S
WI	National Presto Industries, Inc	Eau Claire.	
WI	Oconomowoc Electroplating Co. Inc	Ashippin.	
WI	Onalaska Municipal Landfill	Onalaska.	
WI	Penta Wood Products	Daniels.	
WI	Refuse Hideaway Landfill	Middleton.	
WI	Ripon City Landfill	Ripon.	
WI	Sauk County Landfill	Excelsior.	
WI	Schmalz Dump	Harrison.	
WI	Sheboygan Harbor & River	Sheboygan.	
WI	Spickler Landfill	Spencer.	
WI	Stoughton City Landfill	Stoughton.	
WI	Tomah Municipal Sanitary Landfill	Tomah.	
WI	Unity Auto Mart	Unity.	
WI	Waste Mgmt of WI (Brookfield Sanit LF)	Brookfield.	
WI	Wausau Ground Water Contamination	Wausau.	
WV	Big John Salvage—Hoult Road	Fairmont.	
WV	Fike Chemical, Inc	Nitro.	
WV	Hanlin-Allied-Olin	Moundsville.	
WV	North 25th Street Glass and Zinc	Clarksburg.	
WV	Paden City Groundwater	Paden City.	
WV	Ravenswood PCE Ground Water Plume	Ravenswood.	
WV	Shaffer Equipment/Arbuckle Creek Area	Minden.	
WV	Sharon Steel Corp (Fairmont Coke Works)	Fairmont.	
WV	Vienna Tetrachloroethene	Vienna.	

[a] A = Based on issuance of health advisory by Agency for Toxic Substances and Disease Registry (if scored, HRS score need not be greater than or equal to 28.50).
S = State top priority (included among the 100 top priority sites regardless of score).
P = Sites with partial deletion(s).

TABLE 2—FEDERAL FACILITIES SECTION

St	Site name	City/County	Notes(a)
AK	Adak Naval Air Station	Adak.	
AK	Eielson Air Force Base	Fairbanks N Star Borough.	
AK	Elmendorf Air Force Base	Greater Anchorage Borough.	
AK	Fort Richardson (USARMY)	Anchorage.	
AK	Fort Wainwright	Fairbanks N Star Borough.	
AL	Alabama Army Ammunition Plant	Childersburg.	
AL	Anniston Army Depot (SE Industrial Area)	Anniston.	
AL	Redstone Arsenal (USARMY/NASA)	Huntsville	P
AZ	Williams Air Force Base	Chandler.	
AZ	Yuma Marine Corps Air Station	Yuma.	
CA	Alameda Naval Air Station	Alameda.	
CA	Barstow Marine Corps Logistics Base	Barstow.	
CA	Camp Pendleton Marine Corps Base	San Diego County.	
CA	Castle Air Force Base	Merced.	
CA	Concord Naval Weapons Station	Concord.	
CA	Edwards Air Force Base	Kern County.	

TABLE 2—FEDERAL FACILITIES SECTION—Continued

St	Site name	City/County	Notes(a)
CA	El Toro Marine Corps Air Station	El Toro	P
CA	Fort Ord	Marina	P
CA	George Air Force Base	Victorville.	
CA	Hunters Point Naval Shipyard	San Francisco	P
CA	Jet Propulsion Laboratory (NASA)	Pasadena.	
CA	LEHR/Old Campus Landfill (USDOE)	Davis.	
CA	Lawrence Livermore Lab Site 300 (USDOE)	Livermore.	
CA	Lawrence Livermore Laboratory (USDOE)	Livermore.	
CA	March Air Force Base	Riverside.	
CA	Mather Air Force Base	Sacramento.	
CA	McClellan Air Force Base (GW Contam)	Sacramento.	
CA	Moffett Naval Air Station	Sunnyvale.	
CA	Norton Air Force Base	San Bernardino.	
CA	Riverbank Army Ammunition Plant	Riverbank.	
CA	Sacramento Army Depot	Sacramento.	
CA	Sharpe Army Depot	Lathrop.	
CA	Tracy Defense Depot (USARMY)	Tracy.	
CA	Travis Air Force Base	Solano County.	
CO	Air Force Plant PJKS	Waterton.	
CO	Rocky Flats Plant (USDOE)	Jefferson and Boulder Counties.	P
CO	Rocky Mountain Arsenal (USARMY)	Adams County	P
CT	New London Submarine Base	New London.	
DC	Washington Navy Yard	Washington DC.	
DE	Dover Air Force Base	Dover.	
FL	Cecil Field Naval Air Station	Jacksonville	P
FL	Homestead Air Force Base	Homestead.	
FL	Jacksonville Naval Air Station	Jacksonville.	
FL	Pensacola Naval Air Station	Pensacola.	
FL	Tyndall Air Force Base	Panama City.	
FL	Whiting Field Naval Air Station	Milton.	
GA	Marine Corps Logistics Base	Albany.	
GA	Robins Air Force Base(Lf#4/Sludge Lagoon	Houston County.	
GU	Andersen Air Force Base	Yigo.	
HI	Naval Computer & Telecommunications Area	Oahu.	
HI	Pearl Harbor Naval Complex	Pearl Harbor.	
IA	Iowa Army Ammunition Plant	Middletown.	
ID	Idaho National Engineering Lab (USDOE)	Idaho Falls.	
ID	Mountain Home Air Force Base	Mountain Home.	
IL	Joliet Army Ammunition Plant (LAP Area)	Joliet.	
IL	Joliet Army Ammunition Plant (Mfg Area)	Joliet.	
IL	Sangamo Electric/Crab Orchard NWR (USDOI)	Carterville.	
IL	Savanna Army Depot Activity	Savanna.	
KS	Fort Riley	Junction City.	
KY	Paducah Gaseous Diffusion Plant (USDOE)	Paducah.	
LA	Louisiana Army Ammunition Plant	Doyline.	
MA	Fort Devens	Fort Devens.	
MA	Hanscom Field/Hanscom Air Force Base	Bedford.	
MA	Natick Laboratory Army Research, D&E Cntr	Natick.	
MA	Naval Weapons Industrial Reserve Plant	Bedford.	
MA	Otis Air National Guard Base/Camp Edwards	Sandwich, Falmouth, Bourne, Mashpee.	P
MA	South Weymouth Naval Air Station	Weymouth	P
MD	Aberdeen Proving Ground (Edgewood Area)	Edgewood.	
MD	Aberdeen Proving Ground (Michaelsville LF)	Aberdeen.	
MD	Andrews Air Force Base	Camp Springs.	
MD	Beltsville Agricultural Research (USDA)	Beltsville.	
MD	Brandywine DRMO	Brandywine.	
MD	Curtis Bay Coast Guard Yard	Anne Arundel County.	
MD	Fort Detrick Area B Ground Water	Frederick.	
MD	Fort George G. Meade	Odenton	P
MD	Indian Head Naval Surface Warfare Center	Indian Head.	
MD	Patuxent River Naval Air Station	St. Mary's County.	
ME	Brunswick Naval Air Station	Brunswick.	
ME	Loring Air Force Base	Limestone.	
ME	Portsmouth Naval Shipyard	Kittery.	
MN	Naval Industrial Reserve Ordnance Plant	Fridley	P
MN	New Brighton/Arden Hills/TCAAP (USARMY)	New Brighton	P
MO	Lake City Army Ammu. Plant (NW Lagoon)	Independence.	
MO	Weldon Spring Former Army Ordnance Works	St. Charles County.	
MO	Weldon Spring Quarry/Plant/Pitts (USDOE)	St. Charles County.	
NC	Camp Lejeune Military Res. (USNAVY)	Onslow County.	

TABLE 2—FEDERAL FACILITIES SECTION—Continued

St	Site name	City/County	Notes(a)
NC	Cherry Point Marine Corps Air Station	Havelock.	
NE	Cornhusker Army Ammunition Plant	Hall County.	
NH	Pease Air Force Base	Portsmouth/Newington.	
NJ	Federal Aviation Admin. Tech. Center	Atlantic County.	
NJ	McGuire Air Force Base #1	Wrightstown.	
NJ	Middlesex Sampling Plant (USDOE)	Middlesex.	
NJ	Naval Air Engineering Center	Lakehurst.	
NJ	Naval Weapons Station Earle (Site A)	Colts Neck.	
NJ	Picatinny Arsenal (USARMY)	Rockaway Township.	
NM	Lee Acres Landfill (USDOI)	Farmington.	
NY	Brookhaven National Laboratory (USDOE)	Upton.	
NY	Griffiss Air Force Base	Rome	P
NY	Plattsburgh Air Force Base	Plattsburgh.	
NY	Seneca Army Depot	Romulus	P
OH	Feed Materials Production Center (USDOE)	Fernald.	
OH	Mound Plant (USDOE)	Miamisburg	P
OH	Wright-Patterson Air Force Base	Dayton.	
OK	Tinker Air Force (Soldier Cr/Bldg 300)	Oklahoma City.	
OR	Bradford Island	Cascade Locks.	
OR	Fremont Nat. Forest Uranium Mines (USDA)	Lakeview.	
OR	Umatilla Army Depot (Lagoons)	Hermiston.	
PA	Letterkenny Army Depot (SE Area)	Chambersburg	P
PA	Letterkenny Army Depot (PDO Area)	Franklin County	P
PA	Naval Air Development Center (8 Areas)	Warminster Township.	
PA	Navy Ships Parts Control Center	Mechanicsburg.	
PA	Tobyhanna Army Depot	Tobyhanna	P
PA	Willow Grove Naval Air & Air Res. Stn.	Willow Grove.	
PR	Atlantic Fleet Weapons Training Area—Vieques	Island of Vieques[1]	S
RI	Davisville Naval Construction Batt Cent	North Kingston.	
RI	Newport Naval Education/Training Center	Newport.	
SC	Parris Island Marine Corps Recruit Depot	Parris Island.	
SC	Savannah River Site (USDOE)	Aiken.	
SD	Ellsworth Air Force Base	Rapid City	P
TN	Memphis Defense Depot (DLA)	Memphis.	
TN	Milan Army Ammunition Plant	Milan.	
TN	Oak Ridge Reservation (USDOE)	Oak Ridge.	
TX	Air Force Plant #4 (General Dynamics)	Fort Worth.	
TX	Lone Star Army Ammunition Plant	Texarkana.	
TX	Longhorn Army Ammunition Plant	Karnack.	
TX	Pantex Plant (USDOE)	Pantex Village.	
UT	700 South 1600 East PCE Plume	Salt Lake City.	
UT	Hill Air Force Base	Ogden.	
UT	Monticello Mill Tailings (USDOE)	Monticello	P
UT	Ogden Defense Depot (DLA)	Ogden.	
UT	Tooele Army Depot (North Area)	Tooele.	
VA	Defense General Supply Center (DLA)	Chesterfield County.	
VA	Fort Eustis (US Army)	Newport News.	
VA	Langley Air Force Base/NASA Langley Cntr	Hampton.	
VA	Marine Corps Combat Development Command	Quantico.	
VA	Naval Amphibious Base Little Creek	Virginia Beach.	
VA	Naval Surface Warfare—Dahlgren	Dahlgren.	
VA	Naval Weapons Station—Yorktown	Yorktown.	
VA	Naval Weapons Station Yorktown—Cheatham Annex	Williamsburg.	
VA	Norfolk Naval Base (Sewells Pt Nvl Cmpx)	Norfolk.	
VA	Norfolk Naval Shipyard	Portsmouth.	
VA	St. Juliens Creek Annex (U.S. Navy)	Chesapeake.	
WA	American Lake Gardens/McChord AFB	Tacoma.	
WA	Bangor Naval Submarine Base	Silverdale.	
WA	Bangor Ordnance Disposal (USNAVY)	Bremerton.	
WA	Fairchild Air Force Base (4 Waste Areas)	Spokane County.	
WA	Fort Lewis Logistics Center	Tillicum.	
WA	Hanford 100-Area (USDOE)	Benton County	P
WA	Hanford 200-Area (USDOE)	Benton County.	
WA	Hanford 300-Area (USDOE)	Benton County.	
WA	Jackson Park Housing Complex (USNAVY)	Kitsap County.	
WA	Naval Air Station, Whidbey Island (Ault)	Whidbey Island.	
WA	Naval Undersea Warfare Station (4 Areas)	Keyport.	
WA	Old Navy Dump/Manchester Lab (USEPA/NOAA)	Manchester.	
WA	Puget Sound Naval Shipyard Complex	Bremerton.	
WV	Allegany Ballistics Laboratory (USNAVY)	Mineral.	
WV	West Virginia Ordnance (USARMY)	Point Pleasant	P

TABLE 2—FEDERAL FACILITIES SECTION—Continued

St	Site name	City/County	Notes(a)
WY	F.E. Warren Air Force Base	Cheyenne.	

[1] Only the Vieques portions of the AFWTA are included in appendix B to Part 300, the National Priorities List. The Culebra portions of the AFWTA (that were included in the NPL proposal AFWTA on August 13, 2004) are not included at this time due to ongoing negotiations between the Commonwealth of Puerto Rico and the Department of the Army.

Notes:

(a) A = Based on issuance of health advisory by Agency for Toxic Substances and Disease Registry (if scored, HRS score need not be greater than or equal to 28.50).

S = State top priority (included among the 100 top priority sites regardless of score).

P = Sites with partial deletion(s).

[62 FR 15576, Apr. 1, 1997]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting part 300, appendix B, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.govinfo.gov*.

APPENDIX C TO PART 300—SWIRLING FLASK DISPERSANT EFFECTIVENESS TEST, REVISED STANDARD DISPERSANT TOXICITY TEST, AND BIOREMEDIATION AGENT EFFECTIVENESS TEST

EFFECTIVE DATE NOTE: At 88 FR 38338, June 12, 2023, appendix C to part 300 was revised and will appear after this appendix.

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1.0 Introduction

1.1 *Scope and Application.* The methods described below apply to ‘‘dispersants, surface washing agents, surface collecting agents, bioremediation agents, and miscellaneous oil spill control agents’’ involving subpart J (Use of Dispersants and Other Chemicals) in 40 CFR part 300 (National Oil and Hazardous Substances Pollution Contingency Plan). They are revisions and additions to the EPA's Standard Dispersant Effectiveness and Toxicity Tests (1). The new Swirling Flask Dispersant Effectiveness Test is used only for testing dispersants. The Revised Standard Dispersant Toxicity Test is used for testing dispersants, as well as surface washing agents, surface collecting agents, and miscellaneous oil spill control agents. The bioremediation agent effectiveness test is used for testing bioremediation agents only.

1.2 *Definitions.* The definitions of dispersants, surface washing agents, surface collecting agents, bioremediation agents, and miscellaneous oil spill control agents are provided in 40 CFR 300.5.

2.0 Swirling Flask Dispersant Effectiveness Test

2.1 *Summary of Method.* This protocol was developed by Environment Canada to provide a relatively rapid and simple testing procedure for evaluating dispersant effectiveness (2). It uses a modified Erlenmeyer flask to which a side spout has been added for removing subsurface samples of water near the bottom of the flask without disturbing a surface oil layer. Seawater and a surface layer of oil are added to the flask. Turbulent mixing is provided by placing the flask on a standard shaker table at 150 rpm for 20 minutes to induce a swirling motion to the liquid contents. Following shaking, the flask is immediately removed from the shaker table and maintained in a stationary position for 10 minutes to allow the oil that will reform a slick to return to the water's surface. A sample of water for chemical analysis is then removed from the bottom of the flask through the side spout, extracted with methylene chloride (dichloromethane-DCM), and analyzed for oil content by UV-visible absorption spectrophotometry at wavelengths of 340, 370, and 400 nm (2).

2.2 *Apparatus.*

2.2.1 Modified Erlenmeyer Flask. Use 125-ml glass Erlenmeyer flasks that have been modified to include an attachment of a glass side spout that extends from the bottom of the flask upward to the neck region, as shown in Figure 1.

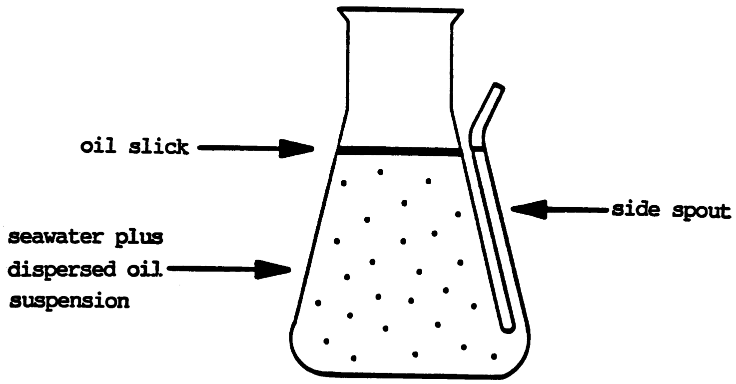
2.2.2 *Shaker Table.* Use a shaker table with speed control unit with variable speed (40–400 rpm) and an orbital diameter of approximately 0.75 inches (2 cm) to provide turbulence to solutions in test flasks.

2.2.3 *Spectrophotometer.* Use a UV-visible spectrophotometer capable of measuring absorbance at 340, 370, and 400 nm. A Hitachi Model U–2000 or equivalent is acceptable for this purpose.

2.2.4 *Glassware.* Glassware should consist of 5-, 10-, 25-, 100-, and 500-ml graduated cylinders; 125-ml separatory funnels with Teflon stopcocks; and 10-, 100-, and 1,000-ml volumetric flasks and micropipettes.

Figure 1

Swirling Flask Test Apparatus



2.3 *Reagents.* 2.3.1 *Synthetic seawater.* The synthetic sea salt "Instant Ocean," manufactured by Aquarium Systems of Mentor, OH, can be used for this purpose. The synthetic seawater solution is prepared by dissolving 34 g of the salt mixture in 1 liter of distilled water (*i.e.*, a salinity of 34 ppt). Table 1 provides a list of the ion composition of the seasalt mixture.

TABLE 1—MAJOR ION COMPOSITION OF "INSTANT OCEAN" SYNTHETIC SEA SALT

Major Ion	% Total Weight	Ionic Concentration at 34 ppt salinity (mg/1)
Chloride ($C1^{-}$)	47.470	18,740
Sodium ($NA^{=}$)	26.280	10,454
Sulfate (SO_4-)	6.602	2,631
Magnesium ($Mg^{==}$)	3.230	1,256
Calcium ($Ca^{==}$)	1.013	400
Potassium ($K^{=}$)	1.015	401
Bicarbonate (HCO_3-)	0.491	194
Boron (B)	0.015	6.0
Strontium ($Sr^{==}$)	0.001	7.5
SOLIDS TOTAL	86.11%	34,089.50
Water	13.88	
TOTAL	99.99%	

Following the preparation, the saltwater solution is allowed to equilibrate to the ambient temperature of the laboratory and should be in the range of 22 ±3 °C.

2.3.2 *Test oil.* Two EPA/American Petroleum Institute (API) standard reference oils, Prudhoe Bay and South Louisiana crude, should be used for this test. These oils can be obtained from the Resource Technology Corporation, 2931 Soldier Springs Road, P.O. Box 1346, Laramie, WY 82070, (307) 742–5452. These oils have been thoroughly homogenized, as well as characterized physically and chemically for previous EPA and API studies. Various selected parameters are presented in table 2.

TABLE 2—TEST OIL CHARACTERISTICS

	Prudhoe Bay crude oil	South Louisiana crude oil
Specific gravity[1]	0.894 kg/1	0.840 kg/1
API gravity[1]	26.8 degrees	37.0 degrees
Sulfur	1.03 wt%	0.23 wt%
Sulfur compounds, profile.		
Nitrogen	0.20 wt%	0.031 wt%
Vanadium	21 mg/1	0.95 mg/1
Nickel	11 mg/1	1.1 mg/1
Simulated distillation profile.		
Infrared spectrum.		
UV fluorescence spectrum.		
Pour Point	+ 25 °F	0 °F
Viscosity		
at 40 °C	14.09 cST	3.582 cST
at 100 °C	4.059 cST	1.568 cST
Index	210	(2)

[1] At 15 °C

[2] Not calculable when viscosity at 100 °C is less than 2.0.

2.3.3 *Methylene Chloride (Dichloromethane-DCM), pesticide quality.* For extraction of all sample water and oil-standard water samples.

2.4 *Pretest preparation.* 2.4.1 *Preparation and analysis of oil standards.* 2.4.1.1 Standard solutions of oil for calibrating the UV-visible spectrophotometer are prepared with the specific reference oils and dispersant used for a particular set of experimental test runs. For experiments with no dispersant, only oil is used to make the standard solution. For experiments with the oil plus dispersant, the standard is made with a 1:10 (v:v) mixture of the dispersant to the test oil (*i.e.*, a dispersant-to-oil ratio of 1:10). This ratio is used in the test tank with dispersant added. The presence of water and certain dispersants in DCM extracts can affect absorbance readings in a spectrophotometer. All standard solutions of oil (and dispersant, if present) should be prepared in a stepwise manner that reflects the analytical protocol used for the experimental water samples.

2.4.1.2 To prepare the standards, prepare a parent oil-DCM standard by mixing 1 part oil (plus $\frac{1}{10}$ part premixed dispersant, if applicable) to 9 parts DCM (*i.e.*, 1:10 dilution of the oil v:v). Add a specific volume of the parent oil-DCM standard to 30 ml of synthetic seawater in a separatory funnel. Extract the oil-water mixture with 5-ml volumes of DCM after 15 seconds of vigorous shaking followed by a 2 minute stationary period to allow for phase separation for each extraction. Repeat the extraction using a total of three 5-ml portions of DCM. Adjust the final DCM volume for the combined extracts to 20 ml with DCM in a 25-ml graduated cylinder.

2.4.1.3 The quantities of oil used to achieve the desired concentrations in the final 20-ml DCM extracts for the standard oil-solutions are summarized in table 3. Specific masses for oil amounts in standards are determined as volumes of oil multiplied by the density of the oil.

2.4.2 *Linear stability calibration of UV-Visible spectrophotometer.*

2.4.2.1 Before DCM-extracts of dispersed oil-water samples can be analyzed for their oil content, the UV-visible spectrophotometer must meet an instrument stability calibration criterion. This criterion is determined with the six oil standards identified in table 3. Determine the absorbance of standards at each of the three analytical wavelengths (*i.e.*, 340, 370, and 400 nm). Determine the response factors (RFs) for the test oil at each of the three analytical wavelengths using the following equation:

$$RF_x = C/A_x \qquad (1)$$

where:

RF_x = Response factor at wavelength x (x = 340, 370, or 400 nm)

C = Oil concentration, in mg of oil/ml of DCM in standard solution

A_x = Spectrophotometric absorbance of wavelength x

TABLE 3—OIL STANDARD SOLUTIONS: CONCENTRATIONS IN FINAL DCM EXTRACTIONS [1]

Final oil concentration (mg/ml of DCM)	Final extract volume (ml of DCM)	Total amount of oil in standard (mg)	Volume of parent oil-DCM std (µl) added to saltwater
4.0	20.0	80.0	890
2.0	20.0	40.0	440
1.0	20.0	20.0	220
0.50	20.0	10.0	110
0.10	20.0	2.0	22
0.05	20.0	1.0	11

[1] Assuming an oil density of 0.9 g/ml and an extraction efficiency of 100% for oil from the 30-ml of seawater.

2.4.2.2 Instrument stability for the initial calibration is acceptable when the RFs for the five highest standard extracts of oil are <20% different from the overall mean value for the five standards. If this criterion is satisfied, analysis of sample extracts can begin. RFs for the lowest concentration (0.05 mg oil/ml DCM) are not included in the consideration because the absorbance is close to the detection limit of the spectrophotometer (with associated high variability in the value) for the 1-cm path-length cell used for measurements. Absorbances ≥3.5 are not included because absorbance saturation occurs at and above this value.

2.4.2.3 If one or more of the standard oil extracts do not meet this linear-stability criterion, then the ''offending'' standard(s) can be prepared a second time (*i.e.*, extraction of the specified amount of oil from 30-ml or seawater for the ''offending'' standard according to the pretest preparation procedure). If replacement of the reanalyzed standard solution(s) in the standard curve meets the linear-stability criterion (*i.e.*, no RF >20% different from the overall mean), then analysis of sample extracts can begin.

2.4.2.4 If the initial-stability criterion is still not satisfied, analysis of sample extract cannot begin and the source of the problem (e.g., preparation protocol for the oil standards, spectrophotometer stability, etc.) must be corrected.

2.4.2.5 The initial six-point calibration of the UV-visible spectrophotometer at the oil concentrations identified is required at least once per test day.

2.5 *Test procedure.* 2.5.1 *Preparation of premixed dispersant oil.* Prepare a premixed dispersant oil by mixing 1 part dispersant to 10 parts oil. Store this mixture in a glass container. The dispersant effectiveness test procedures are listed in steps 1–20:

1. Prepare 4 replicates (same test oil and dispersant), one control (*i.e.*, no dispersant), and one method blank and run at the same time on the shaker table.
2. Add 120±2 ml of synthetic seawater to each of the modified 125-ml glass Erlenmeyer flasks. Measure and record the water temperature.
3. Place the flasks securely into the attached slot on the shaker table.
4. Carefully add 100 µl of an oil-dispersant solution onto the center of the water's surface using a positive displacement pipette.
5. Agitate the flasks for 20±1 minutes at 150±10 rpm on the shaker table.
6. After the 20±1 minutes shaking, remove the flasks from the shaker table and allow them to remain stationary for 10±1 minutes for oil droplet ''settling.''
7. At the conclusion of the 10-minute settling period, carefully decant a 30-ml sample through the side spout of the test flasks into a 50-ml graduated cylinder.

NOTE: Discard the first 1–2 ml of sample water to remove nonhomogeneous water-oil initially contained in the spout.

8. Transfer the samples from the graduated cylinder into a 125- or 250-ml glass separatory funnel fitted with a Teflon stopcock.
9. Add 5 ml of pesticide-quality DCM to the separatory funnel and shake vigorously for 15 seconds. Release the pressure carefully from the separatory funnel through the stopcock into a fume hood.
10. Allow the funnel to remain in a stationary position for 2 minutes to allow phase-separation of the water and DCM.
11. Drain the DCM layer from the separatory funnel into a glass-stoppered, 25-ml graduated glass cylinder.
12. Repeat the DCM-extraction process two additional times.
13. Combine the three extracts in the graduated cylinder and adjust the final volume to 20-ml with additional DCM.
14. Analyze the samples using a UV-spectrophotometer at 340, 370, and 400 nm-wavelengths and determine the quantity of oil as follows:

$$C_x = (A_x)x(RF_x)x(V_{DCM})x(V_{tw}/V_{ew}) \qquad (2)$$

where:

C_x = Total mass of dispersed oil in swirling flask at wavelength x (x = 340, 370, or 400 nm)

A_x = Spectrophotometric absorbance at wavelength x

RF_x = Mean response factor at wavelength x (determined from equation 1)

V_{DCM} = Final volume of DCM-extract of water sample (20 ml)

V_{tw} = Total water volume in swirling flask vessel (120 ml)

V_{ew} = Volume of water extracted for dispersed oil content (30 ml)

15. Obtain three concentration values for oil in each experimental water sample (340, 370, and 400 nm).
16. Determine the mean of three values as follows:

$$C_{mean} = (C_{340} + C_{370} + C_{400})/3 \qquad (3)$$

NOTE: Means will be used for all dispersion-performance calculations. Samples where one of the values for C_{340}, C_{370}, or C_{400} is more than 30% different from C_{mean} will be flagged. Whenever oil measurements are flagged as having a concentration based on one wavelength as >30% different from C_{mean}, raw data will be evaluated to establish that the measurements are valid. In addition, attempts will be made to correlate the difference to oil type, dispersant test, or dispersant used. If no errors or correlations are apparent and >10% of all oil measurements are flagged, the mean concentration data will be used in the calculation for dispersant performance and the subject data will be flagged.

17. Determine the dispersant performance (*i.e.*, percent of oil that is dispersed, or EFF) based on the ratio of oil dispersed in the test system to the total oil added to the system as follows:

$$\text{EFF (in \%)} = (C_{mean}/C_{TOT}) \times 100 \qquad (4)$$

where:

C_{mean} = Mean value for total mass of dispersed oil in the swirling flask determined by spectrophotometric analysis

C_{TOT} = Total mass of oil initially added to the experimental swirling flask

18. Calculate EFF using equation 4 for coupled experiments with and without dispersant (EFF_c and EFF_d, respectively). EFF_c is the effectiveness of the control and represents natural dispersion of the oil in the test apparatus. EFF_d is the measured uncorrected value.

19. Calculate the final dispersant performance of a chemical dispersant agent after correcting for natural dispersion using equation 5.

$$EFF_D = EFF_d—EFF_c \qquad (5)$$

where:

EFF_D = % dispersed oil due to dispersant only

EFF_d = % dispersed oil with dispersant added

EFF_c = % dispersed oil with no dispersant added

20. Calculate the average dispersant effectiveness value by summing the corrected values (EFF_D) for each of the four replicates for each of the two test oils and dividing this sum by eight.

2.6 *Performance criterion.* The dispersant product tested will remain in consideration for addition to the NCP Product Schedule if the average dispersant effectiveness, as calculated in section 2.5 above, is at least 45% (*i.e.*, 50%±5%).

2.7 *Quality Control (QC) procedures for measurements of oil concentrations.* 2.7.1 *UV-visible spectrophotometric measurements.* At least 5% of all UV-visible spectrophotometric measurements will be performed in duplicate as a QC check on the analytical measurement method. The absorbance values for the duplicates should agree within ±5% of their mean value.

2.7.2 *Method blanks.* Analytical method blanks involve an analysis of seawater blanks (*i.e.*, seawater but no oil or dispersant in a swirling flask vessel) through testing and analytical procedures (3, pp 79–80). Method blanks are analyzed with a frequency of at least 1 for every 12 experimental swirling flask samples. Oil concentrations in method blanks must be <5% of that occurring for 100% dispersion of oil in testing apparatus.

3.0 Revised standard dispersant toxicity test

3.1 *Summary of method.* The standard toxicity test for dispersants and other products involves exposing two species (Menidia beryllina (silversides) and Mysidopsis bahia (mysid shrimp)) to five concentrations of the test product and No. 2 fuel oil alone and in a 1:10 mixture of product to oil. To aid in comparing results from assays performed by different workers, reference toxicity tests are conducted using dodecyl sodium sulfate (DSS) as a reference toxicant. The test length is 96 hours for Menidia and 48 hours for Mysidopsis. LC_{50} s are calculated based on mortality data at the end of the exposure period (for method of calculation, see section 3.6 below).

3.2 *Selection and preparation of test materials.*

3.2.1 *Test organisms.*

3.2.1.1 *Menidia beryllina.* Obtain fish (silversides) from a single source for each series of toxicity tests. In-house cultures are recommended wherever it is cost-effective; however, organisms are available from commercial suppliers. Information on the source of test organisms and any known unusual condition to which fish were exposed before use should be included in the data report. Use of animals previously treated with pesticides or chemotherapeutic agents should be avoided. Organisms should not be used if they appear to be unhealthy, discolored, or show signs of stress. Use 7-day old larval fish. Fish should be cultured in accordance with the methods outlined in Middaugh, et al. (5). There should be no need to acclimate organisms to the 25±1 °C temperature recommended for the toxicity tests if laboratory stock cultures of Menidia are maintained at the recommended culture temperature of 25±1 °C. If test organisms must be obtained from a commercial source, it may become necessary to acclimate test fish to the test temperature of 25±1 °C, a pH of 8.0±0.2, and 20±2 ppt salinity since changes in temperature may occur during shipping. Eliminate groups of fish having a mortality of more than 10% during the first 48 hours, and more than 5% thereafter. During acclimation, organisms should be maintained on a diet of freshly hatched Artemia (brine shrimp) nauplii. Feed the fish daily to satiation during the acclimation period, and once daily during the 96-hour test. Care should be taken daily to remove excess food and fecal material from beakers during the test. Use only those organisms that feed actively and that appear to be healthy. Organisms should be free of disease, external parasites, and any signs of physical damage or stress. Discard any fish injured or dropped while handling.

3.2.1.2 *Mysidopsis bahia.* Several methods for culturing Mysidopsis bahia (mysid shrimp) may be used and are noted in appendix A of Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (6). To ensure uniformity of mysids, recently hatched mysids should be collected daily from stock cultures and identified by the date of hatch. Mysids used in 48-hour tests should be from a single day's collection, but may have an age range of 5–7 days old. In cases where in-house cultures of mysids are unavailable, organisms may be purchased from a commercial source. Information on the source of test organisms should be submitted in the data report.

3.2.2 *Preparation of experimental water.* Filtered natural seawater is recommended for use since it represents a natural source of saltwater containing an inherent population of microorganisms. Synthetic seawater formulated according to the following method can serve as an acceptable alternative to filtered, natural seawater for toxicity tests performed in laboratories in which natural seawater is unavailable.

3.2.3 *Synthetic seawater formation.* To prepare standard seawater, mix technical-grade salts with 900 liters of distilled or demineralized water in the order and quantities listed in table 4. These ingredients must be added in the order listed and each ingredient must be dissolved before another is added. Stir constantly after each addition during preparation until dissolution is complete. Add distilled or demineralized water to make up to 1,000 liters. The pH should now be 8.0±0.2. To attain the desired salinity of 20±1 ppt, dilute again with distilled or demineralized water at time of use.

3.3 *Sampling and storage of test materials.* Toxicity tests are performed with No. 2 fuel oil having the characteristics defined in table 5. Store oil used for toxicity tests in sealed containers to prevent the loss of volatiles and other changes. For ease in handling and use, it is recommended that 1,000-ml glass containers be used. To ensure comparable results in the bioassay tests, use oils packaged and sealed at the source. Dispose of unused oil in each open container on completion of dosing to prevent its use at a later date when it may have lost some of its volatile components. Run all tests in a bioassay series with oil from the same container and with organisms from the same group collected or secured from the same source.

TABLE 4—SYNTHETIC SEAWATER

[Toxicity Test]

Salt	(g) [1]
NaF	1.9
$SrCl_2 \cdot 6H_2O$	13.0
$H_3 BO_2$	20.0
KBr	67.0
KCl	466.0
$CaC1_2 \cdot 2H_2O$	733.0
$Na_2 SO_4$	2,660.0
$MgCl_2 \cdot 6H_2O$	3,330.0
NaCl	15,650.0
$Na_2SiO_3 \cdot 9H_2O$	13.0
EDTA [2]	0.4
$NaHCO_3$	133.0

[1] Amount added to 900 liters of water, as described in the text.

[2] Ethylenediaminetetraacetate tetrasodium salt.

3.4 *General test conditions and procedures for toxicity tests.*

3.4.1 *Temperature.* For these toxicity tests, use test solutions with temperatures of 25±1 °C.

3.4.2 *Dissolved oxygen and aeration.*

3.4.2.1 *Menidia.* Because oils contain toxic, volatile materials, and because the toxicity of some water-soluble fractions of oil and degradation products are changed by oxidation, special care must be used in the oxygenation of test solutions. Aeration during the test is generally not recommended but should be used to maintain the required dissolved oxygen (DO) in cases where low DO is observed. The DO content of test solutions must not drop below 60% saturation during the first 48 hours of a static acute (96-hour) test and must remain between 40–100% after the first 48 hours of the test. Aeration at a rate of 100±15 bubbles per minute is supplied by a serological pipette as needed for maintenance of DO. If aeration is necessary, all test chambers should be aerated. At this rate, and with the proper weight of fish, DO concentration should remain slightly above 4 ppm over a 96-hour period. Take DO measurements daily.

TABLE 5—TEST OIL CHARACTERISTICS: NO. 2 FUEL OIL

Characteristic	Minimum	Maximum
Gravity (°API)	32.1	42.8
Viscosity kinematic at 100 °F (cs)	2.35	3.00
Flash point (°F)	150	..
Pour point (°F)	..	0
Cloud point (°F)	..	10
Sulfur (wt %)	..	0.35
Aniline point (°F)	125	180
Carbon residue (wt %)	..	0.16
Water (vol %)	..	0
Sediment (wt %)	..	0
Aromatics (vol %)	10	15
Distillation:		
IBP (°F)	347	407
10% (°F)	402	456
50% (°F)	475	530
90% (°F)	542	606

TABLE 5—TEST OIL CHARACTERISTICS: NO. 2 FUEL OIL—Continued

Characteristic	Minimum	Maximum
End Point (°F)	596	655
Neutralization No	..	0.05

3.4.2.2 *Mysidopsis*. Achieve sufficient DO by ensuring that the surface area to volume ratio of the test solution exposed is large enough. Oxygen content should remain high throughout the test because of the low oxygen demand of the organisms. Aeration is not recommended during 48-hour acute toxicity tests unless the DO falls below 60% saturation.

3.4.3 *Controls*. With each fish or mysid test or each series of simultaneous tests of different solutions, perform a concurrent control test in exactly the same manner as the other tests and under the conditions prescribed or selected for those tests. Use the diluent water alone as the medium in which the controls are held. There must be no more than 10% mortality among the controls during the course of any valid test.

3.4.4 *Reference toxicant*. To aid in comparing results from tests performed by different workers and to detect changes in the condition of the test organisms that might lead to different results, perform reference toxicity tests with reagent grade DSS in addition to the usual control tests. Prepare a stock solution of DSS immediately before use by adding 1 gram of DSS per 500 ml of test water solution. Use exploratory tests before the full scale tests are begun to determine the amount of reference standard to be used in each of the five different concentrations.

3.4.5 *Number of organisms*. At a minimum, 20 organisms of a given species are exposed for each test concentration. For the toxicity test procedures using Menidia, place 10 fish in each of two jars. For the toxicity tests using Mysidopsis, place 10 larvae in each of two containers.

3.4.6 *Transfer of organisms*. Organisms should be handled as little as possible in order to minimize stress. Transfer Menidia and Mysidopsis from the acclimatization aquaria to the test chambers with a pipette or a wide-bore, smooth glass tube (4 to 8 mm internal diameter) fitted with a rubber bulb. Dip nets should be avoided when handling larval fish and mysids. Do not hold fish out of the water longer than necessary and discard any specimen accidentally dropped or otherwise mishandled during transfer.

3.4.6.1 *Mysidopsis*. To have the mysids ready for study, mysids may be sorted 24 hours prior to initiation of the 48-hour test. Transfer the mysids to a beaker containing a small volume of water; this vessel serves as a holding chamber during randomized transfer of the organisms to test solutions. Mysids are randomly selected from the batch of mysids in the holding chamber, and transferred to 50-ml beakers containing a small volume of seawater. One mysid is added per beaker using a small piece of flexible 500-µm screening until all of the beakers contain one mysid. The process of random selection and sorting is continued until the appropriate number of mysids has been delivered to each of the 50-ml beakers. The mysids are gently released from the 50-ml beakers into larger beakers filled with an appropriate volume of 20-ppt seawater (25 °C) to bring the total volume to 200 ml. The beakers are randomly placed into a temperature-controlled water bath to acclimate overnight at 25 °C. The mysids are transferred to larger beakers (1-liter) for the 48-hour test after the addition of 800 ml of the test solution. A total of 10 mysids per beaker are used for 48-hour acute toxicity tests. A minimum of two replicate chambers are used for each test concentration and control.

3.4.6.2 *Menidia and Mysidopsis* are fed 50 brine shrimp nauplii/organism daily during the 96-hour and 48-hour tests. Excess food should be removed daily by aspirating with a pipette.

3.4.7 *Test duration and observations*. 3.4.7.1 *Menidia*. Observe the number of dead fish in each test container and record at the end of each 24-hour period. Fish are considered dead upon cessation of respiratory and all other overt movements, whether spontaneous or in response to mild mechanical prodding. Remove dead fish as soon as observed. Also note and report when the behavior of test fish deviates from that of control fish. Such behavioral changes would include variations in opercular movement, coloration, body orientation, movement, depth in container, schooling tendencies, and others. Abnormal behavior of the test organisms (especially during the first 24 hours) is a desirable parameter to monitor in a toxicity test because changes in behavior and appearance may precede mortality. Toxicants can reduce an organism's ability to survive natural stresses. In these cases, the mortality is not directly attributed to the toxicant, but most certainly is an indirect effect. Reports on behavioral changes during a toxicity test can give insight into the non-acute effects of the tested material. At the end of the 96-hour period, terminate the fish tests and determine the LC_{50} values. The acute toxicity test is terminated after four days of exposure. The number of surviving fish are counted and recorded for each chamber in accordance with standard EPA methods (6). The LC_{50} is calculated using survival data from the test in accordance with the methods described in the guidelines (6).

3.4.7.2 *Mysidopsis*. Terminate the mysid test after 48 hours of incubation. To count the dead animals accurately, place the exposure vessels on a light table such that light passes through the bottom of the vessel. Most of the dead mysids will be on the bottom of the beaker and can readily be seen against the background of the light table. Also search the top of the liquid for mysids trapped there by surface tension. Exercise caution when determining death of the animals. Occasionally, an animal appears dead, but closer observation shows slight movement of an appendage or a periodic spasm of its entire body. For these tests, animals exhibiting any movement when touched with a pipette tip are considered alive. Account for all test animals to ensure accuracy since *Mysidopsis bahia* may disintegrate or be cannibalized by other mysids. Consider individuals not accounted for as dead. At the end of 48 hours of exposure, terminate the mysid assay and determine the LC_{50} values in accordance with the methods described in the guidelines (6).

3.4.8 *Physical and chemical determinations.* 3.4.8.1 *Menidia.* Determine the temperature, DO, and pH of the test solutions before the fish are added and at 24-, 48-, 72-, and 96-hour exposure intervals. It is necessary to take measurements from only one of the replicates of each of the toxicant series.

3.4.8.2 *Mysidopsis.* Determine the temperature, DO, and pH of the test solutions before the nauplii are added and at the 24- and 48-hour exposure interval. Measure DO and pH in only one of the replicates of each of the toxicant series.

3.4.9 *Testing laboratory.* An ordinary heated or air-conditioned laboratory room with thermostatic controls suitable for maintaining the prescribed test temperatures generally will suffice to conduct the toxicity tests. Where ambient temperatures cannot be controlled to 25±1 °C, use water baths with the necessary temperature controls.

3.4.10 *Test containers.* For tests with fish or mysids, use 1-liter glass beakers measuring approximately 10 cm in diameter. In conducting the test, add to each beaker 1 liter of the test solution or seawater formulation aerated to saturation with DO. To add the liter volume easily and accurately, use a large volume (1-liter) graduated cylinder. Process all required glassware before each test. Immerse in normal hexane for 10 minutes. Follow this with a thorough rinse with hot tap water; three hot detergent scrubs; an additional hot tap-water rinse; and three rinses with distilled water. Oven or air dry the glassware in a reasonably dust-free atmosphere.

3.5 *Preparation of test concentrations.* 3.5.1 *Menidia.* Place test jars (approximately 22.5 cm in height, 15 cm in diameter, 11 cm in diameter at the mouth) containing 2 liters of synthetic seawater on a reciprocal shaker. The shaker platform should be adapted to hold firmly six of the toxicity test jars. Add the desired amount of the petroleum product (if applicable) under test directly to each test jar. Dispense the appropriate amount of toxicant (if applicable) into the jars with a pipette. Tightly cap the test jars and shake for 5 minutes at approximately 315 to 333 2-cm (0.75-inch) strokes per minute in a reciprocal shaker or at approximately 150 to 160 rpm on orbital shakers. At the completion of shaking, remove the jars from the shaker and dispense 1 liter of the mixture to each of the 1-liter glass beakers. Randomly place beakers in a constant-temperature water bath or room, take water quality measurements, add fish, and initiate aeration.

3.5.2 *Mysidopsis.* 3.5.2.1 To prepare test solutions for products and oil/product mixtures, blend or mix the test solutions with an electric blender having: speeds of 10,000 rpm or less; a stainless-steel cutting assembly; and a 1-liter borosilicate jar. To minimize foaming, blend at speeds below 10,000 rpm.

3.5.2.2 For the product test solution, add 550 ml of the synthetic seawater to the jar, then with the use of a gas-tight calibrated glass syringe with a Teflon-tipped plunger, add 0.55 ml of the product and mix for 5 seconds.

3.5.2.3 For the oil test solution, add 550 ml of the synthetic seawater to the jar. Then with the use of a gas-tight calibrated glass syringe equipped with a Teflon-tipped plunger, add 0.55 ml of the oil and mix for 5 seconds.

3.5.2.4 For the oil/product mixture, add 550 ml of the synthetic seawater to the mixing jar. While the blender is in operation, add 0.5 ml of the oil under study with the use of a calibrated syringe with a Teflon-tipper plunger and then 0.05 ml of the product as indicated above. Blend for 5 seconds after addition of product. These additions provide test solutions of the product, oil, and the oil/product mixture at concentrations of 1,000 ppm.

3.5.2.5 Immediately after the test solutions are prepared, draw up the necessary amount of test solution with a gas-tight Teflon-tipped glass syringe of appropriate size and dispense into each of the five containers in each series. If the series of five concentrations to be tested are 10, 18, 32, 56, and 100 ppm, the amount of the test solution in the order of the concentrations listed above would be as follows: 10, 18, 32, 56, and 100 ml.

3.5.2.6 Each time a syringe is to be filled for dispensing to the series of test containers, start the mixer and withdraw the desired amount in the appropriate syringe while the mixer is in operation. Turn off immediately after the sample is taken to limit the loss of volatiles.

3.5.2.7 Use exploratory tests before the full-scale test is set up to determine the concentration of toxicant to be used in each of the five different concentrations. After adding the required amounts of liquid, bring the volume in each of the test containers up to 800 ml with the artificial seawater. To ensure keeping each of the series separate, designate on the lid of each container the date, the material under test, and its concentration.

3.5.2.8 When the desired concentrations are prepared, gently release into each beaker the 10 test *Mysidopsis* (previously transferred into 200 ml of medium). This provides a volume of 1 liter in each test chamber. A pair of standard cover glass forceps with flat, bent ends is an ideal tool for handling and tipping the small beaker without risk of contaminating the medium.

3.5.2.9 After adding the test animals, incubate the test beakers at 25±1 °C for 48 hours. Recommended lighting is 2,000 lumens/m^2 (200 ft-c) of diffused, constant, fluorescent illumination.

3.5.2.10 Wash the blender thoroughly after use and repeat the above procedures for each series of tests. Wash the blender as follows: rinse with normal hexane; pour a strong solution of laboratory detergent into the blender to cover the blades; fill the container to about half of its volume with hot tap water; operate the blender for about 30 seconds at high speed; remove and rinse twice with hot tap water, mixing each rinse for 5 seconds at high speed; and then rinse twice with distilled water, mixing each rinse for 5 seconds at high speed.

3.6 *Calculating and reporting.* At the end of the test period, the toxicity tests are terminated and the LC_{50} values are determined.

3.6.1 *Calculations.* The LC_{50} is the concentration lethal to 50% of the test population. It can be calculated as an interpolated value based on percentages of organisms surviving at two or more concentrations, at which less than half and more than half survived. The LC_{50} can be estimated with the aid of computer programs or graphic techniques (log paper). The 95% confidence intervals for the LC_{50} estimate should also be determined.

3.6.2 *Reporting.* The test product and oil and their source and storage are described in the toxicity test report. Note any observed changes in the experimental water or the test solutions. Also include the species of fish used; the sources, size, and condition of the fish; data of any known treatment of the fish for disease or infestation with parasites before their use; and any observations on the fish behavior at regular intervals during the tests. In addition to the calculated LC_{50} values, other data necessary for interpretation (e.g., DO, pH, other physical parameters, and the percent survival at the end of each day of exposure at each concentration of toxicant) should be reported.

3.7 *Summary of procedures.* 3.7.1 *Menidia:*

1. Prepare adequate stocks of the appropriate standard dilution water.

2. Add 2 liters of the standard dilution water to the test jars. Each test consists of 5 replicates of each of 5 concentrations of the test material, a control series of 5 beakers, and a standard reference series of 5 different concentrations for a total of 35 beakers. Simultaneous performance of toxicity tests on the oil, product, and oil/product mixture requires a total of 105 beakers.

3. Add the determined amount (quarter points on the log scale) of test material to the appropriate jars. Preliminary tests will be necessary to define the range of definitive test concentrations.

4. Cap the jars tightly with the Teflon-lined screw caps and shake for 5 minutes at 315 to 333 2-cm (0.75-inch) strokes per minute on a reciprocal shaker.

5. Remove the jars from the shaker, take water quality data, dispense 1 liter of solution to the 1-liter glass beaker, and add 10 acclimated fish per beaker.

6. Aerate with 100±15 bubbles per minute through a 1-ml serological pipette, as needed, to maintain DO above 4.0 mg/l.

7. Observe and record mortalities, water quality, and behavioral changes every 24 hours.

8. After 96 hours, terminate the test, and calculate LC_{50} values and corresponding confidence limits.

3.7.2 *Mysidopsis:*

1. Initiate the procedure for hatching the Mysidopsis in sufficient time before the toxicity test is to be conducted so that 5–7 day old larvae are available.

2. With the use of a small pipette, transfer 10 Mysidopsis into small beakers, each containing 200 ml of the proper synthetic seawater.

3. To prepare the test stock product and oil solutions, add 550 ml of the artificial seawater to the prescribed blender jar. By means of a gas-tight glass syringe with a Teflon-tipped plunger, add 0.55 ml of the product (or oil) and mix at 10,000 rpm for 5 seconds. To prepare the test stock oil/product mixture, add 550 ml of the standard seawater to the blender jar. While the blender is in operation (10,000 rpm), add 0.5 ml of the oil, then 0.05 ml of the product with the use of a calibrated syringe with a Teflon-tipped plunger. Blend for 5 seconds after adding the product. One ml of these stock solutions added to the 100 ml of standard seawater in the test containers yields a concentration of 10 ppm product, oil, or oil/product combination (the test will be in a ratio of 1 part product to 10 parts of oil).

4. Each test consists of 5 replications of each of 5 concentrations of the material under study, a control series of 5 beakers and a standard reference series of 5 different concentrations, for a total of 35 beakers. Simultaneous performance of toxicity tests on the oil, product, and oil/product mixture requires a total of 105 beakers. Immediately after preparing the test solution of the product or oil/product solution, and using an appropriately sized syringe, draw up the necessary amount

of test solution and dispense into each of the five containers in each series. Each time a syringe is to be filled for dispensing to the series of test containers, start the mixer and withdraw the desired amount in the appropriate syringe while the mixer is in operation. Turn mixer off immediately after the sample is taken to limit the loss of volatiles. After adding the required amount of the test oil/product or product mixture, bring the volume of liquid in each of the test containers up to 800 ml with the artificial seawater. When the desired concentrations have been prepared, gently release into each beaker the 10 mysids previously transferred into 200 ml of medium. This provides a volume of 1 liter in each test chamber.

5. Wash the blender as prescribed for each series of tests.

6. Incubate the test beakers at 25±1 °C for 48 hours with the prescribed lighting.

7. Terminate the experiment after 48 hours, observe and record the mortalities, and determine the LC_{50} s and corresponding confidence limits.

4.0 Bioremediation agent effectiveness test

4.1 *Summary of method.* The bioremediation agent effectiveness testing protocol is designed to determine a product's ability to biodegrade oil by quantifying changes in the oil composition resulting from biodegradation. The protocol tests for microbial activity and quantifies the disappearance of saturated hydrocarbons and polynuclear aromatic hydrocarbons (PAHs). The sample preparation procedure extracts the oil phase into dichloromethane (DCM), with a subsequent solvent exchange into hexane. To effectively accomplish the goals of the testing protocol, it is necessary to normalize the concentration of the various analytes in oil to a non-biodegradable marker, either C_2-or C_3-phenanthrene, C_2-chrysene, or hopane[1] (7). The test method targets the relatively easy to degrade normal alkanes and the more resistant and toxic PAHs. It normalizes their concentrations to C_2-or C_3-phenanthrene, C_2-chrysene, or $C_{30}17\alpha(H)$, 21β (H)-hopane on an oil weight basis (mg marker/kg oil, mg target analyte/kg oil). The analytical technique uses a high resolution gas chromatograph/mass spectrometer (GC/MS) because of its high degree of chemical separation and spectral resolution. GC/MS has long been used to study the weathering and fate of oil spilled into the environment. For quantitative analyses, the instrument is operated in the selective ion detection (SIM) mode at a scan rate of greater than 1.5 scans per second to maximize the linear quantitative range and precision of the instrument. The sample preparation method does not exclude analysis of selected samples by GC/MS in the full scanning mode of operation to qualitatively assess changes in the oil not accounted for by the SIM approach. Performed concurrently with the chemical analysis described above is a microbiological analysis. The microbiological analysis is performed to determine and monitor the viability of the microbial cultures being studied. Under this procedure, microbial enumerations of hydrocarbon degraders are performed at each sampling event using a microtiter Most Probable Number (MPN) determination.

4.2 *Apparatus.* The following materials and equipment are required for the protocol: Appropriate flasks and other glassware; sterile tubes; graduated cylinders (100-ml); deionized water; p-iodonitrotetrazolium violet dye; weighing pans or paper; 250-ml borosilicate glass Erlenmeyer flasks with screw tops; Pasteur pipettes; laboratory notebook; microtiter MPN plates (24-well) multi-channel pipetting device; dilution tube and caps; autoclave; environmental room or incubator; balance accurate to 0.1 mg (XD–400); GC/MS instrument equipped with a DB–5 capillary column (30 m, 0.25-mm I.D., and 0.25-μm film thickness) and a split/splitless injection port operating in the splitless mode, such as Hewlett-Packard 5890/5971 GC/MS (recommended for use); and an autosampler for testing multiple samples.

4.3 *Reagents and culture medium.* 4.3.1 *Preparation of seawater.* All products are tested in clean natural seawater. Clean natural seawater means that the source of this seawater must not be heavily contaminated with industrial or other types of effluent. For example, seawater should not be obtained from a source near shipping channels or discharges of industrial or municipal wastewater, or with high turbidity. The seawater is used within seven days of collection. No microbial inoculum is added.

4.3.2 *Preparation of oil.* A medium weight crude oil, Alaska North Slope (ANS), is artificially weathered by heating to 521 °F to remove the light end hydrocarbons prior to experimental start-up (ANS 521). The method is described in the Draft International Standard ISO/DIS 8708 ''Crude Petroleum Oil—Determination of Distillation Characteristics Using 15 Theoretical Plates Columns'' by the International Organization for Standardization (8). The ANS521 crude oil can be obtained from the National Environmental Technology Applications Center's (NETAC) Bioremediation Products Evaluation Center (BPEC), University of Pittsburgh Applied Research Center, 615 William Pitt Way, Pittsburgh, PA, 15238, (412) 826–5511. The crude oil is heated to 190 °C (374 °F) under atmospheric pressure. The system is then cooled and placed under vacuum (or under an atmospheric pressure of 20 mm Hg) for the

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[1] Although any of these biomarkers can be used to conduct this test, it is recommended that hopane be used.

final distillation to an atmospheric equivalent boiling point of 272 °C (521 °F).

4.3.3 *Preparation of mineral nutrient solution.* If a commercial product is strictly a microbial agent and does not contain its own nutrients, a mineral nutrient solution will be provided if requested by the product manufacturer or vendor. If a commercial product contains its own nutrients, no further nutrients will be added. The nutrient solution is a modified salt solution and is described below.

4.3.3.1 *Nutrient preparation:*

1. N&P Salts. The following salts are added to distilled water and made up to a 1,000-ml volume. Adjust final pH to 7.8. The solution is sterilized by autoclaving at 121 °C at 15 psig for 20 minutes or by filtering through a sterile 0.22 µm membrane filter.

$Na_2\ HPO_4.2H_2$—18.40 g
KNO_3—76.30 g

2. $MgSO_4.7H_2\ O$ solution. Dissolve 22.50 g in 1,000 ml distilled water. The solution is sterilized by autoclaving at 121 °C at 15 psig for 20 minutes.

3. $CaCl_2$ solution. Dissolve 27.50 g in 1,000 ml of distilled water. The solution is sterilized by autoclaving at 121 °C at 15 psig for 20 minutes.

4. $FeCl_3{\bullet}6H_2\ O$ solution. Dissolve 0.25 g in 1,000 ml of distilled water. The solution is sterilized by autoclaving at 121 °C at 15 psig for 20 minutes.

5. Trace Element Solution. The following salts are added to distilled water and made up to a 1,000-ml volume. The solution is sterilized by autoclaving at 121 °C at 15 psig for 20 minutes.

$MnSO_4.H_2\ O$—30.2 mg
$H_3\ BO_3$—57.2 mg
$ZnSO_4.7H_2\ O$—42.8 mg
$(NH_4)6Mo_7(O_2)_4$—34.7 mg

The pH of the nutrient solution is adjusted with a pH meter calibrated at room temperature (approximately 25 °C) using commercial buffers of pH 4.0, 7.0, and 10.0 (Fisher Scientific), as appropriate, prior to use. The pH is adjusted with concentrated HCl or 10 M NaOH, as appropriate.

4.3.3.2 *Final concentrations:* Ten (10) ml of solution 1 and 2 ml of solutions 2–5 are added to non-sterile seawater and made up to a 1,000-ml volume immediately prior to test start-up. This seawater/mineral nutrient solution is used for all flasks containing products requiring nutrient supplements and for the flasks containing no commercial additive. Seawater without the above nutrient solutions is used for products containing their own source of nutrients.

4.4 *Pretest preparation.*

4.4.1 *Experimental setup.*

4.4.1.1 The procedure consists of an experimental shaker flask setup and the specific set of microbiological and chemical analyses that are performed on individual product samples. The following test flasks (labeled with unique identifiers) are prepared and set up on a gyratory shaker at day 0 to reflect the following treatment design:

Treatment	No. of samples at sampling times			Total No. of analytical determinations		
	Day 0	Day 7	Day 28	Microbial counts	Gravimetric	GC/MS
Control	3	3	3	9	9	9
Nutrient	3	3	3	9	9	9
Product	3	3	3	9	9	9

Control = Oil + Seawater
Nutrient = Oil + Seawater + Nutrient
Product = Oil + Seawater + Product (+ Nutrient, if required).

4.4.1.2 For each test, a sheet listing the number of flasks, types of controls, number of replicates, product to be tested, and other information is prepared. The following steps should be adhered to for the experimental setup:

1. Borosilicate glass Erlenmeyer flasks (250–ml) are thoroughly cleaned and autoclaved for 20 minutes at 120 °C at 15 psi, then dried in the drying oven.

2. Flasks are labeled with the appropriate code: product or control, sample day, and letter indicating replicate.

3. 100 ml of seawater is added to each flask.

4. For nutrient and product treatments that require the addition of nutrients, seawater containing the nutrient solution is prepared.

5. Pasteur pipettes should be sterilized in advance. Break off the tip to provide a larger opening prior to sterilization.

6. Pour the approximate amount of oil to be used from the large stock bottle into a sterile beaker. Keep the beaker covered when oil is not being removed.

7. The labeled flasks containing seawater and other additions, as necessary, are placed on the balance. The flask is tared. The appropriate amount of oil (0.5 g) is added drop by drop using a sterile Pasteur pipette with the tip broken off to provide a wider opening. Care is taken to avoid splashing the oil or getting it on the sides of flasks. Precautions

are taken when handling and charging the flasks to minimize the likelihood of contamination by exogenous microbes. This includes using a new sterile pipette for each series of flasks.

8. The weight of the oil is recorded in the laboratory notebook.

9. The product is prepared and added to the appropriate flasks according to the manufacturer's or vendor's instructions.

10. Flasks are carried upright and carefully placed in the holders on the shaker table to minimize the amount of oil that might adhere to the side of the flasks. Flasks in which a significant amount of oil is splashed on the sides are redone.

11. The prepared flasks are shaken at 200 rpm at 20 °C until such time that they will be removed for sampling.

4.4.2 *Sampling*. The control and treatments (nutrient and product flasks) are sampled three times over a 28-day period: day 0, day 7, and day 28. The entire flask is sacrificed for analysis; a 0.5–ml aliquot is removed from each flask for the microbiological analysis and the remainder of each flask is used for the chemical analysis. Specific procedures for both the microbiological and chemical analysis are described below. At the time of each sampling event, physical observations of each flask should be recorded.

4.5 *Microbiological analysis*. To monitor the viability of the microbial cultures being studied, microbial enumerations of hydrocarbon degraders are performed at each sampling event using a microtiter MPN determination. This is used as an indicator of the relative change in biomass. This test design relies on using growth response as an indication of enhanced activity as compared to a ''no addition'' control.

4.5.1 *Media preparation*. Media for microbial enumerations are carefully prepared according to manufacturer's or other instructions and sterilized using appropriate methods.

4.5.1.1 *General media treatment:* Buy Bushnell-Haas (B-H) broth in quantities to last no longer than one year. Use media on a first-in, first-out basis. When practical, buy media in quarter-pound multiples, rather than one-pound multiples to keep supply sealed as long as possible. Keep an inventory of media, including kind, amount, lot number, expiration date, date received, and date opened. Check inventory before reordering media. Discard media that are caked, discolored, or show other deterioration.

4.5.1.2 *Sterile saline (pH adjusted):*

1. Weigh 30 g of NaCl.

2. Dissolve in enough water to make 1,000 ml.

3. Adjust pH to 8.0 with NaOH (10M and 0.5M).

4. Sterilize by autoclaving for 15 minutes at 15 psig.

4.5.1.3 *Standard nutrient concentrate (add 1 ml to each 100 ml of Bushnell-Haas medium for MPNs):*

1. Weigh compounds listed below, dissolve in DIH_2 O, dilute to 1 liter.

Potassium Phosphate, monobasic KH_2 PO_4—0.633 g
Potassium Phosphate, dibasic K_2 HPO_4—1.619 g
Sodium Phosphate, dibasic Na_2 HPO_4—2.486 g
Ammonium Chloride NH_4 Cl—3.850 g
Magnesium Sulfate, heptahydrate $MgSO_4 \cdot 7H_2$ O—4.500 g
Calcium Chloride, dihydrate $CaCl_2 \cdot 2H_2$ O—7.290 g
Ferric Chloride, hexahydrate $FeCl_3 \cdot 6H_2$ O—0.250 g

Trace Elements

Manganese Sulfate, monohydrate $MnSO_2 \cdot H_2$ O—6.04 mg
Boric Acid H_3 Bo_3—11.44 mg
Zinc Sulfate, heptahydrate $ZnSO_4 \cdot 7H_2$ O—8.56 mg
Ammonium Moybdate, tetrahydrate $(NH_4)6Mo_7$ $O_{24} \cdot 4H_2$ O—6.94 mg

2. Adjust pH to 6.0.

3. Stir solution for approximately 3 hours, then filter through a Buchner funnel using #1 paper, which will retain approximately 3.8 g of insolubles.

4. Then filter through a 0.45 micron filter into sterile bottles.

5. Cap bottles, label, and store in refrigerator until used.

4.5.1.4 *Quality assurance/Quality control (QA/QC):*

1. Periodically check the effectiveness of sterilization using commercially available tapes or *Bacillus stearothermophilus* spore suspensions, following the instructions with these products.

2. Maintain a media log book that includes the dates, kinds and amounts of media made, pH, and any problems or observations.

3. Before use, check plates and tubes for signs of contamination, drying, or other problems.

4.5.1.5 *Safety/Special precautions:*

1. Note any safety or other precautions for particular media.

2. Note precautions to be followed when using the autoclave.

3. Use gloves and other protective clothes when handling media.

4. Use care in handling hot media.

4.5.2 *Microbial enumeration*. Standardized techniques for performing Most Probable Number microbial enumerations are described below.

4.5.2.1 *Dilutions:*

1. Prior to sacrificing each flask, remove 0.5 ml of water from each flask and add it to a tube of 4.5 ml sterile phosphate buffer (1:10 dilution) as prepared in the *Standard Methods for the Examination of Water and Wastewater* (9). Using sterile technique, mix and perform

serial dilutions (0.5 ml of previous dilution to 4.5 ml of sterile phosphate buffer) to 10^{-9} dilution.

4.5.2.2 *Inoculating MPN plates (oil degrader):*

1. Prepare sufficient sterile 0.4 M NaCl (23.4 g NaCl/1,000 ml B-H) and B-H at pH 7.0 to fill the number of wells required for the test (1.75 ml/well).
2. Using sterile technique, add 1.75 ml of B-H broth to each well.
3. Label the top of the plate with the proper dilution for each row.
4. Add 0.1 ml of fluid from each dilution tube to each well in the appropriate row, starting with the most dilute.
5. After adding the fluid to all the wells, add 20 µl of sterilized No. 2 fuel oil to the top of each well.
6. Incubate each plate at 20 °C.
7. After 14 days of incubation, add 100 µl of p-iodotetrazolium violet dye (50 mg/10 ml of D.I. water) to each well to determine growth.
8. View plates against a white background to determine if color is present. Development of a purple or pink color upon standing for 45 minutes constitutes a positive test.
9. Record the number of positive wells and the dilutions at which they occur.
10. Enter data into a computerized enumeration method using ‘‘MPN Calculator’’ software program (version 2.3 or higher) by Albert J. Klee, U.S. EPA Office of Research and Development, Risk Reduction Engineering Laboratory, Cincinnati, OH.

4.5.2.3 *Quality assurance/Quality control:*

1. Check pH of medium before preparing wells (pH should be approximately 8.0). Adjust pH, if necessary, with dilute NaOH.
2. Keep prepared tetrazolium violet dye solution in the refrigerator in an amber bottle when not in use.
3. Have all laboratory personnel periodically run MPNs on the same sample to test precision.

4.5.2.4 *Safety/Special precautions:*

1. Use sterile technique in preparing solutions, dilutions, plates, and MPN wells.
2. Do not pipette potentially hazardous solutions by mouth.
3. Autoclave all plates and wells before discarding.

4.6 *Chemical analysis of oil composition.*

4.6.1 *Sample procedure.* After 0, 7, and 28 days of incubation on a rotary shaker, the appropriate flasks are sacrificed and extracted with dichloromethane and spiked with a surrogate recovery standard. A 10-ml aliquot of the DCM layer is used for the gravimetric analysis. If significant biodegradation is evident in the results of the gravimetric analysis, then a solvent exchange into hexane takes place prior to the GC/MS analysis. Follow steps 1–19 below when preparing for the chemical analysis.

1. After 0, 7, and 28 days of rotary shaking and incubating at 20 °C, the reaction vessels are sacrificed. Prior to the chemical analysis, a 0.5-ml sample of the aqueous phase is removed for the microbiological analysis (see Microbial Enumeration above).
2. A surrogate recovery standard is prepared in the following manner: 1,000 mg of d_{10}-phenanthrene and 1,000 mg of 5α-androstane are measured into a 500-ml volumetric flask and DCM is added to the mark to produce a 2,000-ng/µl stock solution.
3. A 100-µl aliquot of the surrogate solution is added to each test flask. The final concentration of surrogates in each flask is approximately 4 ng/µl of solvent in the final extract. The aliphatics and marker data should be corrected for percent recovery of the 5α-androstane surrogate and the aromatics for the d_{10}-phenanthrene surrogate.
4. The contents of the flask are placed into a 250-ml separatory funnel.
5. Measure a total volume of 50 ml DCM for use in the extraction. Use 3 10-ml fractions to rinse the flask into the funnel and transfer the remaining aliquot of DCM to the funnel.
6. Stopper and mix vigorously by shaking (approximately 50 times) while ventilating properly.
7. Each funnel is set aside to allow the DCM and water layers to partition. This may take 5–10 minutes for some products, or up to 3 hours if the product has caused the formation of an emulsion.
8. Drain the first 10 ml of the DCM (bottom) layer, collect, cap, uniquely label, and use for gravimetric analysis (see below). Drain the remaining 40 ml and dry it by passing it through a funnel packed with anhydrous sodium sulfate.
9. Assemble a Kuderna-Danish (KD) concentrator by attaching a Snyder column to an evaporation flask with a graduated concentrator tube. Align vertically and partially immerse concentrator tube in a water bath (10). Set the water bath to the appropriate temperature to maintain proper distillation.
10. Collect the de-watered extract into the KD concentrator.
11. Evaporate DCM to approximately 10 ml, then add approximately 50 ml of the exchange solvent (hexane) and concentrate the volume to 10 ml.
12. Rinse the flask into the concentrator tube with 50 ml hexane and concentrate to 10 ml. Repeat one more time with 50 ml of hexane.
13. Remove concentrator tube with the recovered 10 ml of sample volume. The heavier residual material should be present as a precipitate (bottom layer).
14. Centrifuge to aid the separation of the hexane from the precipitant fraction.
15. Place hexane-soluble fraction (top layer)—approximately 1.0 ml—into a GC/MS vial for analysis (see GC/MS Analysis Procedure below). If column fouling and deterioration of separation characteristics occur, an

alumina column sample cleanup method can be considered (see Alternative GC/MS Sample Cleanup Procedure below).

16. Analyze by GC/MS using the conditions determined by the U.S. EPA Risk Reduction Engineering Laboratory, Water and Hazardous Waste Treatment Research Division, in Cincinnati, OH, which follows U.S. EPA Method 8270 (see GC/MS Analysis Procedure below).

17. Calculate surrogate recovery. If surrogate recovery is less than 85 percent for the marker relative to the surrogate recovery standard (d_{10}-phenanthrene), then the water layer should be extracted again using three separate extractions with DCM. Pool the three extractions with original extract and concentrate to 10 ml, and reanalyze by GC/MS.

18. Drain the seawater into a storage sample vial/container.

19. Seal the vial with a Teflon-lined cap and store frozen. This water layer is kept in case additional extractions are necessary.

4.6.2 *Gravimetric analysis*. The initial means to evaluate the effectiveness of a bioremediation agent for oil spill response is through gravimetric analysis. A statistically significant difference ($p < 0.05$) in analytical weight of the oil from the control system as compared to the analytical weight of the oil treated with a bioremediation agent indicates biodegradation has successfully occurred. Hence, the disappearance of oil should be accompanied by significant decreases in total oil residue weight of extractable materials versus a control. If no significant decrease in oil residue weight is observed, the need to perform further chemical analysis should be evaluated. Follow steps 1–3 to conduct the gravimetric analysis.

1. The 10 ml of DCM extract (from Sample Procedure step 8 above) is placed in a small vial and concentrated to dryness by nitrogen blowdown techniques using a steady stream of nitrogen (pre-purified gas). If the oil is severely biodegraded, a larger volume of DCM (>10 ml) may be necessary for the gravimetric analysis.

2. The residue is weighed 3 times for the gravimetric weight of oil. Record the weight of the oil.

3. Compare statistically ($p < 0.05$) the weight of the product treatment versus the weight of the control from each respective time period. If a significant decrease is observed in the sampling (flask containing bioremediation agent) weight, then proceed with the remainder of the sample procedure.

4.6.3 *GC/MS analysis*. Often, analysis of saturated and aromatic hydrocarbons by capillary gas chromatography of DCM extracts leads to column fouling and deterioration of separation characteristics. An alternative, simple ‘‘one-step’’ alumina sample cleanup procedure can be performed on oil before injection; this cleanup removes both asphaltenes and polar compounds and can be applied to DCM extracts as well. This procedure is described in steps 1–11 below.

4.6.3.1 Alternative GC/MS sample cleanup procedure:

1. Weigh 4.0 g alumina (neutral, 80–200 mesh) into scintillation vials covered loosely with aluminum foil caps. Prepare one scintillation vial per sample. Heat for 18 hours at 300 °C or longer. Place in a desiccator of silica until needed.

2. Add 5.0 ml of DCM to a glass luerlok multi-fit syringe (e.g., BD #2471) with stopcock (e.g., Perfectum #6021) in closed position, stainless steel syringe needle (18 gauge), and PTFE frits. Clamp in a vertical position.

3. Transfer 4.0 g of prepared alumina to a plastic weighing boat and fill syringe slowly while applying continuous vibration (e.g., Conair # HM 11FF1).

4. Add a second PTFE frit and push into place on top of the alumina bed.

5. Drain 5.0 ml DCM to the top level of the column frit to await sample addition and discard DCM.

6. Weigh 50 mg ±0.1 mg ANS521 oil into a tared vial.

7. Premeasure 10 ml of DCM into a graduated cylinder. Add 0.2 to 0.3 ml of the DCM to the tared oil vial. Mix and transfer solvent to the column bed with a Pasteur pipette. Open stopcock and collect in a 10-ml volumetric flask. Repeat until approximately 1.0 ml (do not exceed 1.0 ml) of DCM has rinsed the vial and inner walls of the syringe body into the 10-ml flask.

8. Transfer balance of DCM from the graduated cylinder to the column and regulate the solvent flow rate to approximately 1 to 2 ml/minute. Collect all eluent in the 10-ml flask.

9. Transfer a known volume of eluent to another scintillation vial and blow down to dryness (nitrogen).

10. Determine and record weight.

11. Dissolve in 1.0 ml hexane for the GC/MS analysis procedure (see below).

4.6.3.2 GC/MS analysis procedure:

Immediately prior to injection, an internal standard solution of four deuterated compounds is spiked into the sample extracts and injected. Samples are quantified using the internal standard technique (10) for both the aliphatic and aromatic fractions of the oil extracts in order to provide sufficient information that the oil is being degraded. To help ensure that the observed decline in target analytes is caused by biodegradation rather than by physical loss from mishandling or inefficient extraction, it is necessary to normalize the concentrations of the target analytes via a ‘‘conserved internal marker.’’ Conserved internal markers that have been found useful for quantification are C_2- or C_3-phenanthrene, C_2-chrysene, and $C_{30}17\alpha(H),21\beta(H)$-hopane. Deuterated internal standards are used to calculate the relative response factor (RRF) for the target analyte(s). To compute the ''normalized concentrations,'' the target analyte concentration at a given sampling time is simply divided by the selected conserved analyte concentration at the same sampling time (11). Conduct the GC/MS analysis using the following procedure.

1. One (1) ml of the hexane extract (from Sample Procedure step 15 above) is placed into a 1.5-ml vial for use on the autosampler of the GC/MS instrument.

2. To this solution, 20 µl of a 500-ng/µl solution of the internal standards is added and the vial is capped for injection. The final concentration of the internal standards in each sample is 10 ng/µl. This solution contains 4 deuterated compounds: d_8-naphthalene, d_{10}-anthracene, d_{12}-chrysene, and d_{12}-perylene.

3. At the start of any analysis period, the mass spectrometer (MS) is tuned to PFTBA by an autotune program, such as the Hewlett-Packard quicktune routine, to reduce operator variability. Set the GC/MS in the SIM mode at a scan rate of 1.5 scans/second to maximize the linear quantitative range and precision of the instrument. Set all other conditions to those specified in Instrument Configuration and Calibration section below.

4. An instrument blank and a daily standard are analyzed prior to analysis of unknowns. Internal standards are combined with the sample extracts and coinjected with each analysis to monitor the instrument's performance during each run.

5. Information that should be included on the acquisition form include operator's name and signature, date of extraction, date and time of autotune, date of injection(s), instrument blank, daily standard mix injection, GC column number, and standards for the 5-point calibration curve.

6. If the instrument is operated for a period of time greater than 12 hours, the tune will be checked and another daily standard analyzed prior to continuing with analyses.

TABLE 6—ANALYTES LISTED UNDER THE CORRESPONDING INTERNAL STANDARD USED FOR CALCULATING RRFS

Internal Standard	d_8-naphthalene	d_{10}-anthracene	d_{12}-chrysene	d_{12}-perylene
Alkanes	nC10–nC15	nC16–nC23	nC24-nC29	nC30-nC35.
		Pristane		C_{30}17β(H), 21α(H)-hopane.
		Phytane.		
		5α-androstane.		
Aromatics	Naphthalene	Dibenzothiophene.	Fluoranthene	Benzo(b)fluoranthene.
		Fluorene	Pyrene	Benzo(k)fluoranthene.
		Anthracene	Chrysene	Benzo(e)pyrene.
		Phenanthrene		Benzo(a)pyrene.
				Perylene.
				Indeno(g,h,i)pyrene.
				Dibenzo(a,h) anthracene.
				Benzo(1,2,3-cd)perylene.

7. The MS is calibrated using a modified version of EPA Method 8270 (10). Specifically, the concentrations of internal standards are 10 ng/µl instead of 40 ng/µl. A five-point calibration curve is obtained for each compound listed in table 6 prior to sample analysis at 1, 5, 10, 25, and 50 ng/µl. A 5-point calibration must be conducted on a standard mix of compounds to determine RRFs for the analytes. The standard mix (excluding the marker) for this calibration curve may be obtained from Absolute Standards, Inc., 498 Russell St., New Haven, CT, 06513, (800) 368–1131. If C_{30}17β(H),21α(H)-hopane is used, it may be obtained from Dr. Charles Kennicutt II, Geochemical and Environmental Research Group, Texas A&M University, 833 Graham Rd., College Station, TX, 77845, (409) 690–0095.

8. Calculate each compound's relative response factor to its corresponding deuterated internal standard indicated above, using the following equation:

$$RRF = (A_x C_{is})/(A_{is} C_x)(6)$$

where:

RRF = relative response factor

A_x = peak area of the characteristic ion for the compound being measured (analyte)

A_{is} = peak area of the characteristic ion for the specific internal standard

C_x = concentration of the compound being measured (ng/µl)

C_{is} = concentration of the specific internal standard (10 ng/µl). (This concentration is a constant in this equation for the calibration curve.)

9. Identify each analyte based on the integrated abundance from the primary characteristic ion indicated in table 7.

10. Quantitate each analyte using the internal standard technique. The internal standard used shall be the one nearest the retention time of that of a given analyte (Table 8).

TABLE 7—PRIMARY IONS MONITORED FOR EACH TARGET ANALYTE DURING GC/MS ANALYSIS

Compound	Ion
n-alkanes (C_{10}–C_{35})	85
Pristane	85
Phytane	85
Naphthalene	128
C1-naphthalenes	142
C2-naphthalenes	156
C3-naphthalenes	170
C4-naphthalenes	184
Fluorene	166
C1-fluorenes	180
C2-fluorenes	194
C3-fluorenes	208
Dibenzothiophenes	184
C1-dibenzothiophenes	198
C2-dibenzothiophenes	212
C3-dibenzothiophenes	226
Anthracene	178
Phenanthrene	178
C1-phenanthrenes	192
C2-phenanthrenes	206
C3-phenanthrenes	220
Fluoranthene/pyrene	202
C1-pyrenes	216
C2-pyrenes	230
Chrysene	228
C1-chrysenes	242
C2-chrysenes	256
Hopanes (177 family)	177
Hopanes (191 family)	191
Steranes (217 family)	217
Benzo(b)fluoranthene	252
Benzo(k)fluoranthene	252
Benzo(e)pyrene	252
Benzo(a)pyrene	252
Perylene	252
Ideno(g,h,i)pyrene	276
Dibenzo(a,h)anthracene	278
Benzo(1,2,3-cd)perylene	276
d_8-naphthalene	136
d_{10}-anthracene	188
d_{10}-phenanthrene	188
d_{12}-chrysene	240
d_{12}-perylene	264
α-androstane	260

TABLE 8—ANALYTES AND REFERENCE COMPOUNDS

Compound	Reference compound	Compound	Reference compound
n-C10	n-C10	C2-naphthalene	Naphthalene.
n-C11	n-C11	C3-naphthalene	Naphthalene.
n-C12	n-C12	C4-naphthalene	Naphthalene.
n-C13	n-C13	Fluorene	Fluorene.
n-C14	n-C14	C1-fluorene	Fluorene.
n-C15	n-C15	C2-fluorene	Fluorene.
n-C16	n-C16	C3-fluorene	Fluorene.
n-C17	n-C17	Dibenzothiophene	Dibenzothiophene.
Pristane	Pristane	C1-dibenzothiophene	Dibenzothiophene.
n-C18	n-C18	C2-dibenzothiophene	Dibenzothiophene.
Phytane	Phytane	C3-dibenzothiophene	Dibenzothiophene.
n-C19	n-C19	Phenanthrene	Phenanthrene.
n-C20	n-C20	Anthracene	Anthracene.
n-C21	n-C21	C1-phenanthrene	Phenanthrene.
n-C22	n-C22	C2-phenanthrene	Phenanthrene.
n-C23	n-C23	C3-phenanthrene	Phenanthrene.
n-C24	n-C24	Fluoranthene	Fluoranthene.
n-C25	n-C25	Pyrene	Pyrene.
n-C26	n-C26	C1-pyrene	Pyrene.
n-C27	n-C27	C2-pyrene	Pyrene.
n-C28	n-C28	Chrysene	Chrysene.
n-C29	n-C29	C1-chrysene	Chrysene.
n-C30	n-C30	C2-chrysene	Chrysene.
n-C31	n-C31	Benzo(b)fluoranthene	Benzo(b)fluoranthene.
n-C32	n-C32	Benzo(k)fluoranthene	Benzo(k)fluoranthene.
n-C33	n-C33	Benzo(e)pyrene	Benzo(e)pyrene.
n-C34	n-C34	Benzo(a)pyrene	Benzo(a)pyrene.
n-C35 C_{30}17α,21β-hopane	n-C35 C_{30}17α,21β-hopane	Perylene ideno(g,h,i)pyrene	Perylene ideno(g,h,i)pyrene.
5α-androstane	5α-androstane	Dibenzo(a,h)anthracene	Dibenzo(a,h)anthracene.
C1-naphthalene	Naphthalene	Benzo(1,2,3-cd)perylene	Benzo(1,2,3-cd)perylene.

11. Use equation 7 to calculate the concentration of analytes in ng/mg (ppm) oil:

Concentration (ng/mg) = (A_x I_s V_t × 1,000)/(A_{is}(RRF)V_i M_o)(7)

where:

A_x = peak area of characteristic ion for compound being measured

I_s = amount of internal standard injected, in ng (*i.e.*, 20 ng)

V_t = volume of the total DCM extract (50 ml)

A_{is} = peak area of the characteristic ion of the internal standard

RRF = relative response factor

V_i = volume of the extract injected (2 μl)

M_o = total mass of the oil added to the flask, mg

12. Compute the ''normalized concentrations'' for each target analyte concentration at a given sampling time (equation 7) by simply dividing by the conserved internal marker concentration at the same sampling time.

4.6.4 *Generally accepted laboratory procedures.* Samples are immediately logged into the laboratory, where they will be given a unique sample identification based on Julian data and the number logged in. Prior to the analysis of any experimental samples, a five-point standard curve is prepared. One of the mid-range standard curve concentration levels is analyzed daily before sample analysis as a continuing standard. RRFs for all target analytes *should* be within 25% of the standard curve response values at day 0, and at any sampling event the check standard percent difference from the initial five-point calibration must not exceed 20% between the before and after daily standard mix (see below). The collected GC/MS data are initially processed by a macro routine, which performs extracted chromatographic plots of the target compounds, integrates the target compounds, and shows integration results to include tabular numbers. The integration values are then transferred to a spreadsheet format to be quantified. Because of the complexity of the analyte matrix (oil), a very high degree of manual verification and reintegration of the spectral data is required.

4.6.5 *QA/QC procedures.* The reliability of this method is dependent on the QA/QC procedures followed. Before and after each analytical batch (approximately 10 samples), analyze one procedural blank, one duplicate, and one calibration verification standard (10 ng/μl). Analyze one reference crude oil standard. The instrument's performance and reproducibility are validated routinely in this manner. Surrogate recoveries should be within 70 to 120%, and duplicate relative percent difference values should be ±20%. A control chart of the standard oil should be prepared and monitored. Variations of analytes in the control chart should be no more than 25% from the historical averages. Injection port discrimination for n-C25 and greater alkanes must be carefully monitored; the ratio of RRF n-C32/RRF n-C21 alkanes should not be allowed to fall below 80%. The mass discrimination can be reduced by replacing the quartz liner in the injection port after every analytical batch. The instrument's performance and reproducibility are validated routinely by analyzing the reference crude oil standard. All analyses are recorded in instrument logs detailing operating conditions, date and time, file name, etc. After analysis, the sample extracts are archived at refrigeration temperatures. To document QA/QC, the following information is contained in the detailed quantitative reports: average RRF derived from the standard curve; RRF from the daily standard; percent relative standard deviation; area of target analyte; concentration determined both on a weight and volume basis; and values for any surrogates and internal standards.

4.6.6 *Instrument configuration and calibration.* A 2-ml aliquot of the hexane extract prepared by the above procedure is injected into a GC/MS instrument, such as the Hewlett-Packard 5890/5971 GC/MS (recommended for use). This instrument should be equipped with a DB–5 capillary column (30 m, 0.25-mm I.D., and 0.25-μm film thickness) and a split/splitless injection port operating in the splitless mode. Table 9 summarizes the temperature program used for the analysis. This temperature program has been optimized to give the best separation and sensitivity for analysis of the desired compounds on the instrument. Prior to the sample analysis, a five-point calibration must be conducted on a standard mix of the compounds listed in table 7 to determine RRFs for the analyses.

TABLE 9—OPERATING CONDITIONS AND TEMPERATURE PROGRAM OF GC/MS

Operating conditions
Injector port—290 °C Transfer line—320 °C Total run time—73 minutes Column flow rate (He)—1.0 ml/minute

Temperature Program

Level	Temp. 1, °C	Time 1, minutes	Rate, °C/minute	Temp 2, °C	Time 2, minutes
Level 1	55	3	5	280	5
Level 2	280	0	3	310	10

4.7 *Statistical analysis.* The determination of a bioremediation agent's effectiveness will be partially based upon the results of a statistical analysis of the shaker flask experiment. The experimental design for this test is a two factorial design. This two-way analysis of variance (ANOVA) will be used to determine data trends. The statistical method is designed to test various types of bioremediation treatments including microbial, nutrient, enzyme, and combination products. The following is a summary of the statistical methods to be used to evaluate the analytical data obtained from all product tests. The experimental design, data analysis methodology, interpretation of results, required documentation, and a numeric example are outlined below.

4.7.1 *Experimental design.* The experimental design for this test is known as a factorial experiment with two factors. The first factor is product/control group; the second factor is time (measured in days). For example, if two groups (product A and a non-nutrient control) are tested at each of three points in time (day 0, 7, and 28), the experiment is called a 2 × 3 factorial experiment. There will be three replications (replicated shaker flasks) of each group-time combination.

4.7.2 *Data analysis methods.* For each analyte and each product used, a product is considered a success by the demonstration of a statistically significant difference between the mean analyte degradation by the product and the mean analyte degradation by the non-nutrient control. Such a determination will be made by performing an ANOVA on the sample data. The technical aspects of this procedure are outlined in Snedecor and Cochran (12). Most statistical software packages support the use of two-way ANOVA. However, the format required for the input data differs among the various commercial packages. Whichever package is used, the following ANOVA table will be provided as part of the output. In the Degree of Freedom column of table 10, p = the number of product/control groups, t = the number of days at which each group is analyzed, and n = the number of replications. For the example of the 2 × 3 factorial experiment discussed above, p = 2, t = 3, and n = 3. The significance of the F-statistics (as indicated by their corresponding p-values) are used to interpret the analysis.

TABLE 10—TWO-WAY ANOVA TABLE

Source	Degree of freedom (df)	Sum of squares	Mean square	F-Statistic	p-Value
Group	p-1	SSG	MSG-MSG/MSE	MSG/MSE	[1]
Time	t-1	SST	MST-MST/MSE	MST/MSE	[1]
Interaction	(p–1)(t–1)	SSI	MSI-MSI/MSE	MSI/MSE	[1]
Error	pt(n–1)	SSE	MSE-SSE		
Total	npt–1	SSTOT			

[1] To be determined from the value of the F-statistic.

4.7.3 *Interpretation.* 4.7.3.1 If the F-statistic for the interaction is significant at the 0.05 level (*i.e.*, p-value is less than 0.05), the data indicate that the mean response of at least two groups being tested differ for at least one point in time. In order to find out which groups and at which points in time the difference occurs, pairwise comparisons between the group means should be conducted for all time points. These comparisons can be made using protected least squared difference (LSD) or Dunnett mean separation techniques. The protected LSD procedure is detailed in Snedecor and Cochran (12); the Dunnett procedure is outlined in Montgomery (13). For both methods, the mean square error (MSE) from the two-way ANOVA table should be used to compute the separation values.

4.7.3.2 If the F-statistic for the interaction is not significant at the 0.05 level (*i.e.*, p-value not less than 0.05), but the F-statistic for the group is significant (*i.e.*, p-value is less than 0.05), the data indicate that any differences that exist among the group means are consistent across time. To find out which group means differ, a pairwise comparison of the group means should be carried out by pooling data across all points in time. Again, the MSE from the two-way ANOVA table should be used to compute the separation values.

4.7.3.3 If the F-statistic corresponding to both interaction and group are not significant at the 0.05 level, the data indicate no difference between the group means at any point in time. In this case, no further analysis is necessary.

4.7.3.4 Finally, Snedecor and Cochran (12) use caution concerning the use of multiple comparisons. If many such comparisons are being conducted, then about 5% of the tested differences will erroneously be concluded as significant. The researcher must guard against such differences causing undue attention.

4.7.4 *Required documentation.* 4.7.4.1 The following documents should be included to summarize the findings from a product test.

1. Data listings for each analyte that was analyzed. These should show all raw data.
2. A table of summary statistics for each analyte. The table should include the mean, standard deviation, and sample size for each group at each day.
3. An ANOVA table for each analyte. The table should be of the same format as table 10.
4. A clear summary of the mean separations (if mean separations were necessary). The mean separation methods (LSD or Dunnett), the significance level, the minimum significant difference value, and the significant differences should be clearly marked on each output page.
5. All computer outputs should be included. No programming alterations are necessary. The specific computer package used to analyze the data should be included in the report.

Example. An analysis of the total aromatic data (in ppm) was conducted for the following three groups:

Group 1: Non-nutrient Control
Group 2: Nutrient Control

Group 3: Test Product

4.7.4.2 The raw data are shown in table 11. Note the three replications for each group-time combination.

TABLE 11—PRODUCT TEST DATA, TOTAL AROMATICS (PPM)

	Group 1	Group 2	Group 3
Day 0	8153	7912	7711
	8299	8309	8311
	8088	8111	8200
Day 7	8100	7950	6900
	8078	8200	6702
	7999	8019	5987
Day 28	8259	8102	4000
	8111	7754	3875
	8344	7659	3100

4.7.4.3 Table 12 gives the summary statistics (number of observations, means, and standard deviations) for each group-time combination.

TABLE 12—SUMMARY STATISTICS FOR PRODUCT TEST DATA TOTAL AROMATICS (PPM)

Time	Product	n	Mean	Standard deviation
Day 0	Group 1	3	8,180.0	108.1
	Group 2	3	8,110.7	198.5
	Group 3	3	8,074.0	319.2
Day 7	Group 1	3	8,059.0	53.1
	Group 2	3	8,056.3	129.1
	Group 3	3	6,529.7	480.3
Day 28	Group 1	3	8,238.0	117.9
	Group 2	3	7,838.3	233.2
	Group 3	3	3,658.3	487.6

4.7.4.4 Table 13 shows the results of the two-way ANOVA.

TABLE 13—EXAMPLE TWO-WAY ANOVA TABLE

Source	df	Sum of squares	Mean square	F-statistic	p-value
Group	2	23,944,856.41	11,972,428.70	151.94	0.0001
Time	2	10,954,731.19	5,477,365.59	69.51	0.0001
Interaction	4	19,347,589.04	4,836,897.26	61.39	0.0001
Error	18	1,418,303.33	78,794.63		
Total	26	55,665,480.96			

4.7.4.5 From table 13, it can be seen that the F-statistic for interaction is significant (F = 61.39, p = 0.0001). This indicates that group differences exist for one or more days. Protected LSD mean separations were then conducted for each day to determine which group differences exist. The results are summarized in table 14. Note that means with the same letter (T grouping) are not significantly different.

TABLE 14—PAIRWISE PROTECTED LSD MEAN SEPARATION

T grouping	Mean	n	Interaction
A	8,338.0	3	Group 1, Day 28.
A	8,180.0	3	Group 1, Day 0.
A	8,110.7	3	Group 2, Day 0.
A	8,074.0	3	Group 3, Day 0.
A	8,059.0	3	Group 1, Day 7.
A	8,056.3	3	Group 2, Day 7.
A	7,838.3	3	Group 2, Day 28.
B	6,529.7	3	Group 3, Day 7.
C	3,658.3	3	Group 3, Day 28.

Significant Level = 0.05.
Degrees of Freedom = 18.
Mean Square Error = 78794.63.
Critical Value = 2.10.
Least Significant Difference = 481.52.

4.7.4.6 The grouping letters indicate that the product mean values (group 3) at day 7 and day 28 are significantly different from those of both the nutrient control (group 2) and the non-nutrient control (group 1) for those days. No other significant differences are shown. Therefore, in terms of total aromatic degradation, the test indicates the desired statistically significant difference between the mean of the product and the mean of the non-nutrient control.

5.0 Bioremediation agent toxicity test [Reserved]

6.0 Summary technical product test data format.

The purpose of this format is to summarize in a standard and convenient presentation the technical product test data required by the U.S. Environmental Protection Agency before a product may be added to EPA's NCP Product Schedule, which may be used in carrying out the National Oil and Hazardous Substances Pollution Contingency Plan. This format, however, is not to preclude the submission of all the laboratory data used to develop the data summarized in this format. Sufficient data should be presented on both the effectiveness and toxicity tests to enable EPA to evaluate the adequacy of the summarized data. A summary of the technical product test data should be submitted in the following format. The numbered headings should be used in all submissions. The subheadings indicate the kinds of information to be supplied. The listed subheadings, however, are not exhaustive; additional relevant information should be reported where necessary. As noted, some subheadings may apply only to particular types of agents.

I. *Name, Brand, or Trademark*

II. *Name, Address, and Telephone Number of Manufacturer*

III. *Name, Address, and Telephone Numbers of Primary Distributors*

IV. *Special Handling and Worker Precautions for Storage and Field Application*

1. Flammability.
2. Ventilation.
3. Skin and eye contact; protective clothing; treatment in case of contact.
4. Maximum and minimum storage temperatures; optimum storage temperature range; temperatures of phase separations and chemical changes.

V. *Shelf Life*

VI. *Recommended Application Procedure*

1. Application method.
2. Concentration, application rate (e.g., gallons of dispersant per ton of oil).
3. Conditions for use: water salinity, water temperature, types and ages of pollutants.

VII. *Toxicity (Dispersants, Surface Washing Agents, Surface Collecting Agents, and Miscellaneous Oil Spill Control Agents)*

Materials Tested	Species	LC$_{50}$ (ppm)
Product	Menidia beryllina	96-hr.
	Mysidopsis bahia 2	48-hr.
No. 2 fuel oil	Menidia beryllina	96-hr.
	Mysidopsis bahia	48-hr.
Product and No. 2 fuel oil (1:10)	Menidia beryllina	96-hr.
	Mysidopsis bahia	48-hr.

VIII.(a). *Effectiveness (bioremediation agents)*. Raw data must be reported according to the format shown below. The first column lists the names of the analytes measured by GC/MS (SIM), the surrogate standards, and various ratios and sums. In the next three columns, the concentration of the analytes (ng/mg oil), the concentration of the analytes corrected for the recovery of the surrogate standard (α-androstane for alkanes, d$_{10}$-phenanthrene for aromatics), and the concentration of corrected analytes normalized against the conserved internal marker, respectively, are reported for the first replicate from the first sampling event. These three columns are each repeated for the next two replicates, giving 9 total columns for the product of interest. The next 9 columns are the same as the product columns except they are for the non-nutrient control. The last nine columns are for the nutrient control. Thus, a total of 28 columns are needed in the spreadsheet. This spreadsheet is for the first sampling event (day 0). Two more identical spreadsheets will be needed for each of the next two sampling events (days 7 and 28). For the statistical analysis, a report showing the two-way analysis of variance (ANOVA) table created by the software used by the investigator must be shown in its entirety along with the name of the software package used. Another printout showing the mean separation table (protected LSD test results) generated by the software must be reported. The statistical analyses are conducted using the sum of the alkane concentrations and the sum of the aromatics concentrations from the raw data table. Thus, two ANOVAs are run for each sampling event, one for total alkanes and one for total aromatics, giving a total of 6 ANOVAs for a product test (2 ANOVAs × 3 sampling events). Only if significant differences are detected by a given ANOVA will it be necessary to run a protected LSD test.

BIOREMEDIATION AGENT EFFECTIVENESS TEST RAW DATA

[Date: . Testing Date: 0, 7, 28 (Circle One). Initial Oil Weight: .]

	Product Replicate 1			Product Replicate 2
	Concentration ng/mg	Surrogate corrected ng/mg	Normalized to marker ng/mg	
Alkane Analyte				
n-C10.				
n-C11.				
n-C12.				
n-C13.				
n-C14.				
n-C15.				
n-C16.				
n-C17.				
pristane.				
n-C18.				
phytane.				
n-C19.				
n-C20.				
n-C21.				
n-C22.				
n-C23.				
n-C24.				
n-C25.				

BIOREMEDIATION AGENT EFFECTIVENESS TEST RAW DATA—Continued

[Date: . Testing Date: 0, 7, 28 (Circle One). Initial Oil Weight: .]

	Product Replicate 1			Product Replicate 2
	Concentration ng/mg	Surrogate corrected ng/mg	Normalized to marker ng/mg	
n-C26.				
n-C27.				
n-C28.				
n-C29.				
n-C30.				
n-C31.				
n-C32.				
n-C33.				
n-C34.				
n-C35.				
n-C36.				
α-androstane.				
Total alkanes.				
n-C17:pristane.				
n-C18:phytane.				
Aromatic Analyte:				
naphthalene.				
C1-naphthalenes.				
C2-naphthalenes.				
C3-naphthalenes.				
C4-naphthalenes.				
dibenzothiophene.				
fluorene.				
C1-fluorenes.				
C2-fluorenes.				
C3-fluorenes.				
C1-dibenzothiophenes.				
C2-dibenzothiophenes.				
C3-dibenzothiophenes.				
phenanthrene.				
anthracene.				
C1-phenanthrenes.				
C2-phenanthrenes.				
C3-phenanthrenes.				
naphthobenzothio.				
C1-naphthobenzothio.				
C2-naphthobenzothio.				
C3-naphthobenzothio.				
fluoranthene.				
pyrene.				
C1-pyrenes.				
C1-pyrenes.				
chrysene.				
benzo(a)anthracene.				
C1-chrysenes.				
c2-chrysenes.				
benzo(b)fluoranth.				
benzo(k)fluoranth.				
benzo(e)pyrene.				
benzo(a)pyrene.				
perylene.				
indeno(1,2,3-cd)per.				
benzo(g,h,i)pyrene.				
dibenz(ah)anthrac.				
α,β-hopane.				
d8-naphthalene.				
d10-phenanthrene.				
d12-chrysene.				
d12-perylene.				
Total aromatics.				
Grav. weight oil.				
No. oil degraders/ml				

VIII.(b). *Toxicity (Bioremediation Agents)* [Reserved]

IX. *Microbiological Analysis (Bioremediation Agents)*

X. *Physical Properties of Dispersant/Surface Washing Agent/Surface Collecting Agent/Miscellaneous Oil Spill Control Agent:*

1. Flash Point: (°F)
2. Pour Point: (°F)
3. Viscosity: _____ at _____ °F (furol seconds)
4. Specific Gravity: _____ at _____ °F
5. pH: (10% solution if hydrocarbon based)
6. Surface Active Agents (Dispersants and Surface Washing Agents)[2]
7. Solvents (Dispersants and Surface Washing Agents)
8. Additives (Dispersants and Surface Washing Agents)
9. Solubility (Surface Collecting Agents)

XI. *Analysis for Heavy Metals, Chlorinated Hydrocarbons, and Cyanide (Dispersants, Surface Washing Agents, Surface Collecting Agents, and Miscellaneous Oil Spill Control Agents):*

Compounds	Concentration (ppm)
Arsenic.	
Cadmium.	
Chromium.	
Copper.	
Lead.	
Mercury.	
Nickel.	
Zinc.	
Cyanide.	
Chlorinated Hydrocarbons	

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[59 FR 47458, Sept. 15, 1994]

EFFECTIVE DATE NOTE: At 88 FR 38338, June 12, 2023, appendix C to part 300 was revised, effective Dec. 11, 2023. For the convenience of the user, the revised text is set forth as follows:

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[2] If the submitter claims that the information presented under this subheading is confidential, this information should be submitted on a separate sheet of paper clearly labeled according to the subheading and entitled ''Confidential Information.''

APPENDIX C TO PART 300—REQUIREMENTS FOR PRODUCT TESTING PROTOCOLS AND SUMMARY TEST DATA: DISPERSANT BAFFLED FLASK EFFICACY AND TOXICITY TESTS; STANDARD ACUTE TOXICITY TEST FOR BIOREMEDIATION AGENTS, SURFACE WASHING AGENTS, HERDING AGENTS, AND SOLIDIFIERS; AND BIOREMEDIATION AGENT EFFICACY TEST

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1.0 *Applicability and Scope.* This Appendix establishes laboratory protocols required under Subpart J (Use of Dispersants and Other Chemical and Biological Agents) of 40 CFR part 300 (National Oil and Hazardous Substances Pollution Contingency Plan) to make listing determinations for the Product Schedule. The protocols apply, based on product type, to dispersants, bioremediation agents, surface washing agents, herding agents, and solidifiers as defined in Subpart A (Introduction) of 40 CFR part 300.

2.0 *Baffled Flask Dispersant Efficacy Test (BFT)*

2.1 *Summary.* This laboratory protocol establishes procedures to evaluate the degree to which a product effectively disperses oil spilled on the surface of seawater, using a modified 150-mL screw-cap trypsinizing flask (an Erlenmeyer flask with baffles) with a glass and Teflon® stopcock near the bottom to allow removal of subsurface water samples without disturbing the surface oil layer. The efficacy of a dispersant is measured using one reference oil, Strategic Petroleum Oil Reserve Bryan Mound at two temperatures (5 °C and 25 °C). Six replicates and one method blank are required at each temperature. A layer of oil is placed on the surface of artificial seawater, and the dispersant is added to the slick at a dispersant:oil ratio (DOR) of 1:25 (4%) by volume. A standard orbital shaker table provides turbulent mixing at a speed of 250 revolutions per minute (rpm) for 10 minutes, immediately after which it is maintained stationary for 10 minutes to allow non-dispersed oil to rise to the water's surface. An undisturbed water sample is removed from the bottom of the flask through the stopcock, extracted with dichloromethane (DCM), and analyzed for oil content by UV-visible absorption spectrophotometry at wavelengths ranging between 340 and 400 nm.

2.2 *Apparatus.* All equipment must be maintained and calibrated per standard laboratory procedures.

2.2.1 *Modified Trypsinizing Flask.* A modified 150 mL glass screw-capped Erlenmeyer flasks with baffles (*e.g.*, Wheaton No. 355394 or equivalent) fitted with a 2 mm bore Teflon® stopcock and glass tubing, the center of which is no more than 1.3 cm from the bottom, as shown in Figure 1.

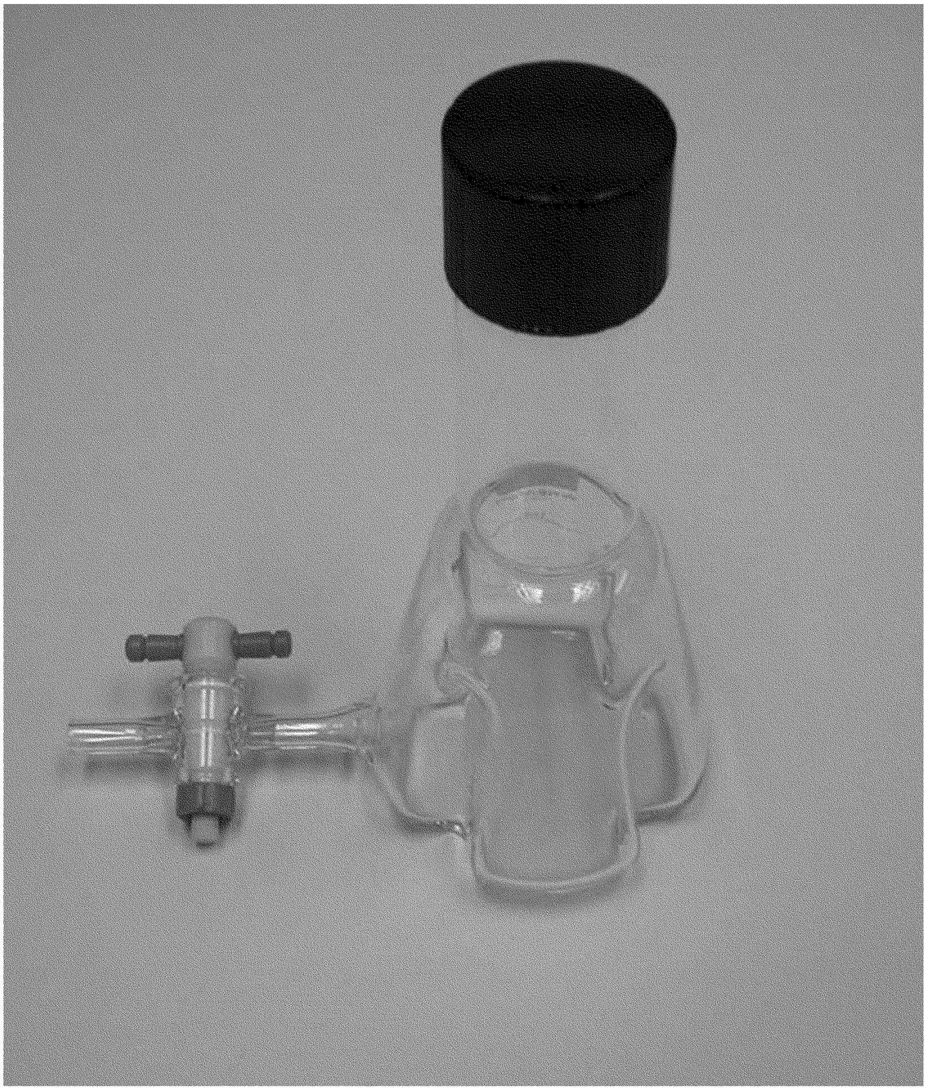


FIGURE 1. A BAFFLED TRYPSINIZING FLASK

2.2.2 *Orbital Shaker Table*. An orbital shaker table with a variable speed control unit capable of maintaining 250 rpm. The orbital diameter must be approximately 1.0 inch (2.5 cm) ±0.1 inch (0.25 cm).

2.2.3 *Spectrophotometer*. A UV-visible spectrophotometer capable of measuring absorbance between 340 and 400 nm (*e.g.*, Shimadzu UV–1800, Agilent 8453, or equivalent). Use standard transmission-matched quartz 10-mm path length rectangular cells with PTFE cover for absorbance measurements.

2.2.4 *Glassware*. Including: 25-ml graduated mixing cylinders (a graduated cylinder with a ground glass stopper); 50- and 100-ml graduated cylinders; 125-mL separatory funnels with Teflon stopcocks; 10-ml volumetric flasks; 30-ml crimp style glass serum bottles; 1-, 2-, 5-mL pipettes; other miscellaneous laboratory items.

2.2.5 *Micropipettor*. Use a micropipettor capable of dispensing 4 µL of dispersant and 100 µL of oil (*e.g.*, Brinkmann Eppendorf repeater pipettor with 100 µL and 5 mL syringe tip attachments or equivalent).

2.2.6 *Syringes.* 25-, 100-, 250-, 1,000-, 2,500-, 5,000-µl gas-tight syringes.

2.2.7 *Constant temperature rooms or incubators to hold the shaker at* 5 °C and 25 °C.

2.2.8 *Analytical Balance.*

2.2.9 *Chemical fume hood.*

2.3 *Reagents.*

2.3.1 *Artificial seawater.* Use the artificial seawater GP2 formulation shown in Table 1 of this Appendix.

2.3.2 *Test oil.* Use the EPA standard reference oil Strategic Petroleum Reserve Bryan Mound. To obtain this oil at no charge (except for a minimal shipping fee), see the instructions at *http://www.epa.gov/emergencies/content/ncp/index.htm.* Selected properties are summarized in Table 2 of this Appendix.

2.3.3 *Dichloromethane (DCM) (also known as methylene chloride), pesticide quality.*

2.4 *Container Handling and Storage.*

2.4.1 *Glassware.* If the glassware has been used with oil before, rinse with DCM to remove as much of the oil adhering to the sides of the flask as possible; waste DCM may be used. Soak in warm water with detergent and individually wash with bristled brushes. First rinse with tap water, then follow with two de-ionized water rinses. Dry either on a rack or in a 110 °C drying oven. After drying, rinse with fresh DCM (use sparingly).

2.4.2 *Serum bottles and other non-volumetric glassware.* Bake for at least 4 hours in a muffle furnace at 450 °C.

2.5 *Calibration Curve for the UV-visible spectrophotometer.*

2.5.1 *Stock Standard Solution Preparation.* Stock standard solution concentrations are based on the mass measurements after each addition and density determinations of the oil/dispersant/DCM solution using a density bottle or a 1-mL gas tight syringe. An example calculation is given in Table 3 of this Appendix according to the following equation:

$$\text{theoreticalconcentration,}\frac{\text{mg}}{\text{mL}}=\frac{\text{massofoil,g*1000mg/g}}{\text{totalmass,g}/\rho_{\text{solution,g/mL}}}$$

$$\textit{theoretical concentration,}\frac{mg}{mL}=\frac{\textit{mass of oil, } g*1000\ mg/g}{\textit{total mass, } g/\rho_{solution,g/mL}}\qquad\text{(Equation 1)}$$

Use the reference oil and the specific dispersant being tested for a particular set of experimental test runs. Prepare the stock standard solution of dispersant-oil mixture in DCM, starting with 2 ml of the oil, then adding 80 µl of the dispersant followed by 18 ml of DCM.

2.5.2 Six-*point Calibration Curve.* For the reference oil, add specific volumes of its stock standard solution (given in Table 4 of this Appendix) to 30 ml of artificial seawater in a 125 ml separatory funnel. Extract the oil/dispersant water mixture with triplicate 5 ml volumes of DCM. Follow each DCM addition by 15 seconds of vigorous shaking, carefully releasing the initial pressure inside the separatory funnel by partially removing the glass stopper inside a fume hood after the first few shakes. Then, allow a 2-minute stationary period for phase separation for each extraction. Drain the extracts into a 25-mL graduated mixing cylinder. Release any entrained bubbles of DCM from the water layer by sideways shaking of the funnel. Use precaution not to drain water into the DCM extract as it can affect the absorbance readings. Adjust the final volume of the collected extracts to 25 mL in the mixing cylinder using DCM. Determine specific masses for oil concentrations in the standards as volumes of oil/dispersant solution multiplied by the concentration of the stock solution. An example calculation is given in Table 4 of this Appendix. One calibration curve is needed for the reference oil and dispersant combination.

2.6 *Sample Preparation and Testing.* See section 2.7 of this Appendix for a detailed description of the spectrophotometer's linear calibration procedure.

2.6.1 Six replicates of the oil and test dispersant are required at each temperature plus two additional tests of method blanks (artificial seawater without oil and dispersant), one at each temperature. A completed test consists of 14 baffled flask tests (a total of six replicates for the reference oil/test dispersant combination at two temperatures (5 °C and 25 °C), plus two method blanks).

2.6.2 Attach a 3-inch length of Teflon tubing to the stopcock of each of the 150-mL baffled flasks. Add 120 mL of artificial seawater to each flask. Put screw cap on flasks and place them at the appropriate temperature (either 5 °C or 25 °C) for equilibration.

2.6.3 Calibrate and adjust the shaker table to 250 ± 10 rpm.

2.6.4 Prepare and time separately each baffled flask. Sequentially add 100 µL of oil and 4 µL of dispersant to the flask layering them onto the center of the seawater to give a dispersant-to-oil ratio (DOR) of 1:25. Avoid any oil or dispersant splashing on the flask walls, as it may reduce efficacy or cause errors in the calculated results. Discard the sample and repeat the setup if: (1) any oil or dispersant splashing occurs during the additions, or (2) the dispersant contacts the water first rather than the oil. This is especially important for 5 °C work because of increased oil viscosity.

2.6.5 For the oil, fill the tip of the pipettor, using a wipe to remove any oil from the sides of the tip. Holding the pipettor vertically, dispense several times back into the reservoir to ensure that the oil flows smoothly. Insert the syringe tip vertically into the baffled flask and let the bottom of the pipettor rest on the neck of the flask. Slowly and carefully dispense the oil one time onto the center of the water's surface. The remainder of the oil can either be returned to the oil bottle or set aside for use in the next test flask.

NOTE TO 2.6.5: If a Brinkmann Eppendorf repeater pipettor is used for dispensing the oil, attach a 5-mL syringe tip, and set the dial to 1.

2.6.6 For the dispersant, use the same procedure as for the oil to dispense onto the center of the oil slick surface. As the dispersant first contacts the oil, it will usually push the oil to the sides of the flask. Replace the screw cap onto the flask.

NOTE TO 2.6.6: If a Brinkmann Eppendorf repeater pipettor is used for dispensing the dispersant, attach a 100-μL syringe tip, and set the dial to 2.

2.6.7 Carefully place flask securely onto the shaker and agitate for 10 ± 0.25 minutes at 250 ± 10 rpm.

2.6.8 Remove the flask from the shaker table and allow a stationary, quiescent period of 10 ± 0.25 minutes to allow undispersed and/or recoalesced oil droplets to refloat to the surface.

2.6.9 Carefully open the screw cap, then the stopcock at the bottom, and discard the first several mL of seawater into a waste beaker to remove non-mixed water-oil initially trapped in the stopcock tubing. Collect a volume slightly greater than 30-mL into a 50-mL graduated cylinder. Adjust the collected volume to the 30-mL mark by removing excess with a disposable glass Pasteur pipette. A web-like emulsion may form at the solvent/water interface during the water sample extraction. Avoid pulling any emulsion phase into the DCM extract as it may cloud the DCM-extract, leading to error.

2.6.10 Transfer the water-oil sample from the graduated cylinder into a 125-mL glass separatory funnel fitted with a Teflon stopcock.

2.6.11 Add 5 mL DCM to the separatory funnel. Start shaking, releasing pressure into the fume hood by loosening the glass stopper. Shake vigorously at least 20 times for 15 seconds.

2.6.12 Allow the funnel to remain in a stationary position for 2 minutes to allow phase separation of the water and DCM.

2.6.13 Drain the DCM layer from the separatory funnel into a 25 mL mixing cylinder. Avoid pulling any emulsion phase into the DCM extract as it may cloud the DCM extract.

2.6.14 Repeat the DCM-extraction process two or three additional times until the DCM is clear. Collect each extract in the graduated cylinder. After the final extraction, lightly shake the separatory funnel sideways once or twice to dislodge entrained bubbles of DCM and drain.

2.6.15 Adjust the final volume to a known quantity, 25 mL, in the mixing cylinder. Using a syringe, dispense 2.5 mL or 5.0 mL of a reference oil sample into a 10-mL volumetric flask, and fill with DCM to make either a 1:4 or 1:2 dilution, respectively.

2.6.16 If analysis cannot be conducted immediately, store the extracted DCM samples at 4 ± 2 °C until time of analysis. Glass-stoppered mixing cylinders may be used for short-term storage or prior to bringing the extracts up to volume. After bringing to volume, transfer the DCM extracts to 25–30 ml crimp-style serum vials with aluminum/Teflon seals.

2.6.17 Complete all analysis within 10 consecutive days from when the sample was collected.

2.7 *UV-Visible Spectrophotometer Linear Stability Calibration*

2.7.1 A six-point calibration of the UV-visible spectrophotometer is required at least once per day for each oil. The stability calibration criterion is determined with the six oil standards identified in Table 4 of this Appendix.

2.7.2 Turn on spectrophotometer and allow it to warm up for at least 30 minutes before beginning analysis. Blank the instrument for the wavelengths between 340 and 400 nm with DCM.

2.7.3 If refrigerated, allow all extracts, standards, and samples to warm to room temperature.

2.7.4 Determine the absorbance of the six standards between the wavelengths of 340 and 400 nm. This can be done by either one of the following methods:

2.7.4.1 *Trapezoidal Rule*. Program the spectrophotometer to take readings every 5λ or 10λ and calculate the area under the curve using the Trapezoidal rule:

$$\acute{R}\int_{340\lambda}^{400\lambda} f(x)dx \approx \frac{H}{2}\sum_{k=1}^{N}\left(f(x_{k+1})+f(x_k)\right) \qquad \text{(Equation 2)}$$

where N + 1 = number of absorbance measurements to delineate N equally spaced sections of the curve, and H = the distance (λ) between each reading. For H = 5, N + 1 = 13 measurements, for H = 10, N + 1 = 7. The following formula illustrates readings taken every 10λ.

$$\mathrm{Area} = \frac{(\mathrm{Abs}_{340}+\mathrm{Abs}_{350})*10}{2} + \frac{(\mathrm{Abs}_{350}+\mathrm{Abs}_{360})*10}{2} + \cdots \frac{(\mathrm{Abs}_{390}+\mathrm{Abs}_{400})*10}{2} Area =$$

$$\frac{(Abs_{340}+Abs_{350})*10}{2} + \frac{(Abs_{350}+Abs_{360})*10}{2} + \cdots \frac{(Abs_{390}+Abs_{400})*10}{2} \qquad \text{(Equation 3)}$$

When using readings taken every 5λ, each absorbance sum is multiplied by 5.

2.7.4.2 Automatic *Integration*. Program the spectrophotometer to automatically integrate the area under the curve between 340 nm and 400 nm.

2.7.4.3 If the wavelengths must be manually set on the spectrophotometer, the older method of only measuring at 340λ, 370λ, and 400λ may be used. Then calculate using the trapezoidal rule for N + 1 = 3, H = 30. While the resulting area count with the older method is less accurate, the final results are similar since the inaccuracy is systematic.

2.7.5 After determining the area count for each standard, determine the response factor (RF) for the oil at each concentration using the following equation:

$$\mathrm{RF} = \frac{\mathrm{TheoreticalConcentration}, \frac{\mathrm{g}}{\mathrm{mL}}(\mathrm{Eq.1})}{\mathrm{area(Eq.3)}} RF = \frac{Theoretical\ Concentration, \frac{g}{mL}\,(Eq.1)}{area\ (Eq.3)}$$

(Equation 4)

2.7.6 Spectrophotometer stability for the initial calibration is acceptable when the RFs of the six standard extracts are less than 10% different from the overall mean value for the six standards, as calculated in Equation 5 of this Appendix and depicted in the example in Table 4 of this Appendix.

$$\%\mathrm{difference} = \frac{|\mathrm{RF}\text{-}\overline{\mathrm{RF}}|}{\overline{\mathrm{RF}}}*100\%\ difference = \frac{|RF-\overline{RF}|}{\overline{RF}} * 100$$

(Equation 5)

2.7.7 If this criterion is satisfied, begin analysis of sample extracts. Absorbances greater than or equal to 3.5 are not included because absorbance saturation occurs at and above this value. If any of the standard oil extracts fails to satisfy the initial-stability criterion, the source of the problem (*e.g.*, preparation protocol for the oil standards, spectrophotometer stability, etc.) must be corrected before analysis of the sample extracts begins.

2.7.8 Determine the slope of the calibration points by using linear regression forced zero intercept:

$$\mathrm{Y(areaunderabsorbancecurve)} = \mathrm{m(slope)}{*}\mathrm{x(concentrationofoil)}\,Y(area\ under\ absorbance\ curve) = m(slope) * x(concentration\ of\ oil) \quad \text{(Equation 6)}$$

2.8 Spectrophotometric *Analysis and Calculations*

2.8.1 Once a successful calibration curve for the reference oil has been created and verified, measure experimental replicates for the reference oil at each temperature followed by a standard check sample.

2.8.2 Determine the area for the absorbance values obtained for the experimental samples by using Equation 2 of this Appendix and illustrated by Equation 3 of this Appendix.

2.8.3 Calculate the Total Oil dispersed and the percentage of oil dispersed (%OD) based on the ratio of oil dispersed in the test system to the total oil added to the system, as follows:

$$\mathrm{TotalOilDispersed, mg} = \frac{\mathrm{Area(Eq.2)}}{\mathrm{CalibrationCurveSlope}}{*}\mathrm{V_{DCM}}{*}\frac{\mathrm{V_{tw}}}{\mathrm{V_{ew}}}\,Total\ Oil\ Dispersed, mg = \frac{Area\ (Eq.2)}{Calibration\ Curve\ Slope} * V_{DCM} * \frac{V_{tw}}{V_{ew}} \quad \text{(Equation 7)}$$

where:

V_{DCM} = final volume of the DCM extract (mL)

V_{tw} = total seawater in Baffled Flask (120 mL)

V_{ew} = volume seawater extracted (30 mL)

$$\%\mathrm{OD} = \frac{\mathrm{TotalOilDispersed}}{\mathrm{\rho_{Oil}{*}V_{Oil}}}{*}100\%OD = \frac{Total\ Oil\ Dispersed}{\rho_{Oil}{*}V_{Oil}} * 100$$

(Equation 8)

where:

r_{Oil} = density of the specific test oil, mg/mL and

V_{Oil} = Volume (mL of oil added to test flask (100 µL = 0.1 mL))

2.8.4 The %ODs for the six replicates within a particular treatment are then subjected to an outlier test, the Grubb's Test or Maximum Normal Residual test (6). A convenient internet-based calculator of a Grubbs outlier may be found at: *http://www.graphpad.com/quickcalcs/Grubbs1.cfm.* If an outlier is detected ($p < 0.05$), analyze an additional replicate to obtain the required six replicates.

2.8.5 Report the Dispersion Efficacy value for each oil and each temperature, which is the lower 95% confidence level of the 6 independent replicates (DE_{LCL95}) for each oil/temperature combination. Error bars are not needed as reporting the lower confidence level computationally takes the variability of the replicates into account as shown in Equation 9 of this Appendix.

$$\mathrm{DE_{LCL95}} = \overline{\%\mathrm{OD}}\text{-}\left(\frac{\mathrm{t_{(n\text{-}1,1\text{-}\alpha)}}^{*}\mathrm{s}}{\sqrt{\mathrm{n}}}\right)\mathrm{DE_{LCL95}} = \overline{\%\mathrm{OD}} - \left(\frac{\mathrm{t_{(n-1,1-\alpha)}}\,{*}\mathrm{s}}{\sqrt{\mathrm{n}}}\right)$$

(Equation 9)

where $\overline{\%OD}$ = mean percentage oil dispersed for the n = 6 replicates, S = standard deviation, and $t_{(n-1,1-\alpha)}$ = 100 * (1-α)th percentile from the t-distribution with n-1 degrees of freedom. For 6 replicates, $t_{n-1,1-\alpha}$ = 2.015, where α = 0.05. An example of the calculations is given in Table 5 of this Appendix.

2.9 *Performance Criterion*

The dispersant product tested will remain in consideration for listing on the NCP Product Schedule if the dispersant efficacy (DE_{LCL95}), as calculated in section 2.8.6 of this Appendix, is:

Oil	Temp (°C)	DE_{LCL95} (%)
Bryan Mound	5	≥70
Bryan Mound	25	≥75

2.10 *Quality Control (QC) Procedures for Oil Concentration Measurements*

2.10.1 *Absorbance readings*. Perform at least 5% of all UV-visible spectrophotometric measurements in duplicate as a QC check on the analytical measurement method. The absorbance values for the duplicates must agree within ±5% of their mean value.

2.10.2 *Method blanks*. Analytical method blanks involve an analysis of artificial seawater blanks (artificial seawater without oil or dispersant in a baffled flask) through testing and analytical procedures. Analyze method blanks with a frequency of at least two per completed test. Oil concentrations in method blanks must be less than detectable limits.

2.10.3 *Accuracy*. Determine accuracy by using a mid-point standard calibration check after each set of replicate samples analyzed. The acceptance criterion is based on a percent recovery of 90–110% using the following equation:

$$\%\text{recovery} = 100{*}\,\frac{\text{measuredconcentrationofcheckstandard}}{\text{theoreticalconcentrationofcheckstandard}}\%recovery = 100 *$$

$$\frac{measured\ concentration\ of\ check\ standard}{theoretical\ concentration\ of\ check\ standard} \qquad \text{(Equation 10)}$$

2.10.4 Calibration *QC checks*. Before analyzing samples, the spectrophotometer must meet an instrument stability calibration criterion using the oil standards. The instrument stability for initial calibration is acceptable when the RFs (Equation 5 of this Appendix) for each of the six standard concentration levels are less than 10% different from the overall mean value.

TABLE 1—CONSTITUENT CONCENTRATIONS FOR GP2 ARTIFICIAL SEAWATER

[Based on Spotte et al., 1984]

Constituent	Concentration (g/L)
NaCl	21.03
Na_2SO_4	3.52
KCl	0.61
KBr *	0.088
$Na_2B_4O_7 \times 10H_2O$ *	0.034
$MgCl_2 \times 6H_2O$	9.50
$CaCl_2 \times 2H_2O$	1.32
$SrCl_2 \times 6H_2O$ *	0.02
$NaHCO_2$ *	0.17

* Use Stock Solution, 1 mL/L GP2 for 100X stock solution for Bromide, Borate, and Strontium. 10 mL/L GP2 for bicarbonate—10X stock solution as it is not soluble in a 100X solution. Adjust to pH 8.0 prior to autoclaving.

TABLE 2—TEST OIL CHARACTERISTICS

[April 2023 oil assay]

Oil	Density, mg/mL @15 °C	API gravity @15 °C	Viscosity @25 °C, (cSt)	Category by API gravity
SPR Bryan Mound	0.8320	38.6	4.721	Light Oil.

TABLE 3—SAMPLE CALCULATION FOR PREPARATION OF OIL + DISPERSANT STOCK STANDARD SOLUTION

Item	Identifier	Amount
Mass of Bottle, g	A	29.498
Mass of Bottle + oil, g	B	31.225
Mass of bottle + disp + oil + DCM, g	C	54.380
Mass of oil, g (*derived*)	F = B − A	1.727
Mass of disp + oil + DCM, g (*derived*)	G = C − A	24.882
Mass of 1 mL syringe, g	D	14.556
Mass of 1 mL syringe + solution, g	E	15.820
Density of solution, g/mL (*derived*)	H = E − D	1.264
Volume of solution, mL (*derived*)	I = G/H	19.687
Conc. of stock solution, mg/mL (*derived*)	J = F*1000/I	87.704

TABLE 4—SAMPLE CALCULATIONS FOR OIL + DISPERSANT SIX POINT CALIBRATION

Oil + Dispersant Stock Standard Solution Concentration = 87.7 mg/mL (*Table 3*)

Standard—stock vol. (uL)	Theoretical conc., mg/mL	Area *(340–400 nm)*	RF	Avg. RF	Dev. from avg. RF	Slope
25	0.088	4.126	0.021	0.021	2.931	48.759
50	0.175	8.757	0.020		3.017	
100	0.351	16.559	0.021		2.577	
150	0.526	25.666	0.021		0.731	
200	0.702	34.142	0.021		0.500	
250	0.877	43.006	0.020		1.260	

TABLE 5—LCL95 SAMPLE CALCULATION WITH TEST OIL AND EXAMPLE DISPERSANT ‘A’

Rep	Area (340–400 nm)	Dilution factor	Extract volume (ml)*	Conc, mg/mL.	Mass in 30 mL, mg	Total oil dispersed, mg	Efficiency, %	Average	Std. dev.	Variance	Coef. of variation	LCL95
1	32.197	1	25	0.66	16.51	66.03	79.76	81.30	4.46	19.85	5.48	81.30
2	35.470	1	25	0.73	18.19	72.75	87.87	....	....	....		
3	30.260	1	25	0.62	15.52	62.06	74.96	....	....	....		
4	31.831	1	25	0.65	16.32	65.28	78.85	....	....	....		
5	33.355	1	25	0.68	17.10	68.41	82.63	....	....	....		
6	33.791	1	25	0.69	17.33	69.30	83.71	....	....	....	....	

* = 25 ml of DCM extract captured oil from 30 ml of aqueous DE test.

2.11 References for Section 2.0

(1) U.S. Environmental Protection Agency (1994), ''Swirling Flask Dispersant Effectiveness Test,'' *Title 40 Code of Federal Regulations,* Pt. 300, Appendix C, pp 47458–47461.

(2) Sorial, G.A., A.D. Venosa, K.M, Koran, E. Holder, and D.W. King. 2004. ''Oil spill dispersant effectiveness protocol: I. Impact of operational variables.'' ASCE J. Env. Eng. 130(10):1073–1084.

(3) Sorial, G.A., A.D. Venosa, K.M, Koran, E. Holder, and D.W. King. 2004. ''Oil spill dispersant effectiveness protocol: II. Performance of revised protocol.'' ASCE J. Env. Eng. 130(10):1085–1093.

(4) Venosa, A.D., D.W. King, and G.A. Sorial. 2002. ''The baffled flask test for dispersant effectiveness: a round robin evaluation of reproducibility and repeatability.'' Spill Sci. & Technol. Bulletin 7(5–6):299–308.

(5) Spotte, S., G. Adams, and P.M. Bubucis. 1984. ''GP2 medium is an synthetic seawater for culture or maintenance of marine organisms,'' Zoo Biol, 3:229–240.

(6) Grubbs, F. 1969. ''Sample Criteria for Testing Outlying Observations,'' Annals of Mathematical Statistics, pp. 27–58.

3.0 Dispersant Toxicity Testing

3.1 *Summary*. This laboratory protocol includes testing for: (1) dispersant standard static acute toxicity tests for the mysid shrimp, *Americamysis bahia* (48-hr duration) and the inland silverside, *Menidia beryllina* (96-hr duration); (2) dispersant-oil mixture static acute toxicity tests for *Americamysis bahia* and *Menidia beryllina* (48-hr and 96-hr duration, respectively); (3) dispersant developmental assay for *Strongylocentrotus purpuratus* or *Arbacia punctulata*, (72-hr duration); and (4) dispersant 7-day static subchronic tests with *Americamysis bahia* and *Menidia beryllina* (Table 6 of this Appendix).

TABLE 6—TOXICITY TESTING REQUIREMENTS FOR DISPERSANTS

Test procedure				
Test substance	96-Hr static acute: *Menidia beryllina*	48-Hr static acute: *Americamysis Bahia*	72-Hr sea urchin *developmental assay*	7-Day subchronic: *M. beryllina & A. bahia*
Dispersant only	*yes*	*yes*	*yes*	*yes.*
Dispersant—Reference Oil Mixture	*yes*	*yes*	*no*	*no.*

3.2 *Preparation of Stock Solutions*

3.2.1 *Dispersant.* Prepare a 1000 µL/L primary stock solution prior to test initiation by adding 1.1 mL of dispersant to 1100 mL of dilution water consisting of salinity adjusted uncontaminated natural or artificial seawater, in a glass vessel. Using a laboratory top stirrer equipped with a stainless-steel blade, center the stirrer blade in the mixing vessel one inch off the bottom. Initially mix the resulting stock solution for approximately five seconds at speeds of <10,000 rpm to avoid foaming. Thereafter, set the speed to provide a 70% vortex. Using a glass pipette, remove appropriate aliquots of stock solution from between the mixing vessel wall and edge of the vortex and place directly into the dilution water within an exposure vessel. Suspend mixing of the stock solution after the removal of each aliquot. Base the preparation of exposure solutions on the nominal concentration of the stock solution and follow procedures outlined in sections 3.5 and 3.6 of this Appendix.

3.2.2 *Dispersant-Reference Oil(s) Mixtures.* Use Strategic Petroleum Reserve Bryan Mound reference oil. To obtain this oil at no charge (except for a minimal shipping fee) see *https://www.epa.gov/emergency-response/national-contingency-plan-subpart-j#howto.* Assessment of dispersant-reference oil mixture (DOM) toxicity is determined for each reference oil using the aqueous phase of a chemically enhanced-water accommodated fraction (CE–WAF). Fit a glass aspirator bottle (approximately 23 L) equipped with a hose bib at the base with a length of silicon tubing containing a hose clamp. Fill the bottle with 19L of seawater leaving a 20% headspace above the liquid, place on a magnetic stir plate then add and center a stir bar. Add the reference oil at 25 g/L using a silicon tube attached to a glass funnel that reaches just below the water surface. Using this method reduces the production of air bubbles on the oil surface slick. Adjust the stir plate to obtain an oil vortex of 25% of the total volume of the seawater, then add the dispersant to be tested at a ratio of 1:10 dispersant:oil (2.5 g/L). Securely seal the bottle to reduce the loss of volatiles using a silicon stopper and wraps of Parafilm and stir for 18 hours, then allow the solution to settle for 6 hours. Maintain the temperature at 25 °C during stirring and settling. Purge the hose at the base of the bottle of any material followed by removal of the CE–WAF (aqueous phase) into a clean glass container without disturbing the surface oil slick. The CE–WAF should be remixed and 1 to 2 L removed for chemical analysis of total petroleum hydrocarbons (TPH) following the procedures outlined in section 3.4 of this Appendix. The remaining volume will be used for the preparation of exposure solutions following procedures outlined in section 3.3 of this Appendix. To reduce time and cost, mix sufficient amounts of dispersant product-reference oil mixture CE–WAF to allow preparation of exposure solutions for conducting simultaneous acute tests with both *Americamysis bahia* and *Menidia beryllina.*

3.3 *Preparation of Exposure Concentrations.*

3.3.1 *Concentration Selection.* Preliminary rangefinder tests may be necessary using a series of logarithmic concentrations (*e.g.* 0.1, 1, 10, 100 µl dispersant product/L or mg TPH/L) to determine the appropriate exposure concentration range necessary to determine LC_{50} values and 95% confidence intervals. For definitive tests, conduct a minimum of five test concentrations using a geometric ratio between 1.5 and 2.0 (*e.g.* 2, 4, 8, 16, and 32). Note that when testing only the dispersant product, the highest test concentration must not exceed the dispersant's self-dispersibility limit.

3.3.2 *Exposure Concentrations.* Exposure solutions are prepared by adding the appropriate amount of stock solution directly to dilution water in each test chamber. Mix each exposure solution using five rotations in one direction followed by five rotations in the opposite direction using a solid glass stir rod.

3.3.3 *Reference Toxicants.* Separate toxicity tests must be performed with a reference toxicant for each species tested. Conduct additional reference toxicity tests any time a change in the population or source of a test species occurs. Use sodium dodecyl sulfate (SDS), also known as dodecyl sodium sulfate (DSS), and sodium lauryl sulfate (SLS) as the reference toxicant for exposures conducted with *Menidia beryllina* and *Americamysis bahia.* Use copper chloride as the reference toxicant for exposures conducted with the sea urchin developmental test. Use reagent grade quality SDS and copper chloride for tests. Information on procedures for conducting reference toxicant tests with these species can be found in the specific EPA methods documents cited in sections 3.5.1, 3.6.1, and 3.7.1 of this Appendix.

3.4 *Chemical Analysis of Stock Solutions.* Add the 1 L sample of CE–WAF (Section 3.2.2 of this Appendix) solutions directly to amber glass bottles with Teflon®-lined cap. Collect a replicate sample in the event of accidental loss or if reanalysis of the stock solution becomes necessary. Adjust sample to a pH=2 using 50% hydrochloric acid, immediately refrigerate and analyze within 48 hours of collection. Analyze samples for C9–C32 TPH by gas chromatography-flame ionization detection (GC–FID) following EPA SW–846, Method 8015B–DRO (4). Report TPH concentration of stock solutions as milligrams TPH/L and use in the calculation of exposure concentrations for all toxicity tests conducted with CE–WAF.

3.5 *Static Acute Tests with M. beryllina and A. bahia*

3.5.1 *General.* Use EPA's *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA–821–R–02–012) (1) for testing each species separately with dispersant product or a mixture of dispersant product and reference oil (DOM).

3.5.2 *Test Solutions.* Modify procedures in EPA–821–R–02–012 specifically dealing with the handling and toxicity testing of effluents or receiving water samples as follows: Prepare stock solutions following section 3.2 of this Appendix and exposure concentrations following section 3.3 of this Appendix.

3.5.3 *Number of Treatments, Replicates and Organisms.* Conduct a minimum of three replicates of at least five exposure treatments plus a minimum of three replicate dilution water controls. Expose ten organisms per replicate treatment.

3.5.4 *Exposure Period.* Test duration is 48-hr for *Americamysis bahia* and 96-hr for *Menidia beryllina*. Mortality must be recorded at each 24-hour period of each test.

3.5.5 *Test Acceptability.* For each test performed, survival of control animals must be >90% and test results must allow determination of statistically valid LC_{50} and 95% confidence interval values except in cases where the LC_{50} is >1000 μl/L or is determined to be greater than the limits of water solubility of dispersibility.

3.5.6 *Static Acute Test Summary.* A summary of required test conditions is provided in Table 7 of this Appendix.

3.6 *Sea Urchin Developmental Test with Dispersant Product*

3.6.1 *General.* Use Section 15, ''Purple Urchin, *Strongylocentrotus purpuratus* and Sand Dollar, *Dendraster excentricus* Larval Development Test Method'' of EPA's *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (EPA/600/R–95–136) (2). Alternatively, the development of the urchin *Arbacia punctulata* may be tested (see Table 7).

3.6.2 *Test Organism.* Tests of dispersant products are to follow methods for the purple urchin only. Tests with the sand dollar are not required.

3.6.3 *Test Solutions.* Modify procedures in EPA/600/R–95–136, Section 15 specifically dealing with the handling and toxicity testing of effluents or receiving water samples as follows: Prepare stock solutions following section 3.2.1 of this Appendix and exposure concentrations following section 3.3 of this Appendix.

3.6.4 *Number of Treatments and Replicates.* Conduct a minimum of four replicates of five exposure treatments plus a minimum of four replicate dilution water controls.

3.6.5 *Exposure Duration and Test Endpoint.* Examine the effects of the dispersant product on normal development of sea urchin embryos over a period of 72 hours. An IC_{50} (the exposure concentration at which normal development is inhibited in 50% of the embryos) with 95% confidence intervals are to be determined in place of an IC_{25}. The concentration of dispersant causing inhibition of development in 50% of exposed embryos (IC_{50}) with the lower and upper 95% confidence intervals (LCI_{95} and $ULCI_{95}$) must be calculated at the end of the exposure period. Mortality determinations are not required.

3.6.6 *Test Acceptability.* Requirements of the assay are: (i) ≥80% normal larval development in the control treatment, (ii) the minimum significant difference (MSD) that can be statically detected relative to the control is ≤25%, iii) test results which support the determination of a statistically valid IC_{50} and 95% confidence interval unless the LC_{50} is >1000 μl/L or is greater than the limits of water solubility of dispersibility.

3.6.7 *Urchin Developmental Test Summary.* A summary of required test conditions is provided in Table 7 of this Appendix.

3.7 *Seven-day Subchronic Tests with M. beryllina and A. bahia*

3.7.1 *General.* Use Section 13, Method 1006.0, ''Inland Silverside (*Menidia beryllina*) Larval Survival and Growth Method,'' and Section 14, Method 1007.0, ''Mysid (*Mysidopsis* [renamed *Americamysis*] *bahia*) Survival, Growth, and Fecundity Method'' of EPA's *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms* (EPA–821–R–02–014) (3) for testing of dispersant product.

3.7.2 *Test Solutions.* Modify procedures in EPA–821–R–02–014, sections 13 and 14 specifically dealing with the handling and toxicity testing of effluents or receiving water samples as follows: Prepare stock solutions following section 3.2.1 of this Appendix and exposure concentrations following section 3.3 of this Appendix. Exposure solutions should be renewed every 24 hours for the duration of the test.

3.7.3 *Number of Treatments, Replicates and Organisms.* (i) *Menidia beryllina:* Conduct a minimum of four replicates of at least five exposure treatments plus a minimum of four replicate dilution water controls. Expose ten *M. beryllina* per replicate treatment. (ii) *Americamysis bahia:* Conduct a minimum of eight replicates of at least five exposure treatments plus a minimum of eight replicate dilution water controls. Expose five *A. bahia* per replicate treatment.

3.7.4 *Exposure Duration and Test Endpoint.* The test duration is seven days for both species. Test endpoints for *Menidia beryllina* are survival and growth (dry weight) and for *Americamysis bahia* is survival, growth (dry weight) and fecundity. Calculate an LC_{50} and 95% confidence interval for survival and IC_{25} and IC_{50} with 95% confidence intervals for growth (and fecundity for *A. bahia* only). Report the lowest observed effect concentration

(LOEC) and no observed effect concentration (NOEC) for each endpoint.

3.7.5 *Test Acceptability*. Requirements of the assay are: (i) ≥80% survival in the control treatment for each species, (ii) dry weights must meet the specific requirements as stipulated in Method 1006.0 for *Menidia beryllina* and Method 1007.0 for *Americamysis bahia*.

3.7.6 *Subchronic Test Summary*. A summary of required test conditions for each species is provided in Table 7 of this Appendix.

3.8 *Laboratory Report*. The laboratory must include, for each toxicity test report, all applicable information, data and analyses as follows:

3.8.1 *Test Objective:* protocol title and source, endpoint(s);

3.8.2 *Product Information:* product name, manufacturer contact information, lot number, production date, date received/chain of custody;

3.8.3 *Contract Facility:* contact information;

3.8.4 *Dilution Water:* source, pretreatment, physical and chemical characteristics (pH, salinity);

3.8.5 *Test Conditions:* date and time of test (start and end), test chambers type and volume, volume of solution per chamber, number of organisms per chamber, number of replicate chambers per treatment, feeding frequency, amount and type of food, test concentrations, test temperature (mean and range), test salinity (mean and range);

3.8.6 *Test Organisms:* common and scientific name, source contact information, age and date purchased, acclimation conditions (*e.g.*, temperature, salinity, both mean and range), age at test start;

3.8.7 *Reference toxicant:* date received, lot number, date of most recent test, results and current Cumulative Sum Chart, dilution water used, physical and chemical methods used;

3.8.8 *Quality Assurance:* verification of laboratory accreditation, including subcontractor facilities;

3.8.9 *Test Results:* raw data in tabular and graphical form, daily records of affected organisms in each concentration replicate and controls, table of required endpoints (*i.e.*, LC_{50} with 95% confidence interval (CI), IC_{25} and IC_{50} with 95% CI, LOEC and NOEC), statistical methods used to calculate endpoints, summary tables of test conditions and QA data;

3.8.10 *Analytical Results:* method summary including Limit of Detection (LOD)/Limit of Quantitation (LOQ), deviations and reasons if any, sample summary, results including chromatograms and data qualifiers, QA summary including calibration curves, method blank and surrogate recovery, analytical results summary; and

3.8.11 *Conclusions:* Relationship between test endpoints and threshold limit.

TABLE 7—SUMMARY OF TEST CONDITIONS—DISPERSANT TOXICITY

	Acute *M. beryllina*	Acute *A. bahia*	Subchronic *M. beryllina*	Subchronic *A. bahia*	Development *S. purpuratus/A. punctulata*
Test type	Static non-renewal.	Static non-renewal.	Static renewal (daily)	Static renewal (daily)	Static non-renewal.
Test duration	96 hours	48 hours	7 days	7 days	72 ± 2 hours.
Salinity	20 ± 2‰	20 ± 2‰	20 ± 2‰	20 ± 2‰	34 ± 2‰.
Temperature	25 ± 1 °C. Test temperatures must not deviate (maximum minus minimum temperature) by for than 3 °C during the test.				15 ± 1 °C.
Light quality	Ambient laboratory illumination.				
Light intensity	10–20 µE/m²/s.				
Photoperiod	16 h light, 8 h darkness, with phase in/out period recommended.				
Test chamber size [1]	250 mL	250 mL	600 mL–1 L	400 mL	30 mL.
Test solution volume [1]	200 mL	200 mL	500–750 mL	150 mL	10 mL.
Age of test organism [2]	9–14 days	1–5 days	7–11 days	7 days	1 hr old fertilized eggs.
No. organisms per test chamber	10	10	10	5	25 embryos per mL.
No. of replicate chambers per concentration	3	3	4	8	4.
Feeding regime	Refer to specific feeding procedures provided in each test method.				None.
Aeration	None, unless DO falls below 4.0 mg/L, then aerate all chambers. Rate: <100 bubbles/minute.				
Test concentrations	5 exposure concentrations and a control (minimum required).				
Test acceptability (required)	≥90% survival in controls.	≥90% survival in controls.	For controls: ≥80% survival; average dry weight ≥0.5mg where test starts with 7 day old larvae, or ≥0.43 mg for larvae preserved for ≤7days.	For controls: ≥80% survival; average dry weight ≥0.20 mg.	≥80% normal shell development in controls.

[1] Recommended minimum value.
[2] Less than or equal to 24-hr range in age.

3.9 *References for Section 3.0*

(1) U.S. EPA. 2002. *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms.* Fifth Edition. U.S. Environmental Protection Agency, Washington, DC (EPA–821–R–02–012).

(2) U.S. EPA. 1995. *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms.* First Edition. U.S. Environmental Protection Agency, Washington, DC (EPA/600/R–95–136)

(3) U.S. EPA. 2002. *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms.* Third Edition. U.S. Environmental Protection Agency, Washington, DC (EPA–821–R–02–014).

(4) U.S. EPA. 2008. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* U.S. Environmental Protection Agency, Washington, DC (SW–846) *http://www.epa.gov/osw/hazard/testmethods/sw846/online/index.htm.*

4.0 *Standard Acute Toxicity Testing of Surface Washing Agents, Bioremediation Agents, Herding Agents, and Solidifiers.*

4.1 *Summary.* This laboratory protocol includes testing for: (1) saltwater standard static acute toxicity tests for test products with the mysid shrimp, *Americamysis bahia* (48-hr duration) and the inland silverside, *Menidia beryllina* (96-hr duration); and (2) freshwater standard static acute toxicity tests for test products with the daphnid, *Ceriodaphnia dubia* (48-hr duration) and the fathead minnow, *Pimephales promelas* (96-hr duration) (see Table 8 of this Appendix).

TABLE 8—TOXICITY TESTING REQUIREMENTS FOR SURFACE WASHING AGENTS, HERDING AGENTS, BIOREMEDIATION AGENTS AND SOLIDIFIERS

Application environment	Test procedure			
	96-hr Static acute: *Menidia beryllina*	48-hr Static acute: *Americamysis bahia*	96-hr Static acute: *Pimephales promelas*	48-hr Static acute: *Ceriodaphnia dubia*
Saltwater only	yes	yes	no	no.
Freshwater only	no	no	yes	yes.
Freshwater and saltwater use.	yes	yes	yes	yes.

4.2 *Dilution Water.* Use Section 7 of EPA's *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA–821–R–02–012) [1] for preparation of the appropriate dilution water for each species tested. Use of clean natural or synthetic seawater for tests conducted with saltwater species is acceptable.

4.3 *Preparation of Stock Solutions.*

4.3.1 Liquid *Surface Washing Agents and/or Herding Agents.* Prepare a 1000 µL/L stock solution prior to test initiation by adding 1.1 mL of test product to 1100 mL of dilution water in a glass vessel. Place on a magnetic stir plate then add and center a stir bar and adjust the stir plate to obtain a vortex of 25% of the total volume of the liquid. Mix the resulting stock solution for approximately five minutes at room temperature. Using a glass pipette, remove appropriate aliquots of stock solution from between the mixing vessel wall and edge of the vortex and place directly into the dilution water within an exposure vessel. Base the preparation of exposure solutions on the nominal concentration of the stock solution and follow procedures outlined in sections 4.6 and/or 4.7 of this Appendix, as appropriate.

4.3.2 *Bioremediation Agents.* For products consisting of two or more liquid and/or solid components, prepare the product following the manufacturers recommended procedure and ensure the test product mixture is completely blended. Prepare a 1000 µL/L stock solution prior to test initiation by adding 1.1 mL of the test product mixture to 1100 mL of dilution water in a glass vessel. Place on a magnetic stir plate then add and center a stir bar and adjust the stir plate to obtain a vortex of 25% of the total volume of the liquid. Mix the resulting stock solution for approximately five minutes at room temperature. Using a glass pipette, remove appropriate aliquots of stock solution from between the mixing vessel wall and edge of the vortex and place directly into the dilution water within an exposure vessel. Base the preparation of exposure solutions on the nominal concentration of the stock solution and follow procedures outlined in sections 4.5 and/or 4.6 of this Appendix, as appropriate.

4.3.3 *Solid Phase Products.* Assessment of the toxicity of solidifiers and other solid phase products are determined using the aqueous phase of water-accommodated fractions (WAFs) of the test product. Fit a glass aspirator bottle (approximately 23L) equipped with a hose bib at the base with a length of silicon tubing containing a hose clamp. Fill the bottle with 19L of dilution water leaving a 20% headspace above the liquid, place on a magnetic stir plate then add and center a stir bar. Add the test product at 25 g/L and securely seal the bottle using a silicon stopper and wraps of parafilm. Adjust the stir plate to obtain a vortex of 25% of the total fluid volume, stir for 18 hours then settle for 6 hours. Maintain the temperature at 25 °C during stirring and settling. Purge the hose at the base of the bottle of any material followed by removal of the WAF (aqueous phase) into a clean glass container without disturbing the product on the surface. The WAF should be remixed and used for the preparation of exposure solutions following procedures outlined in section 4.4 of this Appendix.

4.4 *Preparation of Exposure Concentrations.*

4.4.1 *Concentration Selection.* Preliminary rangefinder tests may be necessary using a series of logarithmic concentrations (*e.g.* 0.1, 1, 10, 100 µl test product/L) to determine the appropriate exposure concentration range necessary to determine LC_{50} values and 95% confidence intervals. For definitive tests, conduct a minimum of five test concentrations using a geometric ratio between 1.5 and 2.0 (*e.g.* 2, 4, 8, 16, and 32). Note that when testing the product, the highest test concentration should not exceed the test product's self-dispersibility limit.

4.4.2 *Exposure Concentrations.* Exposure solutions are prepared by adding the appropriate amount of stock solution directly to dilution water in each test chamber. Mix each exposure solution using five rotations in one direction followed by five rotations in the opposite direction using a solid glass stir rod.

4.4.3 *Reference Toxicants.* Separate toxicity tests must be performed with a reference toxicant for each species tested. Conduct additional reference toxicity tests any time a change in the culture population or source of a test species occurs. Use reagent grade quality sodium dodecyl sulfate (SDS), also known as dodecyl sodium sulfate (DSS), and sodium lauryl sulfate (SLS) as the reference toxicant. Information on procedures for conducting reference toxicant tests with these species can be found in section 4 of EPA's *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA–821–R–02–012) (3).

4.5 *Saltwater Static Acute Tests with Menidia beryllina and Americamysis bahia*

4.5.1 *General.* Use EPA's *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA–821–R–02–012) (1) for testing each species separately with the test product.

4.5.2 *Test Solutions.* Modify procedures in EPA–821–R–02–012 specifically dealing with the handling and toxicity testing of effluents or receiving water samples as follows: Prepare stock solutions following the appropriate sections (4.3.1, 4.3.2, or 4.3.3) of this Appendix and exposure concentrations following section 4.4 of this Appendix.

4.5.3 *Number of Treatments, Replicates and Organisms.* Conduct a minimum of three replicates of at least five exposure treatments plus a minimum of three replicate dilution water controls. Expose ten organisms per replicate treatment.

4.5.4 *Exposure Period.* Test duration is 48-hr for *A. bahia* and 96-hr for *M. beryllina*. Mortality must be recorded at each 24 hour period of each test.

4.5.5 *Test Acceptability.* For each test performed, survival of control animals must be >90% and test results must allow determination of statistically valid LC_{50} and 95% confidence interval values except in cases where the LC_{50} is >1000 µl/L or is determined to be greater than the limits of water solubility or dispersibility.

4.5.6 *Static Acute Test Summary.* A summary of required test conditions is provided in Table 9 of this Appendix.

4.6 *Freshwater Static Acute Tests with Pimephales promelas and Ceriodaphnia dubia*

4.6.1 *General.* Use EPA's *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA–821–R–02–012) (1) for testing each species separately with the test product.

4.6.2 *Test Solutions.* Modify procedures in EPA–821–R–02–012 specifically dealing with the handling and toxicity testing of effluents or receiving water samples as follows: Prepare stock solutions following the appropriate sections (4.3.1, 4.3.2, or 4.3.3) of this Appendix and exposure concentrations following section 4.4 of this Appendix.

4.6.3 *Number of Treatments, Replicates and Organisms. P. promelas:* Conduct a minimum of three replicates of at least five exposure treatments plus a minimum of three replicate dilution water controls. Expose ten organisms per replicate treatment. *C. dubia:* Conduct a minimum of four replicates of at least five exposure treatments plus a minimum of four replicate dilution water controls. Expose five organisms per replicate treatment.

4.6.4 *Exposure Period.* Test duration is 48-hr for *C. dubia* and 96-hr for *P. promelas*. Mortality must be recorded at each 24 hour period of each test.

4.6.5 *Test Acceptability.* For each test performed, survival of control animals must be >90% and test results must allow determination of statistically valid LC_{50} and 95% confidence interval values except in cases where the LC_{50} is >1000 µl/L or is determined to be greater than the limits of water solubility of dispersibility.

4.6.6 *Static Acute Test Summary.* A summary of required test conditions is provided in Table 9 of this Appendix.

4.7 *Laboratory Report.* The laboratory must include, for each toxicity test report, all applicable information, data and analyses as follows:

4.7.1 *Test Objective:* protocol title and source, endpoint(s);

4.7.2 *Product Information:* product name, manufacturer contact information, lot number, production date, date received/chain of custody;

4.7.3 *Contract Facility:* contact information;

4.7.4 *Dilution Water:* source, pretreatment, physical and chemical characteristics (pH, salinity);

4.7.5 *Test Conditions:* date and time of test (start and end), test chambers type and volume, volume of solution per chamber, number of organisms per chamber, number of replicate chambers per treatment, feeding frequency, amount and type of food, test concentrations, test temperature (mean and range), test salinity (mean and range);

4.7.6 *Test Organisms:* common and scientific name, source contact information, age and date purchased, acclimation conditions (*e.g.*, temperature, salinity, both mean and range), age at test start;

4.7.7 *Reference toxicant:* date received, lot number, date of most recent test, results and current Cumulative Sum Chart, dilution water used, physical and chemical methods used;

4.7.8 *Quality Assurance:* verification of laboratory accreditation, including subcontractor facilities;

4.7.9 *Test Results:* raw data in tabular and graphical form, daily records of affected organisms in each concentration replicate and controls, table of required endpoints (*i.e.*, LC$_{50}$, 95% CI, inhibited concentration for 50% of the species (IC$_{50}$), lower observed effect concentration (LOEC) and no observed effect concentration (NOEC)), statistical methods used to calculate endpoints, summary tables of test conditions and QA data; and

4.7.10 *Conclusions:* Relationship between test endpoints and threshold limit.

TABLE 9—SUMMARY OF TEST CONDITIONS—SURFACE WASHING AGENTS, HERDING AGENTS, BIOREMEDIATION AGENTS AND SOLIDIFIERS TOXICITY

	Saltwater acute *M. beryllina*	Saltwater acute *A. bahia*	Freshwater acute *P. promelas*	Freshwater acute *C. dubia*
Test type	Static non-renewal	Static non-renewal	Static non-renewal	Static non-renewal.
Test duration	96 hours	48 hours	96 hours	48 hours.
Salinity	20 ± 2‰	20 ± 2‰	NA	NA.
Temperature	25 ± 1 °C. Test temperatures must not deviate (maximum minus minimum temperature) by more than 3 °C during the test.			
Light quality	Ambient laboratory illumination.			
Light intensity	10–20 μE/m^2/s.			
Photoperiod	16 h light, 8 h darkness, with phase in/out period recommended.			
Test chamber size [1]	250 mL	250 mL	250 mL	30 mL.
Test solution volume [1]	200 mL	200 mL	200 mL	15 mL.
Age of test organism [2]	9–14 days	1–5 days	1–14 days	<24 hours.
No. organisms per test chamber.	10	10	10	5.
No. of replicate chambers per concentration (minimum).	3	3	3	4.
Feeding regime	Refer to specific feeding procedures provided in each test method.			
Aeration	None, unless DO falls below 4.0 mg/L, then aerate all chambers. Rate: <100 bubbles/minute.			
Test concentrations	5 exposure concentrations and a control (minimum required).			
Test acceptability (required).	≥90% survival in controls.			

[1] Recommended minimum value.

[2] Less than or equal to 24-hr range in age.

4.8 *References for Section 4*

(1) U.S. EPA. 2002. *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms.* Fifth Edition. U.S. Environmental Protection Agency, Washington, DC (EPA–821–R–02–012).

5.0 *Bioremediation Agent Efficacy Test Protocol*

5.1 *Summary.* This protocol quantifies changes in weathered Alaska North Slope (ANS) crude oil composition of alkanes and aromatics resulting from the use of a bioremediation agent in either artificial seawater or freshwater. The manufacturer may test either one or both freshwater or saltwater, depending on the product's intended use. Biodegradation of the alkanes and aromatics is monitored for 28 days at 20–23 °C. Product flasks at Day 28 are compared to Day 0 flasks to determine reductions in alkanes and aromatics. A positive control of a known oil-degrading bacterial consortium supplied by EPA is tested. A negative, sterile control is also set up containing exposure water, weathered crude oil, product, and a sterilant, sodium azide. The purpose of the negative, killed control is to make sure the disappearance of the oil constituents at day 28 is due to biodegradation and not some physical loss such as volatilization. The day 28 GC/MS results from the killed control must not be less than 90% of the day 0 results. The sample preparation procedure extracts the oil phase into the solvent dichloromethane (DCM) (also known as methylene chloride) with a subsequent solvent exchange into hexane. The hexane extracts are analyzed by a high-resolution gas chromatograph/mass spectrometer (GC/MS) operated in the selected ion monitoring mode (SIM) at a scan rate of >5 scans per second.

Note to 5.1: Alaska North Slope (ANS) crude oil is artificially weathered by distillation at 521 °F (272 °C) to remove the low molecular weight hydrocarbons to approximate natural weathering processes that occur after a spill.

5.2 *Apparatus.* All equipment must be maintained and calibrated per standard laboratory procedures.

5.2.1 Assorted flasks and other glassware;

5.2.2 Graduated cylinders (100 mL);

5.2.3 Deionized water;

5.2.4 250 mL borosilicate glass Erlenmeyer flasks;

5.2.5 250 mL separatory funnels with stopcocks

5.2.6 Pasteur pipettes;

5.2.7 Multichannel pipettor (5–50 mL and 50–200 mL);

5.2.8 Autoclave; environmental room or incubator;

5.2.9 Balance accurate to 0.1 mg;

5.2.10 Orbital shaker table with clamps sized to hold flasks securely;

5.2.11 GC/MS instrument equipped with a DB–5 capillary column (30 m, 0.25 mm ID, and 0.25 mm film thickness) or equivalent, and a split/splitless injection port operating in the splitless mode, such as an Agilent 6890 GC/5973 MS (or equivalent) equipped with an auto-sampler for testing multiple samples; and

5.2.12 Fixed Rotor Centrifuge.

5.3 *Reagents and consortium medium.*

5.3.1 *Stock Seawater Preparation.* Prepare the artificial seawater GP2 (modified from Spotte *et al.*, 1984) following the procedures in section 2.3 of this Appendix, to obtain the final concentration of the salts listed in Table 1 of this Appendix, except for the sodium bicarbonate ($NaHCO_3$) which is prepared separately. Autoclave the artificial seawater. Filter sterilize the concentrated solution of sodium bicarbonate through a 0.45 µm membrane filter and add to the autoclaved and cooled artificial seawater GP2 to obtain the final concentration listed in Table 1 of this Appendix.

5.3.2 *Seawater for the positive control flasks.* Prepare sodium triphosphate (a.k.a., sodium tripolyphosphate) ($Na_5P_3O_{10}$), potassium nitrate (KNO_3), and ferric chloride hexahydrate ($FeCl_3 \cdot 6H_2O$) as a concentrated solution. Filter sterilize through a 0.45 µm membrane filter and add to autoclaved artificial seawater to obtain the final nutrient concentrations listed in Table 10 of this Appendix. Calibrate the pH meter at room temperature (approximately 20–23 °C) using commercial buffers of pH 4.0, 7.0, and 10.0, as appropriate, prior to use. Adjust the pH of the artificial seawater with concentrated hydrochloric acid (HCl) or 10 normality sodium hydroxide (10 N NaOH), as appropriate.

TABLE 10—ARTIFICIAL SEAWATER NUTRIENT CONCENTRATIONS

Constituent	Final concentration, g/L
* $FeCl_3 \cdot 6H_2O$	0.050
KNO_3	2.890
* $Na_5P_3O_{10}$	0.297

* Added aseptically after the GP2 has been autoclaved to limit phosphorus and iron precipitation.

5.3.3 Seawater for bioremediation agents that do not include nutrients. If a bioremediation agent contains living microorganisms but not nutrients (or limiting concentrations of nutrients), then nutrients may be added by the manufacturer. However, the total concentration of the nutrients added to the bioremediation agent must not exceed the final concentrations listed in Table 11 of this Appendix.

TABLE 11—ARTIFICIAL SEAWATER NUTRIENT CONCENTRATIONS FOR BIOREMEDIATION AGENTS HAVING NO NUTRIENTS INCLUDED

Constituent	Final concentration, g/L
as Iron (Fe)	0.010
as Nitrogen (N)	0.400
as Phosphorus (P)	0.075

If nutrients are supplied by the product manufacturer, the specific composition and concentration used in the efficacy testing must be submitted.

5.3.4 *Freshwater Preparation.* The artificial freshwater, which is a modification of Bushnell-Haas medium (Haines *et al.*, 2005), is prepared following the concentrations listed in Table 12 of this Appendix and then autoclaved. The pH is adjusted to 7.4 before autoclaving. Constituents removed from the original formulation are KNO_3, K_2HPO4 and KH_2PO_4.

TABLE 12—CONSTITUENT CONCENTRATIONS FOR ARTIFICIAL FRESHWATER

[Bushnell-Haas]

Constituent	Final concentration (mg/L)
$MgSO_4 \cdot 7H_2O$	200
$CaCl_2 \cdot 2H_2O$	20
$FeCl_3 \cdot 6H_2O$	50
$MnSO_4 \times H_2O$	0.0302
H_3BO_3	0.0572
$ZnSO_4 \times 7H_2O$	0.0428
$(NH_4)_6Mo_7O_2$	0.0347

5.3.5 *Freshwater for the positive control.* To prepare the freshwater for the positive controls, prepare the nutrients potassium phosphate monobasic (KH2PO4), potassium phosphate dibasic (K2HPO4) and potassium nitrate (KNO3) as a concentrated solution. Filter sterilize and add to autoclaved artificial freshwater to obtain the final concentrations given in Table 13 of this Appendix. Calibrate the pH meter at room temperature (approximately 20–23 °C) using commercial buffers of pH 4.0, 7.0, and 10.0, as appropriate, prior to use. Adjust the pH of the artificial freshwater to 7.4 with 1 N HCl or 1 N NaOH, as appropriate.

TABLE 13—FRESHWATER NUTRIENT CONCENTRATIONS

Constituent	Final concentration (g/L) [1]
KNO_3	2.89
KH_2PO_4	1.00
K_2HPO_4	1.00

[1] Adjust pH to 7.4 prior to autoclaving.

5.3.6 *Freshwater for bioremediation agents that contain living microorganisms but not nutrients or limiting concentrations of nutrients.* If a bioremediation agent does not include nutrients, then nutrients may be added. However, the total concentration of the nutrients added to the bioremediation agent must not exceed the final concentrations provided in Table 14 of this Appendix.

TABLE 14—ARTIFICIAL FRESHWATER NUTRIENT CONCENTRATIONS FOR BIOREMEDIATION AGENTS HAVING NO NUTRIENTS INCLUDED

Constituent	Final concentration, g/L [1]
as Iron (Fe)	not added since iron is already in the freshwater solution.
as Nitrogen (N)	0.400.
as Phosphorus (P)	0.400.

[1] Adjust to pH 7.4 prior to autoclaving.

If nutrients are supplied by the product vendor, the specific composition and concentration used in the efficacy testing must be submitted.

5.3.7 *Oil Preparation.* The test oil, weathered ANS521 crude oil, can be obtained from EPA at no charge (except for a minimal shipping fee). See *https://www.epa.gov/emergency-response/national-contingency-plan-subpart-j#howto* for more information.

5.3.8 *Sodium azide sterilant.* Prepare a stock solution of NaN_3 for addition to the negative killed control. The final concentration in the killed controls will be 0.5 g/L.

5.4 *Experimental Setup and Procedure*

5.4.1 Autoclave clean borosilicate glass Erlenmeyer flasks (250 mL) for 20 minutes at 121 °C at 15 psig.

5.4.2 Label flasks with the appropriate code (negative control, positive control, or product; day to be sampled (0 or 28); letter indicating replicate number) to reflect the following treatment design in Table 15 of this Appendix:

TABLE 15—BIOREMEDIATION EFFICACY TEST—SUMMARY OF EXPERIMENTAL SETUP

Treatment	Number of replicates at sampling times		Analysis
	Day 0	Day 28	
Negative (killed) Control (oil + exposure water + product + EPA consortium + NaN_3 sterilant)	0	3	GC/MS
* Positive control (oil + exposure water + nutrients + EPA consortium)	6	6	GC/MS
Test Type 1: Product containing living microorganisms (oil + exposure water + living product + supplemented nutrients (if necessary))	6	6	GC/MS
Test Type 2: Product containing proprietary nutrients but no live microorganisms (oil + exposure water + product + EPA consortium)	6	6	GC/MS
Test Type 3: Product (such as an enzyme) containing no live microorganisms and no nutrients (oil + exposure water + product)	6	6	GC/MS

* The laboratory must report positive control test results conducted within the year of any test results for bioremediation products, for one or both types of water as applicable.

5.4.3 Aseptically dispense 100 mL of presterilized artificial exposure water (seawater or freshwater) into each sterile flask. For the positive control flasks, use exposure water containing nutrients.

5.4.4 Tare the labeled flasks containing exposure water and other additions, as necessary, on the balance with a minimum accuracy of 0.01 g. Add drop-wise 0.50 g oil (this results in a final oil concentration of 5 g/L) using a sterile Pasteur pipette to the center of the flask taking care to avoid splashing the oil onto the sides of the flasks. Record the precise weight. ANS521 may be previously warmed in a hot water bath at 60 °C for 40–60 minutes to facilitate its flow. Take precautions when handling and charging the flasks to minimize the likelihood of contamination by exogenous microbes, including using a new sterile pipette for each series of flasks.

5.4.5 Preparation of the EPA consortium for both the positive control flasks and the flasks containing non-living bio-stimulation products. Use the supplied vials containing approximately 5 mL of the known EPA consortium frozen in glycerol. Thaw the supplied vials at room temperature (*do not allow cultures preserved in glycerol to sit at room temperature past thawing*), transfer the contents of the thawed vials to a single sterile centrifuge tube, rinse tubes with two volumes each of sterile exposure water, centrifuge at between 6,000- and 7,000-times gravity (6,000–7,000 × *g*) for 15 minutes using a fixed rotor to fully pellet the cells. Carefully resuspend the cell pellet in sterile exposure water using the appropriate volume to achieve the desired seeding density, which will be provided by EPA upon shipment of the consortium.

5.4.6 Positive control flasks contain exposure water, oil, nutrients, and the EPA consortium.

5.4.7 Negative killed control flasks for all products shall contain exposure water, oil, product, the EPA consortium for products not containing a living culture, and the sodium azide sterilant at a final concentration of 0.5 g/L. Add the sodium azide sterilant prior to adding any product or EPA consortium. For the negative killed control flasks and product flasks, prepare and add the product to the flasks in a concentration specified by the manufacturer or vendor.

5.4.8 For non-living products that contain nutrient only, use the EPA consortium as the inoculum.

5.4.9 For other non-living products (*e.g.*, enzymes), do not add nutrients or the EPA consortium as the inoculum as they are not needed.

5.4.10 For products containing living microorganisms, prepare 6 flasks the same way as in Steps a–d, but without the EPA consortium. A product that contains its own nutrients must not be amended with nutrients, unless the product contains insufficient nutrients. Since this is a closed flask test, nutrients could be limiting if they are at the same concentration as used in the field. This could cause the product to fail the test. Thus, the manufacturer has the option to supplement its product with a higher concentration of nutrients than that contained in the product. Any nutrient supplements to a product must be reported and must not exceed the concentration limits in Table 10 (for seawater) and 13 (for freshwater) of this Appendix, as applicable.

5.4.11 Cap all flasks either with sterile cotton stoppers or loosely applied aluminum foil to allow gas exchange with the atmosphere. Set aside the T = 0 flasks for immediate extraction and analysis. Place the rest of the flasks onto the orbital shaker table. Do not tip the flasks excessively to avoid stranding oil above the mixing area of the flask. Set the orbital shaker to 200 rpm and shake the flasks for 28 days at 20–23 °C in the dark.

5.4.12 Submit all information on added microorganisms and nutrients for testing in the data report.

5.5 *Sampling and Chemical Analysis.*

5.5.1 *Summary.* At each sampling event (Days 0 and 28), product and control flasks are sacrificed for analysis of residual oil concentrations (SOP 4 of this Appendix). Record all physical observations for each flask (such as degree of emulsification, whether the oil has congealed into tar balls, wall growth, color, etc.) at each sampling. The analytical procedure is summarized in Table 16 of this Appendix. Dichloromethane (DCM) is the solvent used for the initial extraction. Solvent-exchange the extract into hexane prior to injection into the gas chromatograph. The solvent exchange is done to prevent asphaltenes from contaminating the column.

TABLE 16—BIOREMEDIATION EFFICACY—SUMMARY OF ANALYTICAL PROCEDURES

Matrix	Measurement	Sampling/ measurement method	Analysis method	Sample container/quantity of sample	Preservation/ storage (°C)	Holding times (months)
DCM	N/A	Solvent Exchange to Hexane.	N/A	Capped Vial with Teflon septa, 30 mL.	4	6
Hexane	Hydrocarbon Concentration.	SOP 4	GC/MS	Capped Vial with Teflon septa, 10 mL.	4	6

5.5.2 *Hydrocarbon Extraction.* To measure extraction efficiency, 200 µL of the 400 mg/L surrogate recovery standard (compounds and concentrations described in SOP 1 in this Appendix) is added to each flask. Add 50 mL DCM to each flask. Transfer the contents to a 250 mL separatory funnel and shake for 2 minutes; allow the phases to separate for 2 minutes. If an emulsion remains after 2 minutes, centrifuge the emulsion in Teflon® centrifuge tubes for at least ten minutes in a low-speed centrifuge at 3,000 times gravity (3,000 × *g*) to break the emulsion and recover the DCM phase. Pass the DCM extract through a funnel plugged with glass wool and containing approximately 20 g anhydrous, granular sodium sulfate (Na_2SO_4) to remove water. Repeat the steps above two more times with 25 mL DCM each (100 mL DCM used in total). Add 10 mL DCM on to the sodium sulfate after the third extraction to rinse off any oil residue. Collect the extract in 125 mL serum vials, capped with Teflon lined septa and aluminum crimp seals, and store at 4 °C for up to 6 months.

5.5.3 *Solvent Exchange.* Perform a solvent exchange (DCM to hexane) prior to GC/MS analysis to prevent injection of asphaltenes into the GC/MS column. Transfer the DCM extract to concentration tubes. Place the tubes in a 29 °C water bath under a stream of dry nitrogen gas. Reduce the sample to 1 mL and transfer the extract to a 10 mL volumetric flask. Rinse the concentration tube with hexane and add it to the volumetric flask 2 times. Adjust the final volume with hexane to 10 mL.

5.5.4 *Hydrocarbon Analysis.* Quantify the concentrations of 25 alkanes, 32 aromatics and hopane (SOP 4, Table SOP 4.4 of this Appendix) using an Agilent 6890 GC/5973 MS or equivalent equipped with a 30-m × 0.25-mm ID × 0.25-µm film thickness DB–5 or equivalent fused silica column. To prepare the samples, transfer 1.0 mL of the hexane extract into a 2 mL autosampler vial with Teflon lined cap. Add 20 µL of internal standard solution to each vial with a syringe or positive displacement pipettor. SOP 2 of this Appendix outlines the procedure for preparing the internal standard solution. Load vials onto the autosampler tray and analyze in selected ion monitoring mode (SIM). Sum the individual alkane concentrations for the total alkane concentration and the individual aromatic concentrations for total aromatic concentrations in each flask.

5.6 *Quality Assurance/Quality Control (QA/QC).*

5.6.1 *Objectives.* The critical variables to be analyzed for each set of experimental conditions are the individual petroleum hydrocarbons, *i.e.*, the alkanes ranging in carbon number from nC–14 to nC–35, plus pristane and phytane, and the 2- to 4-ring polycyclic aromatic hydrocarbons (PAHs) and their alkylated homologs as listed in SOP 4 of this Appendix. The quality assurance objectives for precision, accuracy, and detection limits are ±20%, 75–125% recovery, and 22.5 µg/L on average for the 58 compounds, respectively. For more details, refer to the SOPs of this Appendix.

5.6.2 *Precision Objectives.* Precision is presented as relative percent difference (RPD) for duplicate measurements and as relative standard deviation (RSD, or coefficient of variance) for triplicate measurements, applicable to replication of treatments as separate samples.

5.6.3 *Accuracy Objectives.* These are based on the check standards and standard oil samples run concurrently with the sample analyses for GC/MS analysis of critical compounds. Critical compounds in the check standards and in the oil standards must fall within 75–125% of expected values for the analysis to be valid. Six surrogate compounds (SOP 1 of this Appendix) added to each sample before extraction can also serve as a surrogate for determining accuracy. The measured surrogate concentrations must fall within 75–125% of expected values.

5.6.4 *Calibration Range.* Conduct all measurements within the linear calibration range of the instrument. The calibrated concentration range for GC/MS analysis is 0.1 mg/L to 30 mg/L. If the measured concentration of any critical compound is above the calibration range, dilute the sample and re-analyze to quantify that particular compound within the linear calibration range.

5.6.5 *Quality Control.* Table 17 of this Appendix summarizes the QC checks for each measurement. See the corresponding SOP in this Appendix for detailed descriptions of QC checks, frequency, acceptance criteria, and corrective actions.

TABLE 17—QA/QC CHECKS

Sample matrix	Measurement	QA/QC check	Frequency	Acceptance criteria	Corrective action
DCM	GC/MS hydrocarbon analysis.	Blanks	Once per calibrated run.	Peak area of interfering peaks <10% of lowest standard peak area.	Flush with solvent, clean injection port, and/or bake column.

TABLE 17—QA/QC CHECKS—Continued

Sample matrix	Measurement	QA/QC check	Frequency	Acceptance criteria	Corrective action
DCM	GC/MS hydrocarbon analysis.	DFTPP Check Standard.	Once per calibrated run.	Must pass all DFTPP criteria.	If any criteria fail, retune and rerun DFTPP check standard.
DCM	GC/MS hydrocarbon analysis.	Initial Calibration Samples.	Once per calibrated run.	Response Factor RSD ≤25% or R2 >0.99.	If RSD for any one compound >25%, recalibrate.
DCM	GC/MS hydrocarbon analysis.	Calibration Check Standards.	Every 10–15 samples.	±25% of expected values.	If >5 compounds are out of range, recalibrate and rerun samples.
Hexane	GC/MS hydrocarbon analysis.	Surrogates	Every Sample.	±30% of expected values.	Re-inject.
Hexane	GC/MS hydrocarbon analysis.	Biomarker Concentration.	Every Sample.	±25% of average values.	Re-inject.

5.7 *Pass/Fail Criteria.*

5.7.1 Calculate the mean and standard deviation of the hopane-normalized total aromatics (sum of all resolved aromatics) and hopane-normalized total alkane concentrations (sum of all resolved alkanes) from the 6 independent replicates at days 0 and 28. To normalize, divide the sum of the alkane analytes and the sum of the aromatic analytes in each replicate by the hopane concentration in the corresponding replicate.

5.7.2 From those data, calculate the 95% Upper Confidence Level (UCL95) at days 0 and 28 using the following formula (Equation 11 of this Appendix):

$$UCL_{95} = \bar{x}_{t(0and28)} + \left(\frac{t_{95,5df} \times \sigma}{\sqrt{n}}\right) \qquad \text{(Equation 11)}$$

where:

$\bar{x}_{t(0and28)}$ = total hopane-normalized alkane or total hopane-normalized aromatic mean of 6 replicates at days 0 and 28,

$t_{95,\ 5\ df}$ = the 95% one-tailed t-value with 5 degrees of freedom (2.015),

s = the standard deviation of the 6 replicates at day 0 and 28, and

n = no. of replicates = 6.

5.7.3 Using Equation 12 of this Appendix, calculate the % reduction of each oil fraction from day 0 to day 28, using the day 0 and 28 UCL_{95} hopane-normalized values for each fraction:

$$\%\,reduction = 100 \times \left[1 - \left(\frac{t_{28(UCL95)}}{t_{0(UCL95)}}\right)\right] \qquad \text{(Equation 12)}$$

where:

$t_{28(UCL95)}$ = UCL_{95} of the hopane-normalized total alkane or total aromatic mean of 6 replicates on day 28, and

$t_{0(UCL95)}$ = UCL_{95} of the hopane-normalized total alkane or total aromatic mean of 6 replicates on day 0.

5.7.4 A product is successful in saltwater or freshwater if the % reduction of total alkanes (aliphatic fraction) from the GC/MS analysis is greater than or equal to 85% and the % reduction of total aromatics (aromatic fraction) is greater than or equal to 35% at day 28 based on the UCL_{95} (Equation 12 of this Appendix). The benchmark reduction ranges in aliphatic and aromatic fractions for the positive control are the same as for the products specified above. The average concentration of the biomarker hopane at day 28 must not differ from the average concentration at day 0 by more than 12% in the positive control. If the conditions for the positive control are not met, the entire procedure must be repeated.

5.8 *Data Verification and Reporting*. GC/MS data files are generated by MS ChemStation software (the Agilent standard software for GC/MS) or equivalent for each injection. Data files contain summed ion chromatograms and selected ion chromatograms. Calibration curves are generated within MS ChemStation software, and all data files are calculated against the calibration curve by MS ChemStation. Data verification would be done by crosschecking between analysts for 10% of the raw data and its reduction process.

5.9 *Laboratory Report*. The summary of findings from a product test must include the data listings for each analyte that was analyzed (*i.e.*, all individual alkanes and aromatics in the list of required analytes), along with QA/QC checks (see Table 17) and instrument detection/reporting limits for each analyte. Express all concentrations as mg analyte/L exposure water.

5.10 *Standard Operating Procedures (SOPs) 1–4*

5.10.1 *SOP 1. Preparation of Surrogate Recovery Standards*

5.10.1.1 *Preparation:*

5.10.1.1.1 *Solvents:* Dichloromethane (DCM), Optima grade or equivalent.

5.10.1.1.2 *Reagents:*

D36-Heptadecane (C17)
D50-Tetracosane (C24)
D66-Dotriacontane (C32)
D10-1-Methylnaphthalene
D10-Phenanthrene
D10-Pyrene
5-beta-cholestane (coprostane)

Note: Deuterated reagents are available from Cambridge Isotope Laboratories, Andover, MA.

5.10.1.1.3 *Equipment:*

Micro-spatula
Small beakers
Glass funnel
Analytical balance (0.0001g)
Vials with Teflon-lined caps
Teflon wash bottle with Optima grade DCM
Volumetric flask (250 mL), class A
Pasteur pipettes

5.10.1.2 *Procedure:*

5.10.1.2.1 Using a calibrated analytical balance, weigh 100 mg (0.100 g) of each reagent into separate 10–25 mL beakers.

5.10.1.2.2 Dissolve the reagents in their beakers by adding 10 mL DCM. Use a Pasteur pipette to transfer the solutions to a single 250 mL volumetric flask.

5.10.1.2.3 Wash the beakers 3 or 4 times with DCM. Use a Pasteur pipette to transfer each of the washings to the 250 mL volumetric flask.

5.10.1.2.4 Dilute the solution to the 250 mL volume mark on the volumetric flask with DCM.

5.10.1.2.5 Use a glass stopper to seal the flask and homogenize the solution by inverting the flask 5 or more times. The final concentration of this solution is 400 mg/L for each of the reagents.

5.10.1.2.6 Transfer the solution into 40 mL storage vials and cap with Teflon-lined caps and label each with the date of preparation, operator, sample names, and concentrations.

5.10.1.2.7 Weigh each vial and record its weight on the label. This weight is used to monitor possible evaporation during storage.

5.10.1.2.8 Store these vials at 0 °C or lower.

5.10.1.2.9 Before using, allow the solution to come to room temperature, and then shake it well.

5.10.1.2.10 Weigh the vial before using it and compare the weight with the last weight recorded on the vial.

5.10.1.2.11 If the weights are consistent, the integrity of the solution can be assumed. If not, investigate and resolve the cause. Prepare a new solution if the integrity has been compromised.

5.10.1.3 *Quality Control:* Inject 20 μL of the surrogate stock solution into 1 mL DCM. Add 20 μL of the internal standard solution (SOP 2 of this Appendix). Analyze this solution by GC/MS using a calibrated method (SOPs 3 and 4 of this Appendix). The expected concentration of each of the corresponding surrogate compounds is 8 ± 2 mg/L. If the measured value does not fall within this range, prepare and measure another independent surrogate solution. If the measured concentration of the second surrogate solution is within the allowable tolerance range, the calibration and instrument conditions are acceptable; properly discard the first surrogate solution. If the concentration of the second surrogate solution is also out of range, then clean and recalibrate the instrument until the problem is resolved.

5.10.2 *SOP 2. Preparation of Internal Standard Solution*

5.10.2.1 *Preparation:*

5.10.2.1.1 *Solvents:* Dichloromethane (DCM), Optima grade or equivalent

5.10.2.1.2 *Reagents:*

D34 n-Hexadecane (C16)
D42 n-Eicosane (C20)
D62 n-Triacontane (C30)
D8-Naphthalene
D10-Anthracene
D12-Chrysene
5-alpha-Androstane

Note: Deuterated reagents are available from Cambridge Isotope Laboratories, Andover, MA.

5.10.2.1.3 *Equipment:*

Micro-spatula
Small beakers
Glass funnel
Analytical balance (0.0001g), calibrated and checked for accuracy
Amber vials with Teflon-lined caps, labeled
Teflon wash bottle with DCM
Volumetric flask (200 mL), class A
Pasteur pipettes

5.10.2.2 *Procedure:*

5.10.2.2.1 Using a calibrated analytical balance, weigh 100 mg (0.100 g) of each of the reagents into separate small beakers.

5.10.2.2.2 Dissolve the reagents in their beakers by adding 10 mL DCM; using a Pasteur pipette, transfer the solutions to a single 200 mL volumetric flask.

5.10.2.2.3 Wash the beakers 3 or 4 times with DCM; use a Pasteur pipette to transfer each of the washings to the 200 mL volume mark on the volumetric flask.

5.10.2.2.4 Dilute the solution with DCM to the 200 mL volume.

5.10.2.2.5 Seal the flask with a glass stopper and homogenize the solution by inverting the flask a minimum of 5 times. The final concentration of this solution is 500 mg/L of each reagent.

5.10.2.2.6 Transfer the solution into 40 mL storage vials and cap with Teflon-lined caps. Label each vial with the date of preparation, operator, sample names, and concentrations.

5.10.2.2.7 Weigh each vial, and record its weight on the label. This weight is used to monitor possible evaporation during storage.

5.10.2.2.8 Store this solution at 0 °C or lower.

5.10.2.2.9 Before using, allow the solution to come to room temperature, and then shake it well.

5.10.2.2.10 Weigh the vial before using it, and compare the weight with the last weight recorded on the vial.

5.10.2.2.11 If the weights are consistent, the integrity of the solution can be assumed. If not, investigate and resolve the cause. Prepare a new solution if the integrity has been compromised.

5.10.2.3 *Quality Control:* Inject 20 µL of the internal standard solution into 1 mL DCM. Analyze this solution by GC/MS. The only peaks corresponding to the internal standards must appear. If other peaks appear, particularly close to the internal standard peaks, discard the internal standard solution and prepare a new solution.

5.10.3 *SOP 3. Preparation of Working Standards, Check Standards, and Oil Standards for GC/MS Consistency*.

5.10.3.1 *Preparation:*

5.10.3.1.1 *Solvent:* Dichloromethane (DCM), Optima grade or equivalent

5.10.3.1.2 *Stock solutions:*

5.10.3.1.2.1 *Oil analysis standard:* 44 compounds, 100 mg/L in hexane/DCM (9:1), four, 1-mL vials required. Available from Absolute Standards, Inc., Hamden, CT, Part #90311.

5.10.3.1.2.2 *Nine compound PAH standard:* 1,000 mg/L in DCM, one vial. Available from Absolute Standards, Inc., Hamden, CT, Part #90822.

5.10.3.1.2.3 1,2-Benzodiphenylene sulfide, (synonym for naphthobenzothiophene). Prepare a 2 mg/mL stock solution. Available from Sigma-Aldrich Co., Part # 255122, purity 99%.

5.10.3.1.2.4 Hopane solution (17 α (H), 21β (H), 0.1 mg/mL in isooctane. Available from Sigma-Aldrich Co. Part #90656.

5.10.3.1.2.5 *Surrogate solution:* 400 mg/L of each reagent in DCM (see SOP 1 of this Appendix).

5.10.3.1.2.6 Internal standard solution, 500 mg/L in DCM (see SOP 2 of this Appendix).

5.10.3.1.3 Alaska North Slope Crude Oil 521 (ANS521).

5.10.3.1.4 *Equipment:*

5.10.3.1.4.1 Glass storage vials with Teflon-lined caps (2 mL and 40 mL capacity);

5.10.3.1.4.2 Volumetric flasks, Class A, 5 mL, 10 mL, and 100 mL

5.10.3.1.4.3 Glass syringes capable of dispensing 25–500 µL with an accuracy and precision of ± 1%, or equivalent

5.10.3.1.4.4 Wheaton repetitive dispenser, Model 411 STEP–PETTE or equivalent

5.10.3.1.4.5 Teflon wash bottle filled with Optima grade DCM or equivalent grade DCM

5.10.3.1.4.6 Pasteur pipettes

The volumes of stock solutions required to make the working standards are listed in Table SOP 3.1 of this Appendix.

TABLE SOP 3.1—AMOUNT OF STOCK SOLUTIONS REQUIRED TO MAKE THE WORKING STANDARDS

Stock standards	A	B	C	D	E		F
Working standards concentration, mg/L	Oil analysis mix (44 compounds, 100 mg/L) µL	Aromatics mix (9 compounds, 1,000 mg/L) µL	1,2-Benzo-diphenylene sulfide (NBT) (2 mg/mL) µL	Surrogate solution (100 mg/L) µL	Hopane solution (100 mg/L) µL	Volumetric flask volume mL	ISTD (500 mg/L) µL
STD 30 (no hopane)	1,500	150	75	375	0	5	100
STD 20 (5 mg/L hopane)	1,000	100	50	250	250	5	100
STD 10 (2.5 mg/L hopane)	500	50	25	125	125	5	100
STD 5* (1 mg/L hopane)	500	50	25	125	100	10	200
STD 5-Utility (1 mg/L hopane)	500	50	25	125	100	10 (used for preparation of STD 2.5 & STD 1).	0
STD 2.5 (0.5 mg/L hopane)	Use 5 mL of STD 5-Utility and dilute to 10 mL.						200
STD 1 (0.2 mg/L hopane)	Use 2 mL of STD 5-Utility and dilute to 10 mL.						200
STD 0.1 (0.2 mg/L hopane)	Use 0.2 mL of STD 5-Utility and dilute to 10 mL.						200

* Make extra STD 5 for use as check standard.

5.10.3.2 *Procedure for Working Standards and Check Standards:*

5.10.3.2.1 Label three 5 mL volumetric flasks as STD30, STD20, STD10, and two 10 mL volumetric flasks as STD5, and STD5-utility.

5.10.3.2.2 Add 1–2 mL of DCM to each volumetric flask.

5.10.3.2.3 Using glass syringes, add the appropriate volume of stock solution A (as listed in Table SOP 3.1 of this Appendix) to the flasks labeled STD30, STD20, STD10, STD5, and STD5-utility.

5.10.3.2.4 Wash the walls of the inner neck of the flasks with several drops of DCM to rinse off the residue of the stock solution into the flasks.

5.10.3.2.5 Repeat Step 3 and Step 4 to dispense stock solutions B–E (do not add stock solution F, internal standard solution, at this step).

5.10.3.2.6 Dilute to volume with DCM for all the above flasks, seal with glass stoppers, and invert several times to homogenize the solutions.

5.10.3.2.7 Label three additional 10 mL volumetric flasks as STD2.5, STD1, and STD0.1. Wet with 1–2 mL DCM.

5.10.3.2.8 Dispense 5 mL of STD5-utility solution into flask STD2.5, 2 mL of STD5-utility solution into flask STD1, and 0.2 mL of STD5-utility solution into flask STD0.1.

5.10.3.2.9 Dilute to volume with DCM, seal with glass stoppers, and invert several times to homogenize the solutions.

5.10.3.2.10 Using a 100 µL glass syringe, dispense 100 µL of internal standard solution into flasks STD30, STD20, and STD10. Dispense 200 µL into flasks STD5, STD2.5, STD1, and STD0.1 to give a final concentration of 10 mg/L internal standard.

5.10.3.2.11 Seal with glass stoppers, and invert the flasks several times to homogenize the solutions.

5.10.3.2.12 Transfer the solutions into 2 mL storage vials, and cap with Teflon-lined caps.

5.10.3.1.13 Label each vial with date of preparation, analyst, sample names, and concentrations.

5.10.3.2.14 Weigh each storage vial and record its weight on the label. This weight is used to monitor possible evaporation during storage.

5.10.3.2.15 Store this solution at 0 °C or below.

5.10.3.2.16 Before using, allow the solution to come to room temperature, and shake it well.

5.10.3.2.17 Weigh the vial before opening, and compare the weight with the last weight recorded on the vial. If the weights are consistent, the integrity of the solution can be assumed. If not, investigate and resolve the cause. Do not use the solution if the integrity has been compromised.

5.10.3.3 *Procedure for Oil Standard.* In a 100 mL volumetric flask, weigh 0.500 g of the standard ANS521 crude oil, add 2 mL of surrogate solution (see SOP 1 of this Appendix), and bring to volume with DCM. Add 2 mL of internal standard solution (see SOP 2 of this Appendix). Follow steps 5.10.3.2.11 through 5.10.3.2.17 of this SOP, substituting 40 mL storage vials for the 2 mL vials.

5.10.3.4 *Quality Control/Quality Assurance:*

5.10.3.4.1 Run the seven standard solutions using the GC/MS method (SOP 4) on a tuned GC/MS. Use the EnviroQuant software or equivalent to calculate the average Relative Response Factor (RRF) and the relative standard deviation (RSD) of the RRFs for each analyte over the six concentrations. The RRF is defined as:

$$RRF = \frac{\text{area analyte}}{\text{area internal standard}} \text{ x } \frac{\text{concentration of internal standard}}{\text{concentration of analyte}} \qquad \text{(Equation 13)}$$

5.10.3.4.2 The RSD of the RRFs for all analytes must be 25% or less. Alternatively, the coefficients of determination (R2) for the calibration curve for each target compounds and surrogate should be over 0.99.

5.10.4 *SOP 4. GC/MS Method for the Analysis of Crude Oil Samples.*

5.10.4.1 *Instrument Specifications:*

5.10.4.1.1 Use an Agilent 6890 GC coupled with an Agilent 5973 mass selective detector (MSD) and an Agilent 6890 series auto sampler or equivalent, equipped with a DB–5 capillary column (30 m, 0.25 mm I.D., and 0.25 µm film thickness) or equivalent, and a split/splitless injection port operating in the splitless mode. Data acquisition occurs in the SIM (selected ion monitoring) mode for quantitative analysis. In SIM mode, the dwell time of each ion is set to be 10 milliseconds and the ions are split up into groups by retention time. One way to divide the ions is by retention time grouping as shown in Table SOP 4.1 of this Appendix. The number of ions in each ion group must be constant, yielding the same scan rate for each group.

TABLE SOP 4.1—IONS ASSOCIATED WITH RETENTION TIME GROUPS

Group	Ions
1	57, 66, 128, 136, 142, 152, 156, 166, 170, 184.
2	57, 66, 166, 170, 178, 180, 184, 188, 192, 194, 198, 208.
3	57, 66, 178, 184, 188, 192, 194, 198, 202, 206, 208, 212, 220, 226.
4	57, 66, 192, 198, 202, 206, 208, 212, 216, 220, 226, 230, 234, 245.
5	57, 66, 191, 217, 228, 240, 242, 248, 256, 262, 264, 270, 276, 284.

5.10.4.1.2 Table SOP 4.2 of this Appendix summarizes the instrumental conditions for crude oil analysis. Use only ultra-high purity helium (99.999% pure) as the carrier gas. In series, connect a moisture trap, an oxygen trap, and an organic trap to the carrier gas line before it enters the column.

TABLE SOP 4.2—INSTRUMENTAL CONDITIONS FOR CRUDE OIL ANALYSIS

Instrument	Agilent 6890 Series II Gas Chromatograph (GC) with an Agilent 5973MSD and an Agilent 6890 auto sampler, or equivalent.
Column	DB–5 capillary column (30 m, 0.25 mm I.D., and 0.25-mm film thickness) or equivalent.
Carrier Gas	Helium, ultra-high purity grade (99.999%).
Inlet Temperature	300 °C.
Transfer Line (detector) Temperature.	310 °C.
Oven Temperature Program	50 °C for 4 minutes, then 7 °C/min to 310 °C, hold for 18 minutes.
Flow Rate	Constant flow at 1mL/min. Linear velocity: 36.2 cm/sec.
Injection Volume	1 μL.
Split/Splitless Mode	Splitless.
Total Run Time	59.18 minutes.

5.10.4.2 *Procedure for preparing the instrument:*

5.10.4.2.1 Lower the injection port temperature and the oven temperature to 50 °C or less to avoid oxidation of the column.

5.10.4.2.2 Replace the liner with a clean, silanized liner. Do not touch the liner with bare fingers. A small piece of muffled glass wool may be inserted to protect the column.

5.10.4.2.3 Return the injection port and oven to the appropriate temperatures.

5.10.4.2.4 Wait five minutes after the temperature equilibrates before using the instrument.

5.10.4.3 *Procedure for tuning the MSD:*

5.10.4.3.1 Perform an air/water check. The value reported for the relative abundance of water (m/z 18), nitrogen (m/z 28), oxygen (m/z 32), or carbon dioxide (m/z 44) shall be less than 5% of the base peak for the system to be considered leak free and are expected to be closed to 1% for a stable system.

5.10.4.3.2 Tune the MSD using the Standard Autotune program and the decafluorotriphenylphosphine (DFTPP) Tune program to reduce instrument variability. The Autotune report file is referenced by the instrument when performing an air/water check and thus must be run at least once per month. Run standards and samples using DFTPP Tune parameters, and retune the instrument using DFTPP Tune at least once per week. The tune programs use three fragment ions of perfluorotributylamine (PFTBA) as a standard for tuning: m/z 69, 219, and 502. Tune reports must meet the following criteria:

5.10.4.3.2.1 Symmetrical peaks;

5.10.4.3.2.2 Mass assignments within ±0.2 amu's from 69, 219, and 502;

5.10.4.3.2.3 Peak widths within 0.5 ± 0.1 amu's;

5.10.4.3.2.4 Relative abundance is 100% for ion 69, at least 35% for ion 219, and at least 1% for ion 502;

5.10.4.3.2.5 Relative abundances for isotope masses 70, 220, and 503 ± 0.2 amu's are 0.5–1.5%, 2–8%, and 5–15%, respectively; and

5.10.4.3.2.6 Air and water peaks at m/z = 18, 28, 32, and 44 amu's must be very small and consistent with historical values.

5.10.4.4 *Maintaining a log book.* Maintain an instrument log book, and make entries for each use. Include the following information in the logbook: operator name, helium cylinder tank pressure and outlet pressure, vacuum gauge reading, any maintenance performed on the instrument (such as changing the injection port liner, gold seal, guard column, source cleaning), sequence name, data path, samples in order of injection, method information, GC column number, and the Standard Auto Tune report and DFTPP Tune report.

5.10.4.5 *Running a Solvent Blank:* Following a liner change or at the start of a new run, run an injection of a pure solvent to confirm that the system is free of excessive or interfering contamination. Analyze the solvent in SCAN mode using the same temperature program used for sample analysis. If contamination is present, analyze additional samples of fresh solvent until the interfering contamination is removed.

5.10.4.6 *Checking the DFTPP Tune:* Prior to running the first calibration standard, verify the instrument tune conditions by running a 10 ng/μL DFTPP check standard to check the mass measuring accuracy of the MS, the resolution sensitivity, the baseline threshold, and the ion abundance ranges. Run the standard using the DFTPP method provided with the instrument. Each of the criteria identified in Table SOP 4.2 of this Appendix must be met before using the instrument for analysis:

TABLE SOP 4.3—ION ABUNDANCE CRITERIA FOR DFTPP

Mass, M/z	Relative to mass	Relative abundance criteria	Purpose of checkpoint
51	442	10–80% of the base peak	Low mass sensitivity.
68	69	<2% of mass 69	Low mass resolution.
70	69	<2% of mass 69	Low mass resolution.
127	442	10–80% of the base peak	Low-mid mass sensitivity.
197	198	<2% of mass 198	Mid mass resolution.
198	442	Base peak or >50% of 442	Mid mass resolution and sensitivity.
199	198	5–9% of mass 198	Mid mass resolution and isotope ratio.
275	442	10–60% of the base peak	Mid-high mass sensitivity.
365	442	>1% of the base peak	Baseline threshold.
441	443	Present and < mass 443	High mass resolution.
442	442	Base peak or >50% of 198	High mass resolution and sensitivity.
443	442	15–24% of mass 442	High mass resolution and isotopic ratio.

5.10.4.7 Calibrating *with a Multiple-Point Calibration Curve.* A 5- or 6-point calibration curve is obtained by running 5 or 6 working standards (see SOP 3) on the tuned GC/MS instrument. Calculate the relative response factor (RRF) for each compound relative to its corresponding deuterated internal standard as indicated in Table SOP 4.3 of this Appendix. The relative standard deviation (RSD) of the RRFs for each compound must be less than 25%. Run an independently prepared check standard immediately after the calibration standards to validate the accuracy of the calibration curve.

5.10.4.8 *Running Samples.* Once the calibration curve has been validated, samples can be analyzed. Dispense 1,000 μL of sample extract into labeled auto-sampler vials. Add 20 μL of the internal standard solution (see SOP 2 of this Appendix) to the extract using a syringe or a positive displacement pipettor. Run a check standard every 10 samples to ensure the consistency of the instrument. The RRF for each compound in the check standard must be within 25% of the average RRF obtained in the initial calibration.

5.10.4.9 *Quantification:* Once a calibration table has been generated, quantify each data file using the ''Calculate and Generate'' function in the MS ChemStation software, or equivalent software. Review individual peak integration manually to ensure proper baseline integration. The quantification of a compound is based on the peak area of the primary ion (Q Ion) indicated in Table SOP 4.4 of this Appendix.

TABLE SOP 4.4—TARGET COMPOUND LIST

Compound name	Quantitation ion	Reference compound for response factor	Internal standard for quantitation
N D34 C16	66	N D34 C16	D34 n C16 Q Ion 66.
n-C14	57	n C14.	
n-C15	57	n C15.	
n-C16	57	n C16.	
N D34 C17	66	N D34 C17.	
n-C17	57	n C17.	
Pristane	57	Pristane.	
n-C18	57	n C18.	
Phytane	57	Phytane.	
n C19	57	n C19.	
N D42 C20	66	N D42 C20	D42 n C20 Q Ion 66.
n C20	57	n C20.	
n C21	57	n C21.	

TABLE SOP 4.4—TARGET COMPOUND LIST—Continued

Compound name	Quantitation ion	Reference compound for response factor	Internal standard for quantitation
n C22	57	n C22.	
n C23	57	n C23.	
N D50 C 24	66	N D50 C 24.	
n C24	57	n C24.	
n C25	57	n C25.	
n C26	57	n C26.	
n C27	57	n C27.	
n C28	57	n C28.	
n C29	57	n C29.	
N D62 C30	66	N D62 C30	D62 n C30Q Ion 66.
n C30	57	n C30.	
n C31	57	n C31.	
N D66 C32	57	N D66 C32.	
n C32	57	n C32.	
n C33	57	n C33.	
n C34	57	n C34.	
n C35	57	n C35.	
D8 Naphthalene	136	D8 Naphthalene	D8 Naphthalene Q Ion 136.
Naphthalene	128	Naphthalene.	
D10 1-Methylnaphthalene	152	D10 1-Methylnaphthalene.	
C1 Naphthalene*	142	C1 Naphthalene.	
C2 Naphthalene*	156	C2 Naphthalene.	
C3 Naphthalene*	170	C3 Naphthalene.	
C4 Naphthalene*	184	C3 Naphthalene.	
D10 Anthracene	188	D10 Anthracene	D10 Anthracene Q Ion 188.
D10 Phenanthrene	188	D10 Phenanthrene.	
Phenanthrene	178	Phenanthrene.	
C1 Phenanthrene*	192	C1 Phenanthrene.	
C2 Phenanthrene*	206	C2 Phenanthrene.	
C3 Phenanthrene*	220	C2 Phenanthrene.	
C4 Phenanthrene*	234	C2 Phenanthrene.	
Fluorene	166	Fluorene.	
C1 Fluorene*	180	Fluorene.	
C2 Fluorene*	194	Fluorene.	
C3 Fluorene*	208	Fluorene.	
Dibenzothiophene	184	Dibenzothiophene.	
C1 Dibenzothiophene*	198	Dibenzothiophene.	
C2 Dibenzothiophene*	212	Dibenzothiophene.	
C3 Dibenzothiophene*	226	Dibenzothiophene.	
Naphthobenzothiophene (NBT)	234	Naphthobenzothiophene.	
C1 NBT*	248	Naphthobenzothiophene.	
C2 NBT*	262	Naphthobenzothiophene.	
C3 NBT*	276	Naphthobenzothiophene.	
Fluoranthene	202	Fluoranthene.	
D10 Pyrene	212	D10 Pyrene.	
Pyrene	202	Pyrene.	
C1 Pyrene*	216	Pyrene.	
C2 Pyrene*	230	Pyrene.	
D12 Chrysene	240	D12 Chrysene	D12 Chrysene Q Ion 240.
Benzo(a)anthracene/Chrysene*	228	Chrysene.	
C1 Chrysene*	242	Chrysene.	
C2 Chrysene*	256	Chrysene.	
C3 Chrysene*	270	Chrysene.	
C4 Chrysene*	284	Chrysene.	
5α-androstane	245	5α-androstane	5α-androstane Q Ion 245.
Coprostane	219	Coprostane.	
Hopane	191	Hopane.	

* Summed compounds; draw an integration line underneath all peaks with selected ion.

5.10.4.10 Equation 14 of this Appendix is used to calculate the concentration of analytes in units of μg/g oil added:

$$Concentration\ of\ analyte\ (\mu g/g\ oil) = \frac{100 \times A_{analyte} \times C_{istd}}{A_{istd} \times RRF} \qquad \text{(Equation 14)}$$

where:

$A_{analyte}$ = the peak area of the analyte,
C_{istd} = the concentration of the internal standard,
A_{istd} = the area of the internal standard,
RRF = the relative response factor, and
100 is the conversion factor to convert mg/L DCM to µg/g oil added.

5.10.4.11 If some analytes are not commercially available, the RRFs of other compounds (usually the parent compound) are used to quantify those analytes. For example, the RRF of C3-naphthalene may be used to calculate the concentrations of C3- and C4-naphthalenes. See Table SOP 4.4 of this Appendix for details. The quantification of these alkylated PAHs is relative because it is assumed that the molecular ions of the alkylated PAHs have the same RRFs as the parent compound ions. Nevertheless, these relative concentrations are useful for monitoring the fate of these compounds during the course of any analysis, as long as their concentrations are measured in a consistent way throughout the analysis.

5.10.4.12 Concentration calculations for all target compounds are performed using EnviroQuant software or equivalent. Data for each sample can be printed directly using a customized report template. Data can also be automatically entered into a spreadsheet within the EnviroQuant software.

5.10.5 *Quality Assurance/Quality Control.* The following criteria must be met before any samples are analyzed:

5.10.5.1 Air/water check to verify the system is leak free.

5.10.5.2 AutoTune and DFTPP Tune pass all criteria.

5.10.5.3 DFTPP check standard passes all criteria.

5.10.5.4 Solvent blank scan indicates the GC/MS system is free of interfering contamination.

5.10.5.5 Prepare and monitor a control chart of a standard oil analysis. Concentrations of the analytes in the control chart must be no more than 25% different from their historical averages.

5.10.5.6 Relative response factors for analytes in the check standards inserted between every 10 samples must be no more than 25 percent different from the average RRF of those same analytes in the calibration curve. Peak shapes must be symmetrical.

5.11 *References for Section 5*

(1) Haines, J.R., E.J. Kleiner, K.A. McClellan, K.M. Koran, E.L. Holder, D.W. King, and A.D. Venosa. 2005. ''Laboratory evaluation of oil spill bioremediation products in salt and freshwater systems.'' J. Ind. Microbiol. Biotech 32: 171–185.

At 88 FR 41834, June 28, 2023, appendix C to part 300 was corrected, effective, Dec. 11, 2023, on page 38339, Equation 1 should read as follows:

$$theoretical\ concentration, \frac{mg}{mL} = \frac{mass\ of\ oil,\ g * 1000\ mg/g}{total\ mass,\ g/\rho_{solution\ ,g/mL}} \qquad \text{(Equation 1)}$$

On page 38340, Equation 2 should read as follows:

$$\int_{340\lambda}^{400\lambda} f(x)dx \approx \frac{H}{2}\Sigma_{k=1}^{N}(f(x_{k+1})+f(x_k)) \qquad \text{(Equation 2)}$$

On the same page, Equation 3 should read as follows:

$$Area = \frac{(Abs_{340}+Abs_{350})*10}{2} + \frac{(Abs_{350}+Abs_{360})*10}{2} + \cdots \frac{(Abs_{390}+Abs_{400})*10}{2} \qquad \text{(Equation 3)}$$

On page 38341, Equation 4 should read as follows:

$$RF = \frac{Theoretical\ \ Concentration\ \ ,\frac{g}{mL}\,(Eq.1)}{area\ \ (Eq.3)} \qquad \text{(Equation 4)}$$

On the same page, Equation 5 should read as follows:

$$\%\ difference = \frac{|RF - \overline{RF}|}{\overline{RF}} * 100 \qquad \text{(Equation 5)}$$

On the same page, Equation 6 should read as follows:

$$Y(area\ under\ absorbance\ curve) = m(slope) * x(concentration\ of\ \ oil) \quad \text{(Equation 6)}$$

On the same page, Equation 7 should read as follows:

$$Total\ Oil\ Dispersed, mg = \frac{Area\ \ (Eq.2)}{Calibration\ \ Curve\ Slope} * V_{DCM} * \frac{V_{tw}}{V_{ew}} \qquad \text{(Equation 7)}$$

On the same page, Equation 8 should read as follows:

$$\%OD = \frac{Total\ \ Oil\ \ Dispersed}{\rho_{Oil} * V_{Oil}} * 100 \qquad \text{(Equation 8)}$$

On page 38342, Equation 9 and the first two words following it should read as follows:

$$\mathrm{DE}_{\mathrm{LCL95}} = \overline{\%\mathrm{OD}} - \left(\frac{\mathrm{t}_{(\mathrm{n}-1,1-\alpha)} * \mathrm{s}}{\sqrt{\mathrm{n}}}\right) \qquad \text{(Equation 9)}$$

where (%OD)

On the same page, Equation 10 should read as follows:

$$\%recovery = 100 * \frac{measured\ \ concentration\ \ \ of\ check\ standard}{theoretical\ concentration\ \ \ of\ check\ standard} \qquad \text{(Equation 10)}$$

APPENDIX D TO PART 300—APPROPRIATE ACTIONS AND METHODS OF REMEDYING RELEASES

(a) This appendix D to part 300 describes types of remedial actions generally appropriate for specific situations commonly found at remedial sites and lists methods for remedying releases that may be considered by the lead agency to accomplish a particular response action. This list shall not be considered inclusive of all possible methods of remedying releases and does not limit the lead agency from selecting any other actions deemed necessary in response to any situation.

(b) In response to contaminated soil, sediment, or waste, the following types of response actions shall generally be considered: removal, treatment, or containment of the soil, sediment, or waste to reduce or eliminate the potential for hazardous substances or pollutants or contaminants to contaminate other media (ground water, surface water, or air) and to reduce or eliminate the potential for such substances to be inhaled, absorbed, or ingested.

(1) Techniques for removing contaminated soil, sediment, or waste include the following:

(i) Excavation.

(ii) Hydraulic dredging.

(iii) Mechanical dredging.

(2) Techniques for treating contaminated soil, sediment, or waste include the following:

(i) Biological methods, including the following:

(A) Treatment via modified conventional wastewater treatment techniques.

(B) Anaerobic, aerated, and facultative lagoons.

(C) Supported growth biological reactors.

(D) Microbial biodegradation.

(ii) Chemical methods, including the following:

(A) Chlorination.

(B) Precipitation, flocculation, sedimentation.

(C) Neutralization.

(D) Equalization.

(E) Chemical oxidation.

(iii) Physical methods, including the following:

(A) Air stripping.

(B) Carbon absorption.

(C) Ion exchange.

(D) Reverse osmosis.

(E) Permeable bed treatment.

(F) Wet air oxidation.

(G) Solidification.

(H) Encapsulation.

(I) Soil washing or flushing.

(J) Incineration.

(c) In response to contaminated ground water, the following types of response actions will generally be considered: Elimination or containment of the contamination to prevent further contamination, treatment and/or removal of such ground water to reduce or eliminate the contamination, physical containment of such ground water to reduce or eliminate potential exposure to such contamination, and/or restrictions on use of the ground water to eliminate potential exposure to the contamination.

(1) Techniques that can be used to contain or restore contaminated ground water include the following:

(i) Impermeable barriers, including the following:

(A) Slurry walls.

(B) Grout curtains.

(C) Sheet pilings.

(ii) Permeable treatment beds.

(iii) Ground-water pumping, including the following:

(A) Water table adjustment.

(B) Plume containment.

(iv) Leachate control, including the following:

(A) Subsurface drains.

(B) Drainage ditches.

(C) Liners.

(2) Techniques suitable for the control of contamination of water and sewer lines include the following:

(i) Grouting.

(ii) Pipe relining and sleeving.

(iii) Sewer relocation.

(d)(1) In response to contaminated surface water, the following types of response actions shall generally be considered: Elimination or containment of the contamination to prevent further pollution, and/or treatment of the contaminated water to reduce or eliminate its hazard potential.

(2) Techniques that can be used to control or remediate surface water include the following:

(i) Surface seals.

(ii) Surface water diversions and collection systems, including the following:

(A) Dikes and berms.

(B) Ditches, diversions, waterways.

(C) Chutes and downpipes.

(D) Levees.

(E) Seepage basins and ditches.

(F) Sedimentation basins and ditches.

(G) Terraces and benches.

(iii) Grading.

(iv) Revegetation.

(e) In response to air emissions, the following techniques will be considered:

(1) Pipe vents.

(2) Trench vents.

(3) Gas barriers.

(4) Gas collection.

(5) Overpacking.

(6) Treatment for gaseous emissions, including the following:

(i) Vapor phase adsorption.

(ii) Thermal oxidation.

(f) Alternative water supplies can be provided in several ways, including the following:

(i) Individual treatment units.

(ii) Water distribution system.

(iii) New wells in a new location or deeper wells.

(iv) Cisterns.

(v) Bottled or treated water.

(vi) Upgraded treatment for existing distribution systems.

(g) Temporary or permanent relocation of residents, businesses, and community facilities may be provided where it is determined necessary to protect human health and the environment.

[55 FR 8865, Mar. 8, 1990]

APPENDIX E TO PART 300—OIL SPILL RESPONSE

Table of Contents

1.0 Introduction.

1.1 Background. The Oil Pollution Act of 1990 (OPA) amends the Federal Water Pollution Control Act (FWPCA), commonly referred to as the Clean Water Act (CWA), to require the revision of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). In revising the NCP, the need to separate the response requirements for oil discharges and release of hazardous substances, pollutants, and contaminants became evident.

1.2 Purpose/objective. This document compiles general oil discharge response requirements into one appendix to aid participants and responders under the national response system (NRS). This appendix provides the organizational structure and procedures to prepare for and respond to oil discharges. Nothing in this appendix alters the meaning or policy stated in other sections or subparts of the NCP.

1.3 Scope.

(a) This appendix applies to discharges of oil into or upon the navigable waters of the United States and adjoining shorelines, the waters of the contiguous zone, or waters of the exclusive economic zone, or which may affect the natural resources belonging to, appertaining to, or under the exclusive management authority of the United States.

(b) This appendix is designed to facilitate efficient, coordinated, and effective response to discharges of oil in accordance with the authorities of the CWA. It addresses:

(1) The national response organization that may be activated in response actions, the responsibilities among the federal, state, and local governments, and the resources that are available for response.

(2) The establishment of regional and area contingency plans.

(3) Procedures for undertaking removal actions pursuant to section 311 of the CWA.

(4) Listing of federal trustees for natural resources for purposes of the CWA.

(5) Procedures for the participation of other persons in response actions.

(6) Procedures for compiling and making available cost documentation for response actions.

(7) National procedures for the use of dispersants and other chemicals in removals under the CWA.

(c) In implementing the NCP provisions compiled in this appendix, consideration shall be given to international assistance plans and agreements, security regulations and responsibilities based on international agreements, federal statutes, and executive orders. Actions taken pursuant to the provisions of any applicable international joint contingency plans shall be consistent with the NCP to the greatest extent possible. The Department of State shall be consulted, as appropriate, prior to taking action that may affect its activities.

1.4 Abbreviations. This section of the appendix provides abbreviations relating to oil.

(a) Department and Agency Title Abbreviations:

ATSDR—Agency for Toxic Substances and Disease Registry
CDC—Centers for Disease Control
DOC—Department of Commerce
DOD—Department of Defense
DOE—Department of Energy
DOI—Department of Interior
DOJ—Department of Justice
DOL—Department of Labor
DOS—Department of State
DOT—Department of Transportation
EPA—Environmental Protection Agency
FEMA—Federal Emergency Management Agency
GSA—General Services Administration
HHS—Department of Health and Human Services
NIOSH—National Institute for Occupational Safety and Health
NOAA—National Oceanic and Atmospheric Administration
OSHA—Occupational Safety and Health Administration
RSPA—Research and Special Programs Administration
USCG—United States Coast Guard
USDA—United States Department of Agriculture

NOTE: Reference is made in the NCP to both the Nuclear Regulatory Commission and the National Response Center. In order to avoid confusion, the NCP will spell out Nuclear Regulatory Commission and use the abbreviation ''NRC'' only with respect to the National Response Center.

(b) Operational Abbreviations:

AC—Area Committee
ACP—Area Contingency Plan
DRAT—District Response Advisory Team
DRG—District Response Group
ERT—Environmental Response Team
ESF—Emergency Support Functions
FCO—Federal Coordinating Officer
FRERP—Federal Radiological Emergency Response Plan
FRP—Federal Response Plan
LEPC—Local Emergency Planning Committee
NCP—National Contingency Plan
NPFC—National Pollution Funds Center
NRC—National Response Center
NRS—National Response System
NRT—National Response Team
NSF—National Strike Force
NSFCC—National Strike Force Coordination Center
OSC—On-Scene Coordinator
OSLTF—Oil Spill Liability Trust Fund
POLREP—Pollution Report
PIAT—Public Information Assist Team
RCP—Regional Contingency Plan
RERT—Radiological Emergency Response Team
RRT—Regional Response Team
SERC—State Emergency Response Commission
SONS—Spill of National Significance
SSC—Scientific Support Coordinator
SUPSALV—United States Navy Supervisor of Salvage
USFWS—United States Fish and Wildlife Service

1.5 Definitions. Terms not defined in this section have the meaning given by CERCLA, the OPA, or the CWA. This appendix restates the NCP definitions relating to oil.

Activation means notification by telephone or other expeditious manner or, when required, the assembly of some or all appropriate members of the RRT or NRT.

Area Committee (AC) as provided for by CWA sections 311(a)(18) and (j)(4), means the entity appointed by the President consisting of members from qualified personnel of federal, state, and local agencies with responsibilities that include preparing an area contingency plan for an area designated by the President.

Area contingency plan (ACP) as defined by CWA sections 311(a)(19) and (j)(4) means the plan prepared by an Area Committee that is developed to be implemented in conjunction with the NCP and RCP, in part to address removal of a worst case discharge and to mitigate or prevent a substantial threat of such a discharge from a vessel, offshore facility, or onshore facility operating in or near an area designated by the President.

Bioremediation agents means microbiological cultures, enzyme additives, or nutrient additives that are deliberately introduced into an oil discharge and that will significantly increase the rate of biodegradation to mitigate the effects of the discharge.

Burning agents means those additives that, through physical or chemical means, improve the combustibility of the materials to which they are applied.

CERCLA is the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986.

Chemical agents means those elements, compounds, or mixtures that coagulate, disperse, dissolve, emulsify, foam, neutralize, precipitate, reduce, solubilize, oxidize, concentrate, congeal, entrap, fix, make the pollutant mass more rigid or viscous, or otherwise facilitate the mitigation of deleterious effects or the removal of the oil pollutant from the water. Chemical agents include biological additives, dispersants, sinking agents, miscellaneous oil spill control agents, and burning agents, but do not include solvents.

Claim in the case of a discharge under CWA means a request, made in writing for a sum certain, for compensation for damages or removal costs resulting from an incident.

Claimant as defined by section 1001 of the OPA means any person or government who presents a claim for compensation under Title I of the OPA.

Clean natural seawater means that the source of this seawater must not be heavily contaminated with industrial or other types of effluent.

Coastal waters for the purpose of classifying the size of discharges, means the waters of the coastal zone except for the Great Lakes and specified ports and harbors on inland rivers.

Coastal zone as defined for the purpose of the NCP, means all United States waters subject to the tide, United States waters of the Great Lakes, specified ports and harbors on inland rivers, waters of the contiguous zone, other waters of the high seas subject to the NCP, and the land surface or land substrata, ground waters, and ambient air proximal to those waters. The term coastal zone delineates an area of federal responsibility for response action. Precise boundaries are determined by EPA/USCG agreements and identified in federal regional contingency plans.

Coast Guard District Response Group (DRG) as provided for by CWA sections 311(a)(20) and (j)(3), means the entity established by the Secretary of the department in which the USCG is operating within each USCG district and shall consist of: the combined USCG personnel and equipment, including firefighting equipment, of each port within the district; additional prepositioned response equipment; and a district response advisory team.

Contiguous zone means the zone of the high seas, established by the United States under Article 24 of the Convention on the Territorial Sea and Contiguous Zone, which is contiguous to the territorial sea and which extends nine miles seaward from the outer limit of the territorial sea.

Damages as defined by section 1001 of the OPA means damages specified in section 1002(b) of the Act, and includes the cost of assessing these damages.

Discharge as defined by section 311(a)(2) of the CWA, includes, but is not limited to, any spilling, leaking, pumping, pouring, emitting, emptying, or dumping of oil, but excludes discharges in compliance with a permit under section 402 of the CWA, discharges resulting from circumstances identified and reviewed and made a part of the public record with respect to a permit issued or modified under section 402 of the CWA, and subject to a condition in such permit, or continuous or anticipated intermittent discharges from a point source, identified in a permit or permit application under section 402 of the CWA, that are caused by events occurring within the scope of relevant operating or treatment systems. For purposes of the NCP, discharge also means substantial threat of discharge.

Dispersants means those chemical agents that emulsify, disperse, or solubilize oil into the water column or promote the surface spreading of oil slicks to facilitate dispersal of the oil into the water column.

Exclusive economic zone as defined in OPA section 1001, means the zone established by Presidential Proclamation Numbered 5030, dated March 10, 1983, including the ocean waters of the areas referred to as ''eastern special areas'' in Article 3(1) of the Agreement between the United States of America and the Union of Soviet Socialist Republics on the Maritime Boundary, signed June 1, 1990.

Facility as defined by section 1001 of the OPA means any structure, group of structures, equipment, or device (other than a vessel) which is used for one or more of the following purposes: exploring for, drilling for, producing, storing, handling, transferring, processing, or transporting oil. This term includes any motor vehicle, rolling stock, or pipeline used for one or more of these purposes.

Federal Response Plan (FRP) means the agreement signed by 25 federal departments and agencies in April 1987 and developed under the authorities of the Earthquake Hazards Reduction Act of 1977 and the Disaster Relief Act of 1974, as amended by the Stafford Disaster Relief Act of 1988.

First federal official means the first federal representative of a participating agency of the National Response Team to arrive at the scene of a discharge or a release. This official coordinates activities under the NCP and may initiate, in consultation with the OSC, any necessary actions until the arrival of the predesignated OSC.

Indian tribe as defined in OPA section 1001, means any Indian tribe, band, nation, or other organized group or community, but not including any Alaska Native regional or village corporation, which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians and has governmental authority over lands belonging to or controlled by the Tribe.

Inland waters for the purposes of classifying the size of discharges, means those waters of the United States in the inland zone, waters of the Great Lakes, and specified ports and harbors on inland rivers.

Inland zone means the environment inland of the coastal zone excluding the Great Lakes, and specified ports and harbors on inland rivers. The term inland zone delineates an area of federal responsibility for response action. Precise boundaries are determined by EPA/USCG agreements and identified in federal regional contingency plans.

Lead administrative trustee means a natural resource trustee who is designated on an incident-by-incident basis for the purpose of preassessment and damage assessment and chosen by the other trustees whose natural resources are affected by the incident. The lead administrative trustee facilitates effective and efficient communication during response operations between the OSC and the other natural resource trustees conducting activities associated with damage assessment and is responsible for applying to the OSC for access to response operations resources on behalf of all trustees for initiation of damage assessment.

Lead agency means the agency that provides the OSC to plan and implement response actions under the NCP.

Miscellaneous oil spill control agent is any product, other than a dispersant, sinking agent, surface washing agent, surface collecting agent, bioremediation agent, burning agent, or sorbent that can be used to enhance oil spill cleanup, removal, treatment, or mitigation.

National Pollution Funds Center (NPFC) means the entity established by the Secretary of Transportation whose function is the administration of the Oil Spill Liability Trust Fund (OSLTF). Among the NPFC's duties are: providing appropriate access to the OSLTF for federal agencies and states for removal actions and for federal trustees to initiate the assessment of natural resource damages; providing appropriate access to the OSLTF for claims; and coordinating cost recovery efforts.

National Response System (NRS) is the mechanism for coordinating response actions by all levels of government in support of the OSC. The NRS is composed of the NRT, RRTs, OSC, Area Committees, and Special Teams and related support entities.

National Strike Force (NSF) is a special team established by the USCG, including the three USCG Strike Teams, the Public Information Assist Team (PIAT), and the National Strike Force Coordination Center. The NSF is available to assist OSCs in their preparedness and response duties.

National Strike Force Coordination Center (NSFCC), authorized as the National Response Unit by CWA section 311(a)(23) and (j)(2), means the entity established by the Secretary of the department in which the USCG is operating at Elizabeth City, North Carolina, with responsibilities that include administration of the USCG Strike Teams, maintenance of response equipment inventories and logistic networks, and conducting a national exercise program.

Natural resources means land, fish, wildlife, biota, air, water, groundwater, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States (including the resources of the exclusive economic zone defined by the Magnuson Fishery Conservation and Management Act of 1976), any state or local government, any foreign government, any Indian tribe, or, if such resources are subject to a trust restriction on alienation, any member of an Indian tribe.

Navigable waters means the waters of the United States, including the territorial seas, as defined in §120.2 of this chapter.

Offshore facility as defined by section 311(a)(11) of the CWA means any facility of any kind located in, on, or under any of the navigable waters of the United States, and any facility of any kind which is subject to the jurisdiction of the United States and is located in, on, or under any other waters, other than a vessel or a public vessel.

Oil as defined by section 311(a)(1) of the CWA means oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil. Oil, as defined by section 1001 of the OPA means oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil, but does not include petroleum, including crude oil or any fraction thereof, which is specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. 9601) and which is subject to the provisions of that Act.

Oil Spill Liability Trust Fund means the fund established under section 9509 of the Internal Revenue Code of 1986 (26 U.S.C. 9509).

On-scene coordinator (OSC) means the federal official predesignated by the EPA or the USCG to coordinate and direct response under subpart D.

Onshore facility as defined by section 311(a)(10) of the CWA, means any facility (including, but not limited to, motor vehicles and rolling stock) of any kind located in, on, or under any land within the United States other than submerged land.

On-site means the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of a response action.

Person as defined by section 1001 of the OPA, means an individual, corporation, partnership, association, state, municipality, commission, or political subdivision of a state, or any interstate body.

Public vessel as defined by section 311(a)(4) of the CWA, means a vessel owned or bareboat-chartered and operated by the United States, or by a state or political subdivision thereof, or by a foreign nation, except when such vessel is engaged in commerce.

Remove or removal as defined by section 311(a)(8) of the CWA, refers to containment and removal of oil or hazardous substances from the water and shorelines or the taking of such other actions as may be necessary to minimize or mitigate damage to the public health or welfare (including, but not limited to, fish, shellfish, wildlife, public and private property, and shorelines and beaches) or to the environment. For the purpose of the NCP, the term also includes monitoring of action to remove a discharge.

Removal costs as defined by section 1001 of the OPA means the costs of removal that are incurred after a discharge of oil has occurred, or in any case in which there is a substantial threat of a discharge of oil the costs to prevent, minimize, or mitigate oil pollution from such an incident.

Responsible party as defined by section 1001 of the OPA means the following:

(a) Vessels—In the case of a vessel, any person owning, operating, or demise chartering the vessel.

(b) Onshore Facilities—In the case of an onshore facility (other than a pipeline), any person owning or operating the facility, except a federal agency, state, municipality, commission, or political subdivision of a state, or any interstate body, that as the owner transfers possession and right to use the property to another person by lease, assignment, or permit.

(c) Offshore Facilities—In the case of an offshore facility (other than a pipeline or a deepwater port licensed under the Deepwater Port Act of 1974 (33 U.S.C. 1501 *et seq.*)), the lessee or permittee of the area in which the facility is located or the holder of a right of use and easement granted under applicable state law or the Outer Continental Shelf Lands Act (43 U.S.C. 1301–1356) for the area in which the facility is located (if the holder is a different person than the lessee or permittee), except a federal agency, state, municipality, commission, or political subdivision of a state, or any interstate body, that as owner transfers possession and right to use the property to another person by lease, assignment, or permit.

(d) Deepwater Ports—In the case of a deepwater port licensed under the Deepwater Port Act of 1974 (33 U.S.C. 1501–1524), the licensee.

(e) Pipelines—In the case of a pipeline, any person owning or operating the pipeline.

(f) Abandonment—In the case of an abandoned vessel, onshore facility, deepwater port, pipeline, or offshore facility, the person who would have been responsible parties immediately prior to the abandonment of the vessel or facility.

Sinking agents means those additives applied to oil discharges to sink floating pollutants below the water surface.

Size classes of discharges refers to the following size classes of oil discharges which are provided as guidance to the OSC and serve as the criteria for the actions delineated in subpart D. They are not meant to imply associated degrees of hazard to public health or welfare, nor are they a measure of environmental injury. Any oil discharge that poses a substantial threat to public health or welfare or the environment or results in significant public concern shall be classified as a major discharge regardless of the following quantitative measures:

(a) Minor discharge means a discharge in inland waters of less than 1,000 gallons of oil or a discharge to the coastal waters of less than 10,000 gallons of oil.

(b) Medium discharge means a discharge of 1,000 to 10,000 gallons of oil to the inland waters or a discharge of 10,000 to 100,000 gallons of oil to the coastal waters.

(c) Major discharge means a discharge of more than 10,000 gallons of oil to the inland waters or more than 100,000 gallons of oil to the coastal waters.

Sorbents means essentially inert and insoluble materials that are used to remove oil and hazardous substances from water through adsorption, in which the oil or hazardous substance is attracted to the sorbent surface and then adheres to it, absorption, in which the oil or hazardous substance penetrates the pores of the sorbent material, or a combination of the two. Sorbents are generally manufactured in particulate form for spreading over an oil slick or as sheets, rolls, pillows, or booms. The sorbent material may consist of, but is not limited to, the following materials:

(a) Organic products—

(1) Peat moss or straw;

(2) Cellulose fibers or cork;

(3) Corn cobs;

(4) Chicken or duck feathers.

(b) Mineral compounds—

(1) Volcanic ash or perlite;

(2) Vermiculite or zeolite.

(c) Synthetic products—

(1) Polypropylene;

(2) Polyethylene;

(3) Polyurethane;

(4) Polyester.

Specified ports and harbors means those ports and harbor areas on inland rivers, and land areas immediately adjacent to those waters, where the USCG acts as predesignated on-scene coordinator. Precise locations are determined by EPA/USCG regional agreements and identified in federal regional contingency plans and area contingency plans.

Spill of national significance (SONS) means a spill which due to its severity, size, location, actual or potential impact on the public health and welfare or the environment, or the necessary response effort, is so complex that it requires extraordinary coordination of federal, state, local, and responsible party resources to contain and cleanup the discharge.

State means the several states of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the U.S. Virgin Islands, the Commonwealth of the Northern Marianas, and any other territory or possession over which the United States has jurisdiction. For purposes of the NCP, the term includes Indian tribes as defined in the NCP except where specifically noted.

Surface collecting agents means those chemical agents that form a surface film to control the layer thickness of oil.

Surface washing agent is any product that removes oil from solid surfaces, such as beaches and rocks, through a detergency mechanism and does not involve dispersing or solubilizing the oil into the water column.

Tank vessel as defined by section 1001 of OPA means a vessel that is constructed or adapted to carry, or that carries, oil or hazardous material in bulk as cargo or cargo residue, and that: (1) is a vessel of the United States; (2) operates on the navigable waters; or (3) transfers oil or hazardous material in a place subject to the jurisdiction of the United States.

Threat of discharge, see definition for discharge.

Trustee means an official of a federal natural resources management agency designated in subpart G of the NCP or a designated state official or Indian tribe or, in the case of discharges covered by the OPA, a foreign government official, who may pursue claims for damages under section 1006 of the OPA.

United States when used in relation to section 311(a)(5) of the CWA, mean the states, the District of Columbia, the Commonwealth of Puerto Rico, the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Pacific Island Governments.

Vessel as defined by section 311(a)(3) of the CWA means every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water other than a public vessel.

Volunteer means any individual accepted to perform services by the lead agency which has authority to accept volunteer services (for examples, see 16 U.S.C. 742f(c)). A volunteer is subject to the provisions of the authorizing statute and the NCP.

Worst case discharge as defined by section 311(a)(24) of the CWA means, in the case of a vessel, a discharge in adverse weather conditions of its entire cargo, and in the case of an offshore facility or onshore facility, the largest foreseeable discharge in adverse weather conditions.

2.0 National response system.

2.1 Overview. The national response system (NRS) is the mechanism for coordinating response actions by all levels of government in support of the OSC. The NRS is composed of the National Response Team (NRT), Regional Response Teams (RRTs), On-scene coordinator (OSC), Area Committees, and Special Teams and related support entities. The NRS functions as an incident command system (ICS) under the direction of the OSC. Typical of an ICS, the NRS is capable of expanding or contracting to accommodate the response effort required by the size or complexity of the discharge.

2.2 Priorities. (a) Safety of human life must be given the highest priority during every response action. This includes any search and rescue efforts in the general proximity of the discharge and the insurance of safety of response personnel.

(b) Stabilizing the situation to preclude the event from worsening is the next priority. All efforts must be focused on saving a vessel that has been involved in a grounding, collision, fire or explosion, so that it does not compound the problem. Comparable measures should be taken to stabilize a situation involving a facility, pipeline, or other source of pollution. Stabilizing the situation includes securing the source of the spill and/or removing the remaining oil from the container (vessel, tank, or pipeline) to prevent additional oil spillage, to reduce the need for follow-up response action, and to minimize adverse impact to the environment.

(c) The response must use all necessary containment and removal tactics in a coordinated manner to ensure a timely, effective response that minimizes adverse impact to the environment.

(d) All parts of this national response strategy should be addressed concurrently, but safety and stabilization are the highest priorities. The OSC should not delay containment and removal decisions unnecessarily and should take actions to minimize adverse impact to the environment that begins as soon as a discharge occurs, as well as actions to minimize further adverse environmental impact from additional discharges.

(e) The priorities set forth in this section are broad in nature, and should not be interpreted to preclude the consideration of other priorities that may arise on a site-specific basis.

2.3 Responsibility. (a) The predesignated OSC has the responsibility to direct response actions and coordinate all other response efforts at the scene of an oil discharge or threatened discharge. The OSC monitors or directs all federal, state, local, and private removal actions, or arranges for the removal of an actual or threatened oil discharge, removing and if necessary, requesting authority to destroy a vessel. Additionally, the CWA requires the OSC to direct all federal, state, local, and private removal actions to any incident that poses a substantial threat to the public health or welfare.

(b) Cleanup responsibility for an oil discharge immediately falls on the responsible party, unless the discharge poses a substantial threat to public health or welfare. In a large percentage of oil discharges, the responsible party shall conduct the cleanup. If the responsible party does conduct the removal, the OSC shall ensure adequate surveillance over whatever actions are initiated.

(1) If effective actions are not being taken to eliminate the threat, or if removal is not being properly done, the OSC should, to the extent practicable under the circumstances, so advise the responsible party. If the responsible party does not respond properly, the OSC shall take appropriate response actions and should notify the responsible party of the potential liability for federal response costs incurred by the OSC pursuant to the OPA and CWA. Where practicable, continuing efforts should be made to encourage response by responsible parties.

(2) If the Administrator of EPA or the Secretary of the department in which the USCG is operating determines that there may be an imminent and substantial threat to the public health or welfare or the environment of the United States (including fish, shellfish, and wildlife, public and private property, shorelines, beaches, habitats, and other living and nonliving natural resources under the jurisdiction or control of the United States, because of an actual or threatened discharge of oil from any vessel or offshore or onshore facility into or upon the navigable waters of the United States), the Administrator or Secretary may request the U.S. Attorney General to secure the relief from any person, including the owner or operator of the vessel or facility necessary to abate a threat or, after notice to the affected state, take any other action authorized by section 311 of the CWA including administrative orders, that may be necessary to protect the public health or welfare.

(3) The responsible party is liable for costs of federal removal and damages in accordance with section 311(f) of the CWA, section 1002 of the OPA, and other federal laws.

(c) In those incidents where a discharge or threat of discharge poses a substantial threat to the public health or welfare of the United States, the OSC shall direct all federal, state, or private actions to remove the discharge or to mitigate or prevent the threat of such a discharge, as appropriate. The OSC shall also request immediate activation of the RRT.

(d) During responses to any discharge the OSC may request advice or support from the Special Teams and any local support units identified by the Area Committee. Examples include scientific advice from the Scientific Support Coordinator (SSC), technical guidance or prepositioned equipment from the District Response Group (DRG), or public information assistance from the National Strike Force (NSF).

(e) When an oil discharge exceeds the response capability of the region in which it occurs, transects regional boundaries, or involves a substantial threat to the public health or welfare, substantial amounts of property, or substantial threats to the natural resources, the NRT should be activated as an emergency response team. If appropriate the RRT Chairman may contact the NRT Chairman and request the NRT activation.

3.0 Components of national response system and responsibilities.

The NRS is the mechanism for coordinating response actions by all levels of government in support of the OSC. The NRS organization is divided into national, regional, and area levels. The national level comprises the NRT, the National Strike Force Coordination Center (NSFCC), and the National Response Center (NRC). The regional level is comprised of the RRT. The area level is made up of the OSC, Special Teams, and Area Committees. The basic framework for the response management structure is a system (e.g., a unified command system), that brings together the functions of the federal government, the state government, and the responsible party to achieve an effective and efficient response, where the OSC retains authority.

3.1 National.

3.1.1 National response team. (a) National planning and coordination is accomplished through the NRT. The NRT consists of representatives from the USCG, EPA, Federal Emergency Management Agency (FEMA), Department of Defense (DOD), Department of Energy (DOE), Department of Agriculture (DOA), Department of Commerce (DOC), Department of Health and Human Services (HHS), Department of the Interior (DOI), Department of Justice (DOJ), Department of Labor (DOL), Department of Transportation (DOT), Department of State (DOS), Nuclear Regulatory Commission, and General Services Administration (GSA). Each agency shall designate a member to the team and sufficient alternates to ensure representation, as agency resources permit. The NRT will consider requests for membership on the NRT from other agencies. Other agencies may request membership by forwarding such requests to the chair of the NRT (see Figure 1).

(b) The chair of the NRT shall be the representative of the EPA and the vice chair shall be the representative of the USCG, with the exception of periods of activation because of response action. During activation, the chair shall be the member agency providing the OSC. The vice chair shall maintain records of NRT activities along with national, regional, and area plans for response actions.

(c) While the NRT desires to achieve a consensus on all matters brought before it, certain matters may prove unresolvable by this means. In such cases, each agency serving as a participating agency on the NRT may be accorded one vote in NRT proceedings.

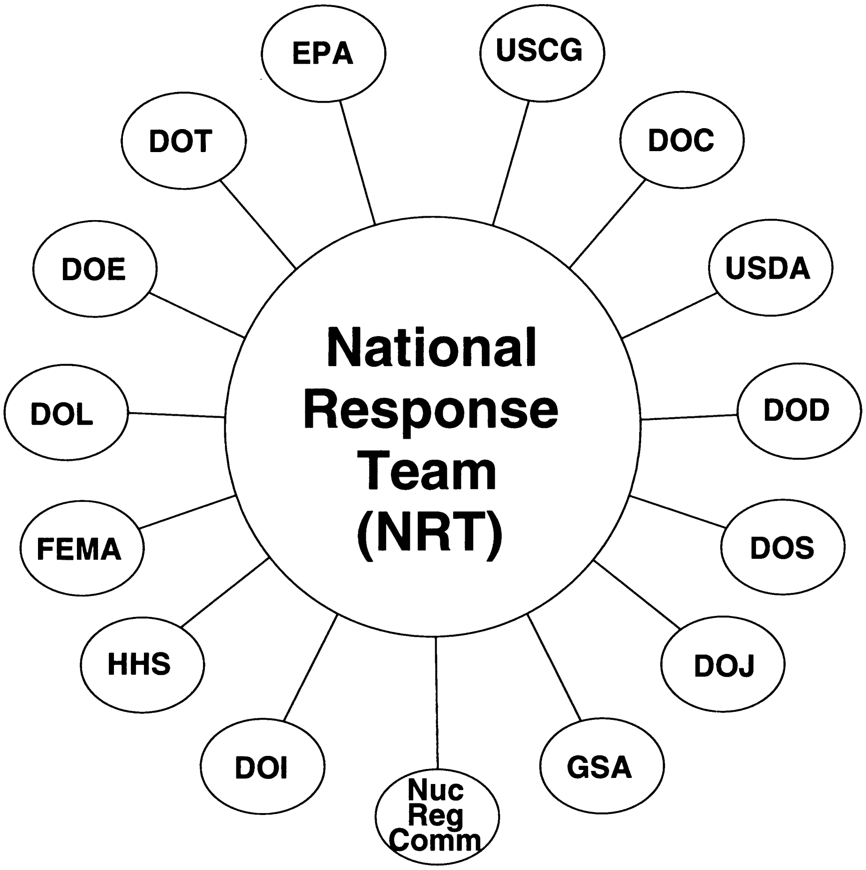
(d) The NRT may establish such bylaws, procedures, and committees as it deems appropriate to further the purposes for which it is established.

(e) The NRT shall evaluate methods of responding to discharges, shall recommend any changes needed in the response organization, and shall recommend to the Administrator of EPA changes to the NCP designed to improve the effectiveness of the national response system, including drafting of regulatory language.

(f) The NRT shall provide policy and program direction to the RRTs.

(g) The NRT may consider and make recommendations to appropriate agencies on the training, equipping, and protection of response teams and necessary research, development, demonstration, and evaluation to improve response capabilities.

Figure 1



(h) Direct planning and preparedness responsibilities of the NRT include:

(1) Maintaining national preparedness to respond to a major discharge of oil that is beyond regional capabilities;

(2) Monitoring incoming reports from all RRTs and activating for a response action, when necessary;

(3) Coordinating a national program to assist member agencies in preparedness planning and response, and enhancing coordination of member agency preparedness programs;

(4) Developing procedures, in coordination with the NSFCC, as appropriate, to ensure the coordination of federal, state, and local governments, and private response to oil discharges;

(5) Monitoring response-related research and development, testing, and evaluation activities of NRT agencies to enhance coordination, avoid duplication of effort, and facilitate research in support of response activities;

(6) Developing recommendations for response training and for enhancing the coordination of available resources among agencies with training responsibilities under the NCP;

(7) Reviewing regional responses to oil discharges, including an evaluation of equipment readiness and coordination among responsible public agencies and private organizations; and

(8) Assisting in developing a national exercise program, in coordination with the

NSFCC to ensure preparedness and coordination nationwide.

(i) The NRT shall consider matters referred to it for advice or resolution by an RRT.

(j) The NRT should be activated as an emergency response team:

(1) When an oil discharge:

(A) Exceeds the response capability of the region in which it occurs;

(B) Transects regional boundaries; or

(C) Involves a substantial threat to the public health or welfare, substantial amounts of property, or substantial threats to natural resources;

(2) If requested by any NRT member.

(k) When activated for a response action, the NRT will meet at the call of the chair and may:

(1) Monitor and evaluate reports from the OSC and recommend to the OSC, through the RRT, actions to combat the discharge;

(2) Request other federal, state and local governments, or private agencies, to provide resources under their existing authorities to combat a discharge, or to monitor response operations; and

(3) Coordinate the supply of equipment, personnel, or technical advice to the affected region from other regions or districts.

3.1.2 National response center. (a) The NRC, located at USCG Headquarters, is the national communications center, continuously manned for handling activities related to response actions, including those involving discharges of oil. The NRC acts as the single point of contact for all pollution incident reporting, and as the NRT communications center. Notice of discharges must be made by telephone through a toll free number or a special number (Telecommunication Device for the Deaf (TDD) and collect calls accepted). Upon receipt of a notification of discharge, the NRC shall promptly notify the OSC. The telephone report is distributed to any interested NRT member agency or federal entity that has established a written agreement or understanding with the NRC.

(b) The Commandant, USCG, in conjunction with other NRT agencies, provides the necessary personnel, communications, plotting facilities, and equipment for the NRC.

(c) Notice of an oil discharge in an amount equal to or greater than the reportable quantity must be made immediately in accordance with 33 CFR part 153, subpart B. Notification will be made to the NRC Duty Officer, HQ USCG, Washington, DC, telephone (800) 424–8802 or (202) 267–2675. All notices of discharges received at the NRC will be relayed immediately by telephone to the OSC.

3.1.3 National strike force coordination center. NSFCC, located in Elizabeth City, North Carolina, may assist the OSC by providing information on available spill removal resources, personnel, and equipment. The NSFCC can provide the following support to the OSC:

(a) Technical assistance, equipment, and other resources to augment the OSC staff during spill response;

(b) Assistance in coordinating the use of private and public resources in support of the OSC during a response to or a threat of a worst case discharge of oil;

(c) Review of the area contingency plan, including an evaluation of equipment readiness and coordination among responsible public agencies and private organizations;

(d) Assistance in locating spill response resources for both response and planning, using the NSFCC's national and international computerized inventory of spill response resources;

(e) Coordination and evaluation of pollution response exercises; and

(f) Inspection of district prepositioned pollution response equipment.

3.2 Regional. (a) Regional planning and coordination of preparedness and response actions is accomplished through the RRT. In the case of a discharge of oil, preparedness activities shall be carried out in conjunction with Area Committees as appropriate. The RRT agency membership parallels that of the NRT, but also includes state and local representation. The RRT provides: (1) the appropriate regional mechanism for development and coordination of preparedness activities before a response action is taken and for coordination of assistance and advice to the OSC during such response actions; and (2) guidance to Area Committees, as appropriate, to ensure inter-area consistency and consistency of individual ACPs with the RCP and NCP.

(b) The two principal components of the RRT mechanism are a standing team, which consists of designated representatives from each participating federal agency, state governments, and local governments (as agreed upon by the states); and incident-specific teams formed from the standing team when the RRT is activated for a response. On incident-specific teams, participation by the RRT member agencies will relate to the technical nature of the incident and its geographic location.

(1) The standing team's jurisdiction corresponds to the standard federal regions, except for Alaska, Oceania in the Pacific, and the Caribbean area, each of which has a separate standing RRT. The role of the standing RRT includes communications systems and procedures, planning, coordination, training, evaluation, preparedness, and related matters on a regionwide basis. It also includes coordination of Area Committees for these functions in areas within their respective regions, as appropriate.

(2) The role of the incident-specific team is determined by the operational requirements of the response to a specific discharge. Appropriate levels of activation and/or notification of the incident-specific RRT, including

participation by state and local governments, shall be determined by the designated RRT chair for the incident, based on the RCP. The incident-specific RRT supports the designated OSC. The designated OSC manages response efforts and coordinates all other efforts at the scene of a discharge.

(c) The representatives of EPA and the USCG shall act as co-chairs of the RRTs except when the RRT is activated. When the RRT is activated for response actions, the chair is the member agency providing the OSC.

(d) Each participating agency should designate one member and at least one alternate member to the RRT. Agencies whose regional subdivisions do not correspond to the standard federal regions may designate additional representatives to the standing RRT to ensure appropriate coverage of the standard federal region. Participating states may also designate one member and at least one alternate member to the RRT. Indian tribal governments may arrange with the RRT for representation appropriate to their geographical location. All agencies and states may also provide additional representatives as observers to meetings of the RRT.

(e) RRT members should designate representatives and alternates from their agencies as resource personnel for RRT activities, including RRT work planning, and membership on incident-specific teams in support of the OSCs.

(f) Federal RRT members or their representatives should provide OSCs with assistance from their respective federal agencies commensurate with agency responsibilities, resources, and capabilities within the region. During a response action, the members of the RRT should seek to make available the resources of their agencies to the OSC as specified in the RCP and ACP.

(g) RRT members should nominate appropriately qualified representatives from their agencies to work with OSCs in developing and maintaining ACPs.

(h) Affected states are encouraged to participate actively in all RRT activities. Each state Governor is requested to assign an office or agency to represent the state on the appropriate RRT; to designate representatives to work with the RRT in developing RCPs; to plan for, make available, and coordinate state resources for use in response actions; and to serve as the contact point for coordination of response with local government agencies, whether or not represented on the RRT. The state's RRT representative should keep the State Emergency Response Commission (SERC) apprised of RRT activities and coordinate RRT activities with the SERC. Local governments are invited to participate in activities on the appropriate RRT as provided by state law or as arranged by the state's representative. Indian tribes are also invited to participate in such activities.

(i) The standing RRT shall recommend changes in the regional response organization as needed, revise the RCP as needed, evaluate the preparedness of the participating agencies and the effectiveness of ACPs for the federal response to discharges, and provide technical assistance for preparedness to the response community. The RRT should:

(1) Review and comment, to the extent practicable, on local emergency response plans or other issues related to the preparation, implementation, or exercise of such plans upon request of a local emergency planning committee;

(2) Evaluate regional and local responses to discharges on a continuing basis, considering available legal remedies, equipment readiness, and coordination among responsible public agencies and private organizations, and recommend improvements;

(3) Recommend revisions of the NCP to the NRT, based on observations of response operations;

(4) Review OSC actions to ensure that RCPs and ACPs are effective;

(5) Encourage the state and local response community to improve its preparedness for response;

(6) In coordination with the Area Committee and in accordance with any applicable laws, regulations, or requirements, conduct advance planning for use of dispersants, surface washing agents, surface collecting agents, burning agents, bioremediation agents, or other chemical agents in accordance with subpart J of this part;

(7) Be prepared to provide response resources to major discharges or releases outside the region;

(8) Conduct or participate in training and exercises as necessary to encourage preparedness activities of the response community within the region;

(9) Meet at least semiannually to review response actions carried out during the preceding period, consider changes in RCPs, and recommend changes in ACPs;

(10) Provide letter reports on RRT activities to the NRT twice a year, no later than January 31 and July 31; and

(11) Ensure maximum participation in the national exercise program for announced and unannounced exercises.

(j)(1) The RRT may be activated by the chair as an incident-specific response team when a discharge:

(A) Exceeds the response capability available to the OSC in the place where it occurs;

(B) Transects state boundaries;

(C) May pose a substantial threat to the public health or welfare, or to regionally significant amounts of property; or

(D) Is a worst case discharge, as defined in section 1.5 of this appendix.

(2) The RRT shall be activated during any discharge upon a request from the OSC, or

from any RRT representative, to the chair of the RRT. Requests for RRT activation shall later be confirmed in writing. Each representative, or an appropriate alternate, should be notified immediately when the RRT is activated.

(3) During prolonged removal or remedial action, the RRT may not need to be activated or may need to be activated only in a limited sense, or may need to have available only those member agencies of the RRT who are directly affected or who can provide direct response assistance.

(4) When the RRT is activated for a discharge or release, agency representatives will meet at the call of the chair and may:

(A) Monitor and evaluate reports from the OSC, advise the OSC on the duration and extent of response, and recommend to the OSC specific actions to respond to the discharge;

(B) Request other federal, state, or local governments, or private agencies, to provide resources under their existing authorities to respond to a discharge or to monitor response operations;

(C) Help the OSC prepare information releases for the public and for communication with the NRT;

(D) If the circumstances warrant, make recommendations to the regional or district head of the agency providing the OSC that a different OSC should be designated; and

(E) Submit pollution reports to the NRC as significant developments occur.

(5) RCPs shall specify detailed criteria for activation of RRTs.

(6) At the regional level, a Regional Response Center (RRC) may provide facilities and personnel for communications, information storage, and other requirements for coordinating response. The location of each RRC should be provided in the RCP.

(7) When the RRT is activated, affected states may participate in all RRT deliberations. State government representatives participating in the RRT have the same status as any federal member of the RRT.

(8) The RRT can be deactivated when the incident-specific RRT chair determines that the OSC no longer requires RRT assistance.

(9) Notification of the RRT may be appropriate when full activation is not necessary, with systematic communication of pollution reports or other means to keep RRT members informed as to actions of potential concern to a particular agency, or to assist in later RRT evaluation of regionwide response effectiveness.

(k) Whenever there is insufficient national policy guidance on a matter before the RRT, a technical matter requiring solution, a question concerning interpretation of the NCP, or a disagreement on discretionary actions among RRT members that cannot be resolved at the regional level, it may be referred to the NRT for advice.

3.3 Area.

3.3.1 On-scene coordinator. The OSC is the federal official predesignated by EPA or the USCG to coordinate and direct federal responses under subpart D of the NCP. The USCG shall provide OSCs for oil discharges, including discharges from facilities and vessels under the jurisdiction of another federal agency, within or threatening the coastal zone. EPA shall provide OSCs for discharges into or threatening the inland zone. In carrying out a response, the OSC may direct or monitor all federal, state, and private actions to remove a discharge. In contingency planning and removal, the OSC coordinates, directs, and reviews the work of other agencies, Area Committees, responsible parties, and contractors to assure compliance with the NCP, decision document, consent decree, administrative order, and lead agency-approved plans applicable to the response.

3.3.2 Area committees. (a) Area Committees shall be responsible for: (1) preparing an ACP for their areas; (2) working with appropriate federal, state, and local officials to enhance the contingency planning of those officials and to assure pre-planning of joint response efforts, including appropriate procedures for mechanical recovery, dispersal, shoreline cleanup, protection of sensitive environmental areas, and protection, rescue, and rehabilitation of fisheries and wildlife; and (3) working with appropriate federal, state, and local officials to expedite decisions for the use of dispersants and other mitigating substances and devices.

(b) The OSC is responsible for overseeing development of the ACP in the area of the OSC's responsibility. The ACP, when implemented in conjunction with other provisions of the NCP, shall be adequate to remove a worst case discharge, and to mitigate and prevent a substantial threat of such a discharge, from a vessel, offshore facility, or onshore facility operating in or near the area.

3.3.3 Special teams. (a) Special teams include: NOAA/EPA's SSCs; EPA's Environmental Response Team (ERT); and USCG's NSF; DRGs; and NPFC (see Figure 2).

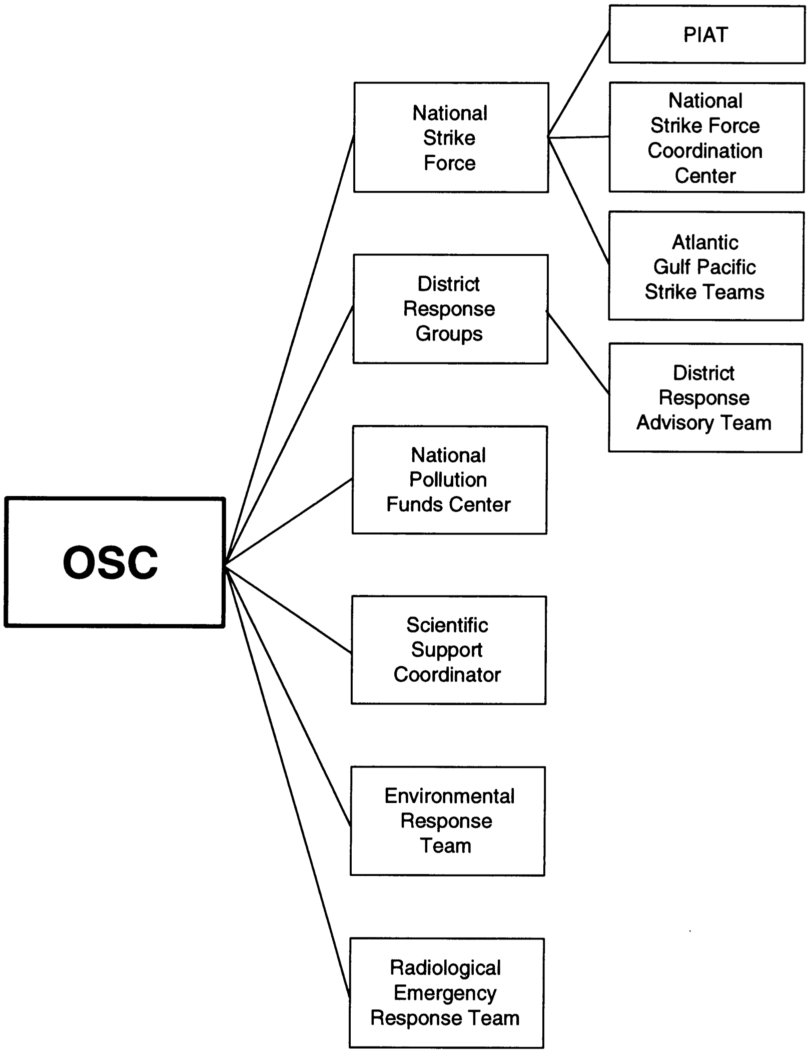
(b) SSCs may be designated by the OSC as the principal advisors for scientific issues, communication with the scientific community, and coordination of requests for assistance from state and federal agencies regarding scientific studies. The SSC strives for a consensus on scientific issues affecting the response, but ensures that differing opinions within the community are communicated to the OSC.

(1) Generally, SSCs are provided by NOAA in the coastal zones, and by EPA in the inland zone. OSC requests for SSC support may be made directly to the SSC assigned to the area or to the agency member of the RRT. NOAA SSCs may also be requested through

NOAA's SSC program office in Seattle, WA. NOAA SSCs are assigned to USCG Districts and are supported by a scientific support team that includes expertise in environmental chemistry, oil slick tracking, pollutant transport modeling, natural resources at risk, environmental tradeoffs of countermeasures and cleanup, and information management.

Figure 2

National Response System Special Teams



(2) During a response, the SSC serves on the federal OSC's staff and may, at the request of the OSC, lead the scientific team and be responsible for providing scientific support for operational decisions and for coordinating on-scene scientific activity. Depending on the nature and location of the incident, the SSC integrates expertise from governmental agencies, universities, community representatives, and industry to assist the OSC in evaluating the hazards and potential effects of releases and in developing response strategies.

(3) At the request of the OSC, the SSC may facilitate the OSC's work with the lead administrative trustee for natural resources to ensure coordination between damage assessment data collection efforts and data collected in support of response operations.

(4) SSCs support the RRTs and the Area Committees in preparing regional and area contingency plans and in conducting spill training and exercises. For area plans, the SSC provides leadership for the synthesis and integration of environmental information required for spill response decisions in support of the OSC.

(c)(1) SUPSALV has an extensive salvage/search and recovery equipment inventory with the requisite knowledge and expertise to support these operations, including specialized salvage, firefighting, and petroleum, oil and lubricants offloading capability.

(2) When possible, SUPSALV will provide equipment for training exercises in support of national and regional contingency planning objectives.

(3) The OSC/RPM may request assistance directly from SUPSALV. Formal requests are routed through the Chief of Naval Operations (N312).

(d) The ERT is established by the EPA in accordance with its disaster and emergency responsibilities. The ERT has expertise in treatment technology, biology, chemistry, hydrology, geology and engineering.

(1) The ERT can provide access to special decontamination equipment and advice to the OSC in hazard evaluation; risk assessment; multimedia sampling and analysis program; on-site safety, including development and implementation plans; cleanup techniques and priorities; water supply decontamination and protection; application of dispersants; environmental assessment; degree of cleanup required; and disposal of contaminated material. The ERT also provides both introductory and intermediate level training courses to prepare response personnel.

(2) OSC or RRT requests for ERT support should be made to the EPA representative on the RRT; EPA Headquarters, Director, Emergency Response Division; or the appropriate EPA regional emergency coordinator.

(e) The NSF is a special team established by the USCG, including the three USCG Strike Teams, the Public Information Assist Team (PIAT), and the NSFCC. The NSF is available to assist OSCs in their preparedness and response duties.

(1) The three Strike Teams (Atlantic, Gulf, and Pacific) provide trained personnel and specialized equipment to assist the OSC in training for spill response, stabilizing and containing the spill, and in monitoring or directing the response actions of the responsible parties and/or contractors. The OSC has a specific team designated for initial contact and may contact that team directly for any assistance.

(2) The NSFCC can provide the following support to the OSC:

—Technical assistance, equipment and other resources to augment the OSC staff during spill response;

—Assistance in coordinating the use of private and public resources in support of the OSC during a response to or a threat of a worst case discharge of oil;

—Review of the ACP, including an evaluation of equipment readiness and coordination among responsible public agencies and private organizations;

—Assistance in locating spill response resources for both response and planning, using the NSFCC's national and international computerized inventory of spill response resources;

—Coordination and evaluation of pollution response exercises; and

—Inspection of district prepositioned pollution response equipment.

(3) PIAT is an element of the NSFCC staff which is available to assist OSCs to meet the demands for public information during a response or exercise. Its use is encouraged any time the OSC requires outside public affairs support. Requests for PIAT assistance may be made through the NSFCC or NRC.

(f)(1) The DRG assists the OSC by providing technical assistance, personnel, and equipment, including pre-positioned equipment. Each DRG consists of all Coast Guard personnel and equipment, including marine firefighting equipment, in its district, additional pre-positioned equipment, and a District Response Advisory Team (DRAT) that is available to provide support to the OSC in the event that a spill exceeds local response capabilities. Each DRG:

(A) Shall provide technical assistance, equipment, and other resources as available when requested by an OSC through the USCG representative to the RRT;

(B) Shall ensure maintenance of all USCG response equipment within its district;

(C) May provide technical assistance in the preparation of the ACP; and

(D) Shall review each of those plans that affect its area of geographic responsibility.

(2) In deciding where to locate personnel and pre-positioned equipment, the USCG shall give priority emphasis to:

(A) The availability of facilities for loading and unloading heavy or bulky equipment by barge;

(B) The proximity to an airport capable of supporting large military transport aircraft;

(C) The flight time to provide response to oil spills in all areas of the Coast Guard district with the potential for marine casualties;

(D) The availability of trained local personnel capable of responding in an oil spill emergency; and

(E) Areas where large quantities of petroleum products are transported.

(g) The NPFC is responsible for implementing those portions of Title I of the OPA that have been delegated to the Secretary of the department in which the Coast Guard is operating. The NPFC is responsible for addressing funding issues arising from discharges and threats of discharges of oil. The NPFC:

(1) Issues Certificates of Financial Responsibility to owners and operators of vessels to pay for costs and damages that are incurred by their vessels as a result of oil discharges;

(2) Provides funding for various response organizations for timely abatement and removal actions related to oil discharges;

(3) Provides equitable compensation to claimants who sustain costs and damages from oil discharges when the responsible party fails to do so;

(4) Recovers monies from persons liable for costs and damages resulting from oil discharges to the full extent of liability under the law; and

(5) Provides funds to initiate natural resources damage assessment.

(h) The organizational concepts of the national response system discussed above are depicted in Figure 3.

4.0 Preparedness activities.

4.1 Federal contingency plans. This section summarizes emergency preparedness activities relating to discharges of oil and describes the three levels of contingency planning under the national response system.

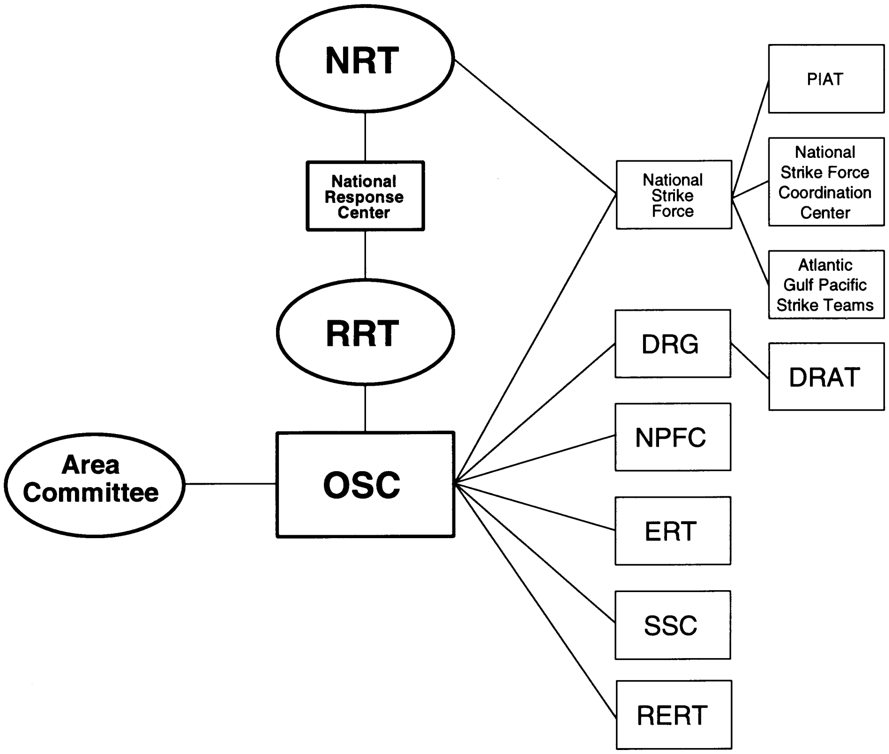
4.1.1 National contingency plan. (a) The NCP provides for efficient, coordinated, and effective response to discharges of oil in accordance with the authorities of the CWA. It provides for:

(1) The national response organization that may be activated in response actions and specifies responsibilities among the federal, state, and local governments and describes resources that are available for response;

(2) The establishment of requirements for federal, regional, and area contingency plans;

(3) Procedures for undertaking removal actions pursuant to section 311 of the CWA;

National Response System Organization



(4) Procedures for involving state governments in the initiation, development, selection, and implementation of response actions;

(5) Listing of federal trustees for natural resources for purposes of the CWA;

(6) Procedures for the participation of other persons in response actions; and

(7) National procedures for the use of dispersants and other chemicals in removals under the CWA.

(b) In implementing the NCP, consideration shall be given to international assistance plans and agreements, security regulations and responsibilities based on international agreements, federal statutes, and executive orders. Actions taken pursuant to the provisions of any applicable international joint contingency plans shall be consistent with the NCP, to the greatest extent possible. The Department of State shall be consulted, as appropriate, prior to taking action which may affect its activities.

4.1.2 Regional contingency plans. The RRTs, working with the states, shall develop federal RCPs for each standard federal region, Alaska, Oceania in the Pacific, and the Caribbean to coordinate timely, effective response by various federal agencies and other organizations to discharges of oil. RCPs shall, as appropriate, include information on all useful facilities and resources in the region, from government, commercial, academic, and other sources. To the greatest extent possible, RCPs shall follow the format of the NCP and be coordinated with state emergency response plans, ACPs, and Title III local emergency response plans. Such coordination should be accomplished by working with the SERCs in the region covered by the RCP. RCPs shall contain lines of demarcation between the inland and coastal zones, as mutually agreed upon by the USCG and the EPA.

4.1.3 Area contingency plans. (a) Under the direction of an OSC and subject to approval by the lead agency, each Area Committee, in consultation with the appropriate RRTs, DRGs, the NSFCC, SSCs, Local Emergency Planning Committees (LEPCs), and SERCs, shall develop an ACP for its designated area. This plan, when implemented in conjunction with other provisions of the NCP, shall be adequate to remove a worst case discharge, and to mitigate or prevent a substantial threat of such a discharge, from a vessel, offshore facility, or onshore facility operating in or near the area.

(b) The areas of responsibility may include several Title III local planning districts, or parts of such districts. In developing the ACP, the OSC shall coordinate with affected SERCs and LEPCs. The ACP shall provide for a well coordinated response that is integrated and compatible to the greatest extent possible with all appropriate response plans of state, local, and non-federal entities, and especially with Title III local emergency response plans.

(c) The ACP shall include the following:

(1) A description of the area covered by the plan, including the areas of special economic or environmental importance that might be impacted by a discharge;

(2) A description in detail of the responsibilities of an owner or operator and of federal, state, and local agencies in removing a discharge, and in mitigating or preventing a substantial threat of a discharge;

(3) A list of equipment (including firefighting equipment), dispersants, or other mitigating substances and devices, and personnel available to an owner or operator and federal, state, and local agencies, to ensure an effective and immediate removal of a discharge, and to ensure mitigation or prevention of a substantial threat of a discharge (this may be provided in an appendix or by reference to other relevant emergency plans (e.g., state or LEPC plans), which may include such equipment lists);

(4) A description of procedures to be followed for obtaining an expedited decision regarding the use of dispersants; and

(5) A detailed description of how the plan is integrated into other ACPs and tank vessel, offshore facility, and onshore facility response plans approved by the President, and into operating procedures of the NSFCC.

4.1.4 Fish and Wildlife and sensitive environments plan annex. (a) In order to provide for coordinated, immediate and effective protection, rescue, and rehabilitation of, and minimization of risk of injury to, fish and wildlife resources and habitat, Area Committees shall incorporate into each ACP a detailed annex containing a Fish and Wildlife and Sensitive Environments Plan that is consistent with the RCP and NCP. The annex shall be prepared in consultation with the U.S. Fish and Wildlife Service (FWS) and NOAA and other interested natural resource management agencies and parties. It shall address fish and wildlife resources and their habitat, and shall include other areas considered sensitive environments in a separate section of the annex, based upon Area Committee recommendations. The annex shall provide the necessary information and procedures to immediately and effectively respond to discharges that may adversely affect fish and wildlife and their habitat and sensitive environments, including provisions for a response to a worst case discharge. Such information shall include the identification of appropriate agencies and their responsibilities, procedures to notify these agencies following a discharge or threat of a discharge; protocols for obtaining required fish and wildlife permits and other necessary permits, and provisions to ensure compatibility of annex-related activities with removal operations.

(b) The annex shall:

(1) Identify and establish priorities for fish and wildlife resources and their habitats and other important sensitive areas requiring protection from any direct or indirect effects from discharges that may occur. These effects include, but are not limited to, any seasonal or historical use, as well as all critical, special, significant or otherwise designated protected areas.

(2) Provide a mechanism to be used during a spill response for timely identification of protection priorities of those fish and wildlife resources and habitats and sensitive environmental areas that may be threatened or injured by a discharge. These include as appropriate, not only marine and freshwater species, habitats, and their food sources, but also terrestrial wildlife and their habitats that may be affected directly by onshore oil or indirectly by oil-related factors, such as loss or contamination of forage. The mechanism shall also provide for expeditious evaluation and appropriate consultations on the effects to fish and wildlife, their habitat, and other sensitive environments from the application of chemical countermeasures or other countermeasures not addressed under paragraph (3) of this section.

(3) Identify potential environmental effects on fish and wildlife, their habitat, and other sensitive environments resulting from removal actions or countermeasures, including the option of no removal. Based on this evaluation of potential environmental effects, the annex should establish priorities for application of countermeasure and removal actions to habitats within the geographic region of the ACP. The annex should establish methods to minimize the identified effects on fish and wildlife because of response activities, including, but not limited to, disturbance of sensitive areas and habitats; illegal or inadvertent taking or disturbance of

fish and wildlife or specimens by response personnel; and fish and wildlife, their habitat, and environmentally sensitive areas coming in contact with various cleaning or bioremediation agents. Furthermore, the annex should identify the areas where the movement of oiled debris may pose a risk to resident, transient, or migratory fish and wildlife, and other sensitive environments and should discuss measures to be considered for removing such oiled debris in a timely fashion to reduce such risk.

(4) Provide for pre-approval of application of specific countermeasures or removal actions that, if expeditiously applied, will minimize adverse spill-induced impacts to fish and wildlife resources, their habitat, and other sensitive environments. Such pre-approval plans must be consistent with paragraphs (2) and (3) of this section and subpart J requirements of the NCP, and must have the concurrence of the natural resource trustees.

(5) Provide monitoring plan(s) to evaluate the effectiveness of different countermeasures or removal actions in protecting the environment. Monitoring should include "set-aside" or "control" areas, where no mitigative actions are taken.

(6) Identify and plan for the acquisition and utilization of necessary response capabilities for protection, rescue, and rehabilitation of fish and wildlife resources and habitat. This may include appropriately permitted private organizations and individuals with appropriate expertise and experience. The suitable organizations should be identified in cooperation with natural resource law enforcement agencies. Such capabilities shall include, but not be limited to, identification of facilities and equipment necessary for deterring sensitive fish and wildlife from entering oiled areas, and for capturing, holding, cleaning, and releasing injured wildlife. Plans for the provision of such capabilities shall ensure that there is no interference with other OSC removal operations.

(7) Identify appropriate federal and state agency contacts and alternates responsible for coordination of fish and wildlife rescue and rehabilitation and protection of sensitive environments; identify and provide for required fish and wildlife handling and rehabilitation permits necessary under federal and state laws; and provide guidance on the implementation of law enforcement requirements included under current federal and state laws and corresponding regulations. Requirements include, but are not limited to procedures regarding the capture, transport, rehabilitation, release of wildlife exposed to or threatened by oil, and disposal of contaminated carcasses of wildlife.

(8) Identify and secure the means for providing, if needed, the minimum required Occupational Safety and Health Administration (OSHA) training for volunteers, including those who assist with injured wildlife.

(9) Evaluate the compatibility between this annex and non-federal response plans (including those of vessels, facilities and pipelines) on issues affecting fish and wildlife, their habitat, and sensitive environments.

4.2 OPA facility and vessel response plans

This section describes and cross-references the regulations that implement section 311(j)(5) of the CWA. A tank vessel, as defined under section 2101 of title 46, U.S. Code, an offshore facility, and an onshore facility that, because of its location, could reasonably expect to cause substantial harm to the environment by discharging into or on the navigable waters, adjoining shorelines, or exclusive economic zone must prepare and submit a plan for responding, to the maximum extent practicable, to a worst case discharge, and to a substantial threat of such a discharge, of oil or a hazardous substance. These response plans are required to be consistent with applicable Area Contingency Plans. These regulations are codified as follows:

(a) For tank vessels, these regulations are codified in 33 CFR part 155;

(b) For offshore facilities, these regulations are codified in 30 CFR part 254;

(c) For non-transportation related onshore facilities, these regulations are codified in 40 CFR part 112.20;

(d) For transportation-related onshore facilities, these regulations are cofidied in 33 CFR part 154;

(e) For pipeline facilities, these regulations are codified in 49 CFR part 194; and

(f) For rolling stock, these regulations are codified in 49 CFR part 106 et al.

4.3 Relation to others plans.

4.3.1 Federal response plans. In the event of a declaration of a major disaster by the President, the FEMA may activate the Federal Response Plan (FRP). A Federal Coordinating Officer (FCO), designated by the President, may implement the FRP and coordinate and direct emergency assistance and disaster relief of impacted individuals, business, and public services under the Robert T. Stafford Disaster Relief Act. Delivery of federal assistance is facilitated through twelve functional annexes to the FRP known as Emergency Support Functions (ESFs). EPA coordinates activities under ESF #10—Hazardous Materials, which addresses preparedness and response to hazardous materials and oil incidents caused by a natural disaster or other catastrophic event. In such cases, the OSC should coordinate response activities with the FCO, through the incident-specific ESF #10 Chair, to ensure consistency with federal disaster assistance activities.

4.3.2 Tank Vessel and Facility Response Plans. (a) Under CWA section 311(j)(5), tank vessels, offshore facilities, and certain onshore facilities are required to prepare and submit response plans for review and approval by the President for the carriage, storage, and transportation of oil and hazardous substances. Separate regulations published by the appropriate federal agencies provide for required response plan development and/or approval.

(b) These plans shall be developed to coordinate responsible party actions with the OSC and the ACP response strategies, for response to oil discharges within the inland and coastal zones of the United States.

4.4 Pre-approval authority.

(a) RRTs and Area Committees shall address, as part of their planning activities, the desirability of using appropriate dispersants, surface washing agents, surface collecting agents, bioremediation agents, or miscellaneous oil spill control agents listed on the NCP Product Schedule, and the desirability of using appropriate burning agents. RCPs and ACPs shall, as appropriate, include applicable preauthorization plans and address the specific contexts in which such products should and should not be used. In meeting the provisions of this paragraph, preauthorization plans may address factors such as the potential sources and types of oil that might be spilled, the existence and location of environmentally sensitive resources that might be impacted by spilled oil, available product and storage locations, available equipment and adequately trained operators, and the available means to monitor product application and effectiveness. The RRT representatives from EPA and the states with jurisdiction over the waters of the area to which a preauthorization plan applies and the DOC and DOI natural resource trustees shall review and either approve, disapprove, or approve with modification the preauthorization plans developed by Area Committees, as appropriate. Approved preauthorization plans shall be included in the appropriate RCPs and ACPs. If the RRT representatives from EPA and the states with jurisdiction over the waters of the area to which a preauthorization plan applies and the DOC and DOI natural resource trustees approve in advance the use of certain products under specified circumstances as described in the preauthorization plan, the OSC may authorize the use of the products without obtaining the specific concurrences described in paragraphs (b) and (c) of this section.

(b) For spill situations that are not addressed by the preauthorization plans developed pursuant to paragraph (a) of this section, the OSC, with the concurrence of the EPA representative to the RRT and, as appropriate, the concurrence of the RRT representatives from the states with jurisdiction over the navigable waters threatened by the discharge, and in consultation with the DOC and DOI natural resource trustees, when practicable, may authorize the use of dispersants, surface washing agents, surface collecting agents, bioremediation agents, or miscellaneous oil spill control agents on the oil discharge, provided that the products are listed on the NCP Product Schedule.

(c) The OSC, with the concurrence of the EPA representative to the RRT and, as appropriate, the concurrence of the RRT representatives from the states with jurisdiction over the navigable waters threatened by the discharge, and in consultation with the DOC and DOI natural resource trustees, when practicable, may authorize the use of burning agents on a case-by-case basis.

(d) The OSC may authorize the use of any dispersant, surface washing agent, surface collecting agent, other chemical agent, burning agent, bioremediation agent, or miscellaneous oil spill control agent, including products not listed on the NCP Product Schedule, without obtaining the concurrence of the EPA representative to the RRT and, as appropriate, the RRT representatives from the states with jurisdiction over the navigable waters threatened by the discharge, when, in the judgment of the OSC, the use of the product is necessary to prevent or substantially reduce a hazard to human life. Whenever the OSC authorizes the use of a product pursuant to this paragraph, the OSC is to inform the EPA RRT representative and, as appropriate, the RRT representatives from the affected states and, when practicable, the DOC/DOI natural resource trustees of the use of a product, including products not on the Schedule, as soon as possible. Once the threat to human life has subsided, the continued use of a product shall be in accordance with paragraphs (a), (b), and (c) of this section.

(e) Sinking agents shall not be authorized for application to oil discharges.

(f) When developing preauthorization plans, RRTs may require the performance of supplementary toxicity and effectiveness testing of products, in addition to the test methods specified in §300.915 and described in appendix C to part 300, due to existing site-specific or area-specific concerns.

4.5 Area response drills. The OSC periodically shall conduct drills of removal capability (including fish and wildlife response), without prior notice, in areas for which ACPs are required and under relevant tank vessel and facility response plans.

5.0 Response operations.

(a) The OSC shall direct response efforts and coordinate all other efforts at the scene of a discharge. As part of the planning and preparation for response, OSCs shall be predesignated by the regional or district head of the lead agency.

(b) The first federal official affiliated with an NRT member agency to arrive at the scene of a discharge should coordinate activities under the NCP and is authorized to initiate, in consultation with the OSC, any necessary actions normally carried out by the OSC until the arrival of the predesignated OSC. This official may initiate federal OSLTF-financed actions only as authorized by the OSC or, if the OSC is unavailable, the authorized representative of the lead agency.

(c) The OSC shall, to the extent practicable, collect pertinent facts about the discharge, such as its source and cause; the identification of responsible parties; the nature, amount, and location of discharged materials; the probable direction and time of travel of discharged materials; whether the discharge is a worst case discharge; the pathways to human and environmental exposure; the potential impact on human health, welfare, and safety and the environment; whether the discharge poses a substantial threat to the public health or welfare; the potential impact on natural resources and property which may be affected; priorities for protecting human health and welfare and the environment; and appropriate cost documentation.

(d) The OSC's efforts shall be coordinated with other appropriate federal, state, local, and private response agencies. OSCs may designate capable persons from federal, state, or local agencies to act as their on-scene representatives. State and local governments, however, are not authorized to take actions under subpart D of the NCP that involve expenditures of the OSLTF unless an appropriate contract or cooperative agreement has been established.

(e) The OSC should consult regularly with the RRT and NSFCC, as appropriate, in carrying out the NCP and keep the RRT and NSFCC, as appropriate, informed of activities under the NCP.

(f) The OSC should evaluate incoming information and immediately advise FEMA of potential major disaster situations.

(g) The OSC is responsible for addressing worker health and safety concerns at a response scene.

(h) In those instances where a possible public health emergency exists, the OSC should notify the HHS representative to the RRT. Throughout response actions, the OSC may call upon the OSHA and HHS representative for assistance on worker health and safety issues.

(i) All federal agencies should plan for emergencies and develop procedures for dealing with oil discharges and releases of hazardous substances, pollutants, or contaminants from vessels and facilities under their jurisdiction. All federal agencies, therefore, are responsible for designating the office that coordinates response to such incidents in accordance with the NCP and applicable federal regulations and guidelines.

(j)(1) The OSC shall ensure that the natural resource trustees are promptly notified of discharges.

(2) The OSC shall coordinate all response activities with the affected natural resource trustees and shall consult with the affected trustees on the appropriate removal action to be taken.

(3) Where the OSC becomes aware that a discharge may affect any endangered or threatened species, or their habitat, the OSC shall consult with DOI, DOC/NOAA, and, if appropriate, the cognizant federal land managing agency.

(k) The OSC shall submit pollution reports (POLREPs) to the RRT and other appropriate agencies as significant developments occur during response actions, through communications networks or procedures agreed to by the RRT and covered in the RCP.

(l) The OSC should ensure that all appropriate public and private interests are kept informed and that their concerns are considered throughout a response, to the extent practicable.

5.1 Phase I—Discovery or notification. (a) A discharge of oil may be discovered through:

(1) A report submitted by the person in charge of a vessel or facility, in accordance with statutory requirements;

(2) Deliberate search by patrols;

(3) Random or incidental observation by government agencies or the public; or

(4) Other sources.

(b) Any person in charge of a vessel or a facility shall, as soon as he or she has knowledge of any discharge from such vessel or facility in violation of section 311(b)(3) of the CWA, immediately notify the NRC. Notification shall be made to the NRC Duty Officer, HQ USCG, Washington, DC, telephone (800) 424–8802 or (202) 267–2675. If direct reporting to the NRC is not practicable, reports may be made to the USCG or EPA predesignated OSC for the geographic area where the discharge occurs. The EPA predesignated OSC may also be contacted through the regional 24-hour emergency response telephone number. All such reports shall be promptly relayed to the NRC. If it is not possible to notify the NRC or predesignated OSC immediately, reports may be made immediately to the nearest Coast Guard unit. In any event, such person in charge of the vessel or facility shall notify the NRC as soon as possible.

(c) Any other person shall, as appropriate, notify the NRC of a discharge of oil.

(d) Upon receipt of a notification of discharge, the NRC shall promptly notify the OSC. The OSC shall ensure notification of the appropriate state agency of any state which is, or may reasonably be expected to be, affected by the discharge. The OSC shall then proceed with the following phases as outlined in the RCP and ACP.

5.2 Phase II—Preliminary assessment and initiation of action

(a) The OSC is responsible for promptly initiating a preliminary assessment.

(b) The preliminary assessment shall be conducted using available information, supplemented where necessary and possible by an on-scene inspection. The OSC shall undertake actions to:

(1) Evaluate the magnitude and severity of the discharge or threat to public health or welfare or the environment;

(2) Assess the feasibility of removal; and

(3) To the extent practicable, identify potentially responsible parties.

(c) Where practicable, the framework for the response management structure is a system (e.g., a unified command system), that brings together the functions of the federal government, the state government, and the responsible party to achieve an effective and efficient response, where the OSC maintains authority.

(d) Except in a case when the OSC is required to direct the response to a discharge that may pose a substantial threat to the public health or welfare (including, but not limited to fish, shellfish, wildlife, other natural resources, and the public and private beaches and shorelines of the United States), the OSC may allow the responsible party to voluntarily and promptly perform removal actions, provided the OSC determines such actions will ensure an effective and immediate removal of the discharge or mitigation or prevention of a substantial threat of a discharge. If the responsible party does conduct the removal, the OSC shall ensure adequate surveillance over whatever actions are initiated. If effective actions are not being taken to eliminate the threat, or if removal is not being properly done, the OSC should, to the extent practicable under the circumstances, so advise the responsible party. If the responsible party does not respond properly, the OSC shall take appropriate response actions and should notify the responsible party of the potential liability for federal response costs incurred by the OSC pursuant to the OPA and CWA. Where practicable, continuing efforts should be made to encourage response by responsible parties.

(1) In carrying out a response under this section, the OSC may:

(A) Remove or arrange for the removal of a discharge, and mitigate or prevent a substantial threat of a discharge, at any time;

(B) Direct or monitor all federal, state, and private actions to remove a discharge; and

(C) Remove and, if necessary, destroy a vessel discharging, or threatening to discharge, by whatever means are available.

(2) If the discharge results in a substantial threat to the public health or welfare of the United States (including, but not limited to fish, shellfish, wildlife, other natural resources, and the public and private beaches and shorelines of the United States), the OSC must direct all response efforts, as provided in section 5.3.4 of this appendix. The OSC should declare as expeditiously as practicable to spill response participants that the federal government will direct the response. The OSC may act without regard to any other provision of the law governing contracting procedures or employment of personnel by the federal government in removing or arranging for the removal of such a discharge.

(e) The OSC shall ensure that the natural resource trustees are promptly notified in the event of any discharge of oil, to the maximum extent practicable as provided in the Fish and Wildlife and Sensitive Environments Plan annex to the ACP for the area in which the discharge occurs. The OSC and the trustees shall coordinate assessments, evaluations, investigations, and planning with respect to appropriate removal actions. The OSC shall consult with the affected trustees on the appropriate removal action to be taken. The trustees will provide timely advice concerning recommended actions with regard to trustee resources potentially affected. The trustees also will assure that the OSC is informed of their activities in natural resource damage assessment that may affect response operations. The trustees shall assure, through the lead administrative trustee, that all data from the natural resource damage assessment activities that may support more effective operational decisions are provided in a timely manner to the OSC. When circumstances permit, the OSC shall share the use of non-monetary response resources (*i.e.*, personnel and equipment) with the trustees, provided trustee activities do not interfere with response actions. The lead administrative trustee facilitates effective and efficient communication between the OSC and the other trustees during response operations and is responsible for applying to the OSC for non-monetary federal response resources on behalf of all trustees. The lead administrative trustee is also responsible for applying to the National Pollution Funds Center for funding for initiation of damage assessment for injuries to natural resources.

5.3 Patterns of response.

5.3.1 Determinations to initiate response and special conditions.

(a) In accordance with the CWA, the Administrator of EPA or the Secretary of the department in which the USCG is operating, as appropriate, is authorized to act for the

United States to take response measures deemed necessary to protect the public health or welfare or environment from discharges of oil.

(b) The Administrator of EPA or the Secretary of the department in which the USCG is operating, as appropriate, is authorized to initiate and, in the case of a discharge posing a substantial threat to public health or welfare is required to initiate and direct, appropriate response activities when the Administrator or Secretary determines that any oil is discharged or there is a substantial threat of such discharge from any vessel or offshore or onshore facility into or on the navigable waters of the United States, on the adjoining shorelines to the navigable waters, into or on the waters of the exclusive economic zone, or that may affect natural resources belonging to, appertaining to, or under exclusive management authority of the United States.

(c) In addition to any actions taken by a state or local government, the Administrator of EPA or the Secretary of the department in which the USCG is operating may request the U.S. Attorney General to secure the relief from any person, including the owner or operator of the vessel or facility necessary to abate a threat or, after notice to the affected state, take any other action authorized by section 311 of the CWA, including issuing administrative orders, that may be necessary to protect the public health or welfare, if the Administrator or Secretary determines that there may be an imminent and substantial threat to the public health or welfare or the environment of the United States, including fish, shellfish, and wildlife, public and private property, shorelines, beaches, habitats, and other living and nonliving natural resources under the jurisdiction or control of the United States, because of an actual or threatened discharge of oil from any vessel or offshore or onshore facility into or upon the navigable waters of the United States.

(d) Response actions to remove discharges originating from operations conducted subject to the Outer Continental Shelf Lands Act shall be in accordance with the NCP.

(e) Where appropriate, when a discharge involves radioactive materials, the lead or support federal agency shall act consistent with the notification and assistance procedures described in the appropriate Federal Radiological Plan. For the purpose of the NCP, the Federal Radiological Emergency Response Plan (FRERP) (50 FR 46542, November 8, 1985) is the appropriate plan. Most radiological discharges and releases do not result in FRERP activation and should be handled in accordance with the NCP. However, releases from nuclear incidents subject to requirements for financial protection established by the Nuclear Regulatory Commission under the Price-Anderson amendments (section 170) of the Atomic Energy Act are specifically excluded from CERCLA and NCP requirements.

(f) Removal actions involving nuclear weapons should be conducted in accordance with the joint Department of Defense, Department of Energy, and FEMA Agreement for Response to Nuclear Incidents and Nuclear Weapons Significant Incidents (January 8, 1981).

(g) If the situation is beyond the capability of state and local governments and the statutory authority of federal agencies, the President may, under the Disaster Relief Act of 1974, act upon a request by the Governor and declare a major disaster or emergency and appoint a FCO to coordinate all federal disaster assistance activities. In such cases, the OSC would continue to carry out OSC responsibilities under the NCP, but would coordinate those activities with the FCO to ensure consistency with other federal disaster assistance activities.

(h) In the event of a declaration of a major disaster by the President, FEMA may activate the FRP. An FCO, designated by the President, may implement the FRP and coordinate and direct emergency assistance and disaster relief of impacted individuals, business, and public services under the Robert T. Stafford Disaster Relief Act. Delivery of federal assistance is facilitated through twelve functional annexes to the FRP known as ESFs. EPA coordinates activities under ESF #10—Hazardous Materials, which addresses preparedness and response to hazardous materials and oil incidents caused by a natural disaster or other catastrophic event. In such cases, the OSC/RPM should coordinate response activities with the FCO, through the incident-specific ESF #10 Chair, to ensure consistency with federal disaster assistance activities.

5.3.2 General pattern of response. (a) When the OSC receives a report of a discharge, actions normally should be taken in the following sequence:

(1) Investigate the report to determine pertinent information such as the threat posed to public health or welfare or the environment, the type and quantity of polluting material, and the source of the discharge.

(2) Officially classify the size (*i.e.*, minor, medium, major) and type (*i.e.*, substantial threat to the public health or welfare, worst case discharge) of the discharge and determine the course of action to be followed to ensure effective and immediate removal, mitigation, or prevention of the discharge. Some discharges that are classified as a substantial threat to the public health or welfare may be further classified as a spill of national significance by the Administrator of EPA or the Commandant of the USCG. The appropriate course of action may be prescribed in 5.3.4, 5.3.5, and 5.3.6 of this appendix.

(A) When the reported discharge is an actual or potential major discharge, the OSC shall immediately notify the RRT and the NRC.

(B) When the investigation shows that an actual or potential medium discharge exists, the OSC shall recommend activation of the RRT, if appropriate.

(C) When the investigation shows that an actual or potential minor discharge exists, the OSC shall monitor the situation to ensure that proper removal action is being taken.

(3) If the OSC determines that effective and immediate removal, mitigation, or prevention of a discharge can be achieved by private party efforts, and where the discharge does not pose a substantial threat to the public health or welfare, determine whether the responsible party or other person is properly carrying out removal. Removal is being done properly when:

(A) The responsible party is applying the resources called for in its response plan to effectively and immediately remove, minimize, or mitigate threat(s) to public health and welfare and the environment; and

(B) The removal efforts are in accordance with applicable regulations, including the NCP. Even if the OSC supplements responsible party resources with government resources, the spill response will not be considered improper, unless specifically determined by the OSC.

(4) Where appropriate, determine whether a state or political subdivision thereof has the capability to carry out any or all removal actions. If so, the OSC may arrange funding to support these actions.

(5) Ensure prompt notification of the trustees of affected natural resources in accordance with the applicable RCP and ACP.

(b) Removal shall be considered complete when so determined by the OSC in consultation with the Governor or Governors of the affected states. When the OSC considers removal complete, OSLTF removal funding shall end. This determination shall not preclude additional removal actions under applicable state law.

5.3.3 Containment, countermeasures, and cleanup. (a) Defensive actions shall begin as soon as possible to prevent, minimize, or mitigate threat(s) to the public health or welfare or the environment. Actions may include but are not limited to: analyzing water samples to determine the source and spread of the oil; controlling the source of discharge; source and spread control or salvage operations; placement of physical barriers to deter the spread of the oil and to protect natural resources and sensitive ecosystems; measuring and sampling; control of the water discharged from upstream impoundment; and the use of chemicals and other materials in accordance with subpart J of part 300 of the NCP to restrain the spread of the oil and mitigate its effects. The ACP should be consulted for procedures to be followed for obtaining an expedited decision regarding the use of dispersants and other products listed on the NCP Product Schedule.

(b) As appropriate, actions shall be taken to recover the oil or mitigate its effects. Of the numerous chemical or physical methods that may be used, the chosen methods shall be the most consistent with protecting public health and welfare and the environment. Sinking agents shall not be used.

(c) Oil and contaminated materials recovered in cleanup operations shall be disposed of in accordance with the RCP, ACP, and any applicable laws, regulations, or requirements. RRT and Area Committee guidelines may identify the disposal options available during an oil spill response and may describe what disposal requirements are mandatory or may not be waived by the OSC. ACP guidelines should address: the sampling, testing, and classifying of recovered oil and oiled debris; the segregation and stockpiling of recovered oil and oiled debris; prior state disposal approvals and permits; and the routes; methods (e.g. recycle/reuse, on-site burning, incineration, landfilling, etc.); and sites for the disposal of collected oil, oiled debris, and animal carcasses; procedures for obtaining waivers, exemptions, or authorizations associated with handling or transporting waste materials. The ACPs may identify a hierachy of preferences for disposal alternatives, with recycling (reprocessing) being the most preferred, and other alternatives preferred based on priorities for health or the environment.

5.3.4 Response to a substantial threat to the public health or welfare. (a) The OSC shall determine whether a discharge results in a substantial threat to public health or welfare (including, but not limited to, fish, shellfish, wildlife, other natural resources, the public and private beaches, and shorelines of the United States). Factors to be considered by the OSC in making this determination include, but are not limited to, the size of the discharge, the character of the discharge, and the nature of the threat to public health or welfare. Upon obtaining such information, the OSC shall conduct an evaluation of the threat posed, based on the OSC's experience in assessing other discharges and consultation with senior lead agency officials and readily available authorities on issues outside the OSC's technical expertise.

(b) If the investigation by the OSC shows that the discharge poses or may present a substantial threat to public health or welfare, the OSC shall direct all federal, state, or private actions to remove the discharge or to mitigate or prevent the threat of such a discharge, as appropriate. In directing the response in such cases, the OSC may act without regard to any other provision of law governing contracting procedures or employment of personnel by the federal government to:

(1) Remove or arrange for the removal of the discharge;

(2) Mitigate or prevent the substantial threat of the discharge; and

(3) Remove and, if necessary, destroy a vessel discharging, or threatening to discharge, by whatever means are available.

(c) In the case of a substantial threat to the public health or welfare, the OSC shall:

(1) Assess opportunities for the use of various special teams and other assistance, including the use of the services of the NSFCC, as appropriate;

(2) Request immediate activation of the RRT; and

(3) Take whatever additional response actions are deemed appropriate, including but not limited to implementation of the ACP or relevant tank vessel or facility response plan.

(d) When requested by the OSC, the lead agency or RRT shall dispatch appropriate personnel to the scene of the discharge to assist the OSC. This assistance may include technical support in the agency's areas of expertise and disseminating information to the public. The lead agency shall ensure that a contracting officer is available on scene, at the request of the OSC.

5.3.5 Enhanced activities during a spill of national significance. (a) A discharge may be classified as an SONS by the Administrator of EPA for discharges occurring in the inland zone and the Commandant of the USCG for discharges occurring in the coastal zone.

(b) For an SONS in the inland zone, the EPA Administrator may name a senior Agency official to assist the OSC in: (1) Communicating with affected parties and the public; and (2) coordinating federal, state, local, and international resources at the national level. This strategic coordination will involve, as appropriate, the NRT, RRT(s), the Governor(s) of affected state(s), and the mayor(s) or other chief executive(s) of local government(s).

(c) For an SONS in the coastal zone, the USCG Commandant may name a National Incident Commander (NIC) who will assume the role of the OSC in: (1) Communicating with affected parties and the public; and (2) coordinating federal, state, local, and international resources at the national level. This strategic coordination shall involve, as appropriate, the NRT, RRT(s), the Governor(s) of affected state(s), and the mayor(s) or other chief executive(s) of local government(s).

5.3.6 Response to worst case discharges. (a) If the investigation by the OSC shows that a discharge is a worst case discharge as defined in the ACP, or there is a substantial threat of such a discharge, the OSC shall:

(1) Notify the NSFCC;

(2) Require, where applicable, implementation of the worst case portion of an approved tank vessel or facility response plan;

(3) Implement the worst case portion of the ACP, if appropriate; and

(4) Take whatever additional response actions are deemed appropriate.

(b) Under the direction of the OSC, the NSFCC shall coordinate use of private and public personnel and equipment, including strike teams, to remove a worst case discharge and mitigate or prevent a substantial threat of such a discharge.

5.3.7 Multi-regional responses. (a) If a discharge moves from the area covered by one ACP or RCP into another area, the authority for response actions should likewise shift. If a discharge affects areas covered by two or more ACPs or RCPs, the response mechanisms of each applicable plan may be activated. In this case, response actions of all regions concerned shall be fully coordinated as detailed in the RCPs and ACPs.

(b) There shall be only one OSC at any time during the course of a response operation. Should a discharge affect two or more areas, EPA, the USCG, DOD, DOE, or other lead agency, as appropriate, shall give prime consideration to the area vulnerable to the greatest threat, in determining which agency should provide the OSC. The RRT shall designate the OSC if the RRT member agencies who have response authority within the affected areas are unable to agree on the designation. The NRT shall designate the OSC if members of one RRT or two adjacent RRTs are unable to agree on the designation.

5.3.8 Worker health and safety. (a) Response actions under the NCP shall comply with the provisions for response action worker safety and health in 29 CFR 1910.120. The national response system meets the requirements of 29 CFR 1910.120 concerning use of an incident command system.

(b) In a response action taken by a responsible party, the responsible party must assure that an occupational safety and health program consistent with 29 CFR 1910.120 is made available for the protection of workers at the response site.

(c) In a response taken under the NCP by a lead agency, an occupational safety and health program should be made available for the protection of workers at the response site, consistent with, and to the extent required by, 29 CFR 1910.120. Contracts relating to a response action under the NCP should contain assurances that the contractor at the response site will comply with this program and with any applicable provisions of the Occupational Safety and Health Act of 1970 (OSH Act) and state laws with plans approved under section 18 of the OSH Act.

(d) When a state, or political subdivision of a state, without an OSHA-approved state plan is the lead agency for response, the state or political subdivision must comply with standards in 40 CFR part 311, promulgated by the EPA pursuant to section 126(f) of the Superfund Amendments and Reauthorization Act of 1986 (SARA).

(e) Requirements, standards, and regulations of the OSH Act and of state OSH laws not directly referenced in paragraphs (a) through (d) of this section, must be complied with where applicable. Federal OSH Act requirements include, among other things, Construction Standards (29 CFR part 1926), General Industry Standards (29 CFR part 1910), and the general duty requirement of section 5(a)(1) of the OSH Act (29 U.S.C. 654(a)(1)). No action by the lead agency with respect to response activities under the NCP constitutes an exercise of statutory authority within the meaning of section 4(b)(1) of the OSH Act. All governmental agencies and private employers are directly responsible for the health and safety of their own employees.

5.4 Disposal

Oil recovered in cleanup operations shall be disposed of in accordance with the RCP, ACP, and any applicable laws, regulations, or requirements. RRT and ACP guidelines may identify the disposal plans to be followed during an oil spill response and may address: the sampling, testing, and classifying of recovered oil and oiled debris; the segregation and stockpiling of recovered oil and oiled debris; prior state disposal approvals and permits; and the routes; methods (e.g., recycle/reuse, on-site burning, incineration, landfilling, etc.); and sites for the disposal of collected oil, oiled debris, and animal carcasses.

5.5 Natural Resource Trustees

5.5.1 Damage assessment. (a) Upon notification or discovery of injury to, destruction of, loss of, or threat to natural resources, trustees may, pursuant to section 1006 of the OPA, take the following actions as appropriate:

(1) Conduct a preliminary survey of the area affected by the discharge to determine if trust resources under their jurisdiction are, or potentially may be, affected;

(2) Cooperate with the OSC in coordinating assessments, investigations, and planning;

(3) Carry out damage assessments; or

(4) Devise and carry out a plan for restoration, rehabilitation, replacement, or acquisition of equivalent natural resources. In assessing damages to natural resources, the federal, state, and Indian tribe trustees have the option of following the procedures for natural resource damage assessments located at 43 CFR part 11.

(b) Upon notification or discovery of injury to, destruction of, loss of, or loss of use of, natural resources, or the potential for such, resulting from a discharge of oil occurring after August 18, 1990, the trustees, pursuant to section 1006 of the OPA, are to take the following actions:

(1) In accordance with OPA section 1006(c), determine the need for assessment of natural resource damages, collect data necessary for a potential damage assessment, and, where appropriate, assess damages to natural resources under their trusteeship; and

(2) As appropriate, and subject to the public participation requirements of OPA section 1006(c), develop and implement a plan for the restoration, rehabilitation, replacement, or acquisition of the equivalent, of the natural resources under their trusteeship.

(c)(1) The trustees, consistent with procedures specified in the Fish and Wildlife and Sensitive Environments Annex to the Area Contingency Plan, shall provide timely advice on recommended actions concerning trustee resources that are potentially affected by a discharge of oil. This may include providing assistance to the OSC in identifying/recommending pre-approved response techniques and in predesignating shoreline types and areas in ACPs.

(2) The trustees shall assure, through the lead administrative trustee, that the OSC is informed of their activities regarding natural resource damage assessment that may affect response operations in order to assure coordination and minimize any interference with such operations. The trustees shall assure, through the lead administrative trustee, that all data from the natural resource damage assessment activities that may support more effective operational decisions are provided in a timely manner to the OSC.

(3) The OSC deploys federal response resources, including but not limited to aircraft, vessels, and booms to contain and remove discharged oil. When circumstances permit, the OSC shall share the use of federal response resources with the trustees, providing trustee activities do not interfere with response actions. The lead administrative trustee facilitates effective and efficient communication between the OSC and the other trustees during response operations and is responsible for applying to the OSC for non-monetary federal response resources on behalf of all trustees. The lead administrative trustee is also responsible for applying to the National Pollution Funds Center for funding for initiation of damage assessment for injuries to natural resources.

(d) The authority of federal trustees includes, but is not limited to the following actions:

(1) Requesting that the Attorney General seek compensation from the responsible parties for the damages assessed and for the costs of an assessment and of restoration planning;

(2) Participating in negotiations between the United States and potentially responsible parties (PRPs) to obtain PRP-financed

or PRP-conducted assessments and restorations for injured resources or protection for threatened resources and to agree to covenants not to sue, where appropriate; and

(3) Initiating damage assessments, as provided in OPA section 6002.

(e) Actions which may be taken by any trustee pursuant to section 311(f)(5) of the CWA or section 1006 of the OPA include, but are not limited to, any of the following:

(1) Requesting that an authorized agency issue an administrative order or pursue injunctive relief against the parties responsible for the discharge; or

(2) Requesting that the lead agency remove, or arrange for the removal of any oil from a contaminated medium pursuant to section 311 of the CWA.

5.5.2 Lead administrative trustee. The lead administrative trustee is a natural resource trustee who is designated on an incident-by-incident basis and chosen by the other trustees whose natural resources are affected by the incident. The lead administrative trustee facilitates effective and efficient communication between the OSC and the other trustees during response operations and is responsible for applying to the OSC for non-monetary federal response resources on behalf of all trustees. The lead administrative trustee is also responsible for applying to the National Pollution Funds Center for funding for initiation of damage assessment for injuries to natural resources.

5.5.3 OSC coordination. (a) The OSC shall ensure that the natural resource trustees are promptly notified in the event of any discharge of oil, to the maximum extent practicable, as provided in the Fish and Wildlife and Sensitive Environments Plan annex to the ACP for the area in which the discharge occurs. The OSC and the trustees shall coordinate assessments, evaluations, investigations, and planning with respect to appropriate removal actions. The OSC shall consult with the affected trustees on the appropriate removal action to be taken.

(b) The trustees will provide timely advice concerning recommended actions with regard to trustee resources that are potentially affected. This may include providing assistance to the OSC in identifying/recommending pre-approved response techniques, and in predesignating shoreline types and areas in ACPs.

(c) The trustees also will assure that the OSC is informed of their activities regarding natural resource damage assessment that may affect response operations.

5.5.4 Dissemination of information. (a) When an incident occurs, it is imperative to give the public prompt, accurate information on the nature of the incident and the actions underway to mitigate the damage. OSCs and community relations personnel should ensure that all appropriate public and private interests are kept informed and that their concerns are considered throughout a response. They should coordinate with available public affairs/community relations resources to carry out this responsibility by establishing, as appropriate, a Joint Information Center bringing together resources from federal and state agencies and the responsible party.

(b) An on-scene news office may be established to coordinate media relations and to issue official federal information on an incident. Whenever possible, it will be headed by a representative of the lead agency. The OSC determines the location of the on-scene news office, but every effort should be made to locate it near the scene of the incident. If a participating agency believes public interest warrants the issuance of statements and an on-scene news office has not been established, the affected agency should recommend its establishment. All federal news releases or statements by participating agencies should be cleared through the OSC. Information dissemination relating to natural resource damage assessment activities shall be coordinated through the lead administrative trustee. The designated lead administrative trustee may assist the OSC by disseminating information on issues relating to damage assessment activities. Following termination of the removal activity, information dissemination on damage assessment activities shall be through the lead administrative trustee.

5.5.5 Responsibilities of trustees. (a) Where there are multiple trustees, because of coexisting or contiguous natural resources or concurrent jurisdictions, they should coordinate and cooperate in carrying out these responsibilities.

(b) Trustees are responsible for designating to the RRTs and the Area Committees, for inclusion in the RCP and the ACP, appropriate contacts to receive notifications from the OSCs of discharges.

(c)(1) Upon notification or discovery of injury to, destruction of, loss of, or threat to natural resources, trustees may, pursuant to section 311(f)(5) of the CWA, take the following or other actions as appropriate:

(A) Conduct a preliminary survey of the area affected by the discharge or release to determine if trust resources under their jurisdiction are, or potentially may be, affected;

(B) Cooperate with the OSC in coordinating assessments, investigations, and planning;

(C) Carry out damage assessments; or

(D) Devise and carry out a plan for restoration, rehabilitation, replacement, or acquisition of equivalent natural resources. In assessing damages to natural resources, the federal, state, and Indian tribe trustees have the option of following the procedures for natural resource damage assessments located at 43 CFR part 11.

(2) Upon notification or discovery of injury to, destruction of, loss of, or loss of use of, natural resources, or the potential for such, resulting from a discharge of oil occurring after August 18, 1990, the trustees, pursuant to section 1006 of the OPA, are to take the following actions:

(A) In accordance with OPA section 1006(c), determine the need for assessment of natural resource damages, collect data necessary for a potential damage assessment, and, where appropriate, assess damages to natural resources under their trusteeship; and

(B) As appropriate, and subject to the public participation requirements of OPA section 1006(c), develop and implement a plan for the restoration, rehabilitation, replacement, or acquisition of the equivalent, of the natural resources under their trusteeship;

(3)(A) The trustees, consistent with procedures specified in the Fish and Wildlife and Sensitive Environments Annex to the Area Contingency Plan, shall provide timely advice on recommended actions concerning trustee resources that are potentially affected by a discharge of oil. This may include providing assistance to the OSC in identifying/recommending pre-approved response techniques and in predesignating shoreline types and areas in ACPs.

(B) The trustees shall assure, through the lead administrative trustee, that the OSC is informed of their activities regarding natural resource damage assessment that may affect response operations in order to assure coordination and minimize any interference with such operations. The trustees shall assure, through the lead administrative trustee, that all data from the natural resource damage assessment activities that may support more effective operational decisions are provided in a timely manner to the OSC.

(C) When circumstances permit, the OSC shall share the use of federal response resources (including but not limited to aircraft, vessels, and booms to contain and remove discharged oil) with the trustees, providing trustee activities do not interfere with response actions. The lead administrative trustee facilitates effective and efficient communication between the OSC and the other trustees during response operations and is responsible for applying to the OSC for non-monetary federal response resources on behalf of all trustees. The lead administrative trustee also is responsible for applying to the National Pollution Funds Center for funding for initiation of damage assessment for injuries to natural resources.

(d) The authority of federal trustees includes, but is not limited to the following actions:

(1) Requesting that the Attorney General seek compensation from the responsible parties for the damages assessed and for the costs of an assessment and of restoration planning; and

(2) Initiating damage assessments, as provided in OPA section 6002.

(e) Actions which may be taken by any trustee pursuant to section 1006 of the OPA include, but are not limited to, any of the following:

(1) Requesting that an authorized agency issue an administrative order or pursue injunctive relief against the parties responsible for the discharge or release; or

(2) Requesting that the lead agency remove, or arrange for the removal of, or provide for remedial action with respect to, any oil from a contaminated medium pursuant to section 311 of CWA.

5.6 Oil spill liability trust fund.

5.6.1 Funding. (a) The OSLTF is available under certain circumstances to fund removal of oil performed under section 311 of the CWA. Those circumstances and the procedures for accessing the OSLTF are described in 33 CFR subchapter M. The responsible party is liable for costs of federal removal and damages in accordance with section 311(f) of the CWA, section 1002 of the OPA, and other federal laws.

(b) Response actions other than removal, such as scientific investigations not in support of removal actions or law enforcement, shall be provided by the agency with legal responsibility for those specific actions.

(c) The funding of a response to a discharge from a federally owned, operated, or supervised facility or vessel is the responsibility of the owning, operating, or supervising agency if it is a responsible party.

(d) The following agencies have funds available for certain discharge removal actions:

(1) DOD has two specific sources of funds that may be applicable to an oil discharge under appropriate circumstances. This does not consider military resources that might be made available under specific conditions.

(i) Funds required for removal of a sunken vessel or similar obstruction of navigation are available to the Corps of Engineers through Civil Works Appropriations, Operations and Maintenance, General.

(ii) The U.S. Navy (USN) may conduct salvage operations contingent on defense operational commitments, when funded by the requesting agency. Such funding may be requested on a direct cite basis.

(2) Pursuant to Title I of the OPA, the state or states affected by a discharge of oil may act where necessary to remove such discharge. Pursuant to 33 CFR subchapter M, states may be reimbursed from the OSLTF for the reasonable costs incurred in such a removal.

5.6.2 Claims. (a) Claims are authorized to be presented to the OSLTF under section 1013 of the OPA of 1990, for certain uncompensated removal costs or uncompensated damages resulting from the discharge, or substantial threat of discharge, of oil from a vessel or facility into or upon the navigable waters, adjoining shorelines, or exclusive economic zone of the United States.

(b) Anyone desiring to file a claim against the OSLTF may obtain general information on the procedure for filing a claim from the Director, National Pollution Funds Center, Suite 1000, 4200 Wilson Boulevard, Arlington, Virginia, 22203–1804, (703) 235–4756.

5.7 Documentation and Cost Recovery.

(a) All OSLTF users need to collect and maintain documentation to support all actions taken under the CWA. In general, documentation shall be sufficient to support full cost recovery for resources utilized and shall identify the source and circumstances of the incident, the responsible party or parties, and impacts and potential impacts to public health and welfare and the environment. Documentation procedures are contained in 33 CFR subchapter M.

(b) When appropriate, documentation shall also be collected for scientific understanding of the environment and for research and development of improved response methods and technology. Funding for these actions is restricted by section 6002 of the OPA.

(c) As requested by the NRT or RRT, the OSC shall submit to the NRT or RRT a complete report on the removal operation and the actions taken. The OSC report shall record the situation as it developed, the actions taken, the resources committed, and the problems encountered. The RRT shall review the OSC report with its comments or recommendations within 30 days after the RRT has received the OSC report.

(d) OSCs shall ensure the necessary collection and safeguarding of information, samples, and reports. Samples and information shall be gathered expeditiously during the response to ensure an accurate record of the impacts incurred. Documentation materials shall be made available to the trustees of affected natural resources. The OSC shall make available to the trustees of affected natural resources information and documentation in the OSC's possession that can assist the trustees in the determination of actual or potential natural resource injuries.

(e) Information and reports obtained by the EPA or USCG OSC shall be transmitted to the appropriate offices responsible for follow-up actions.

5.8 National response priorities

(a) Safety of human life must be given the top priority during every response action. This includes any search and rescue efforts in the general proximity of the discharge and the insurance of safety of response personnel.

(b) Stabilizing the situation to preclude the event from worsening is the next priority. All efforts must be focused on saving a vessel that has been involved in a grounding, collision, fire, or explosion, so that it does not compound the problem. Comparable measures should be taken to stabilize a situation involving a facility, pipeline, or other source of pollution. Stabilizing the situation includes securing the source of the spill and/or removing the remaining oil from the container (vessel, tank, or pipeline) to prevent additional oil spillage, to reduce the need for follow-up response action, and to minimize adverse impact to the environment.

(c) The response must use all necessary containment and removal tactics in a coordinated manner to ensure a timely, effective response that minimizes adverse impact to the environment.

(d) All parts of this national response strategy should be addressed concurrently, but safety and stabilization are the highest priorities. The OSC should not delay containment and removal decisions unnecessarily and should take actions to minimize adverse impact to the environment that begin as soon as a discharge occurs, as well as actions to minimize further adverse environmental impact from additional discharges.

(e) The priorities set forth in this section are broad in nature, and should not be interpreted to preclude the consideration of other priorities that may arise on a site-specific basis.

6.0 Response coordination

6.1 Nongovernmental participation. (a) Industry groups, academic organizations, and others are encouraged to commit resources for response operations. Specific commitments should be listed in the RCP and ACP. Those entities required to develop tank vessel and facility response plans under CWA section 311(j) must be able to respond to a worst case discharge to the maximum extent practicable, and should commit sufficient resources to implement other aspects of those plans.

(b) The technical and scientific information generated by the local community, along with information from federal, state, and local governments, should be used to assist the OSC in devising response strategies where effective standard techniques are unavailable. Such information and strategies will be incorporated into the ACP, as appropriate. The SSC may act as liaison between the OSC and such interested organizations.

(c) ACPs shall establish procedures to allow for well organized, worthwhile, and safe use of volunteers, including compliance with requirements regarding worker health and safety. ACPs should provide for the direction of volunteers by the OSC or by other federal, state, or local officials knowledgeable in contingency operations and capable of providing leadership. ACPs also should identify specific areas in which volunteers can be used, such as beach surveillance, logistical support, and bird and wildlife treatment. Unless specifically requested by the OSC, volunteers generally should not be used for physical removal or remedial activities. If, in the judgment of the OSC, dangerous conditions exist, volunteers shall be restricted from on-scene operations.

(d) Nongovernmental participation must be in compliance with the requirements of subpart H of the NCP if any recovery of costs will be sought.

6.2 Natural resource trustees.

6.2.1 Federal agencies. (a) The President is required to designate in the NCP those federal officials who are to act on behalf of the public as trustees for natural resources. These designated federal officials shall act pursuant to section 1006 of the OPA. ''Natural resources'' means land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled (hereinafter referred to as ''managed or controlled'') by the United States, including the resources of the exclusive economic zone.

(b) The following individuals shall be the designated trustee(s) for general categories of natural resources, including their supporting ecosystems. They are authorized to act pursuant to section 1006 of the OPA when there is injury to, destruction of, loss of, or threat to natural resources, including their supporting ecosystems as a result of a discharge of oil. Notwithstanding the other designations in this section, the Secretaries of Commerce and the Interior shall act as trustees of those resources subject to their respective management or control.

(1) The Secretary of Commerce shall act as trustee for natural resources managed or controlled by DOC and for natural resources managed or controlled by other federal agencies and that are found in, under, or using waters navigable by deep draft vessels, tidally influenced waters or waters of the contiguous zone, the exclusive economic zone, and the outer continental shelf. However, before the Secretary takes an action with respect to an affected resource under the management or control of another federal agency, he shall, whenever practicable, seek to obtain concurrence of that other federal agency. Examples of the Secretary's trusteeship include the following natural resources and their supporting ecosystems: marine fishery resources; anadromous fish; endangered species and marine mammals; and the resources of National Marine Sanctuaries and National Estuarine Research Reserves.

(2) The Secretary of the Interior shall act as trustee for natural resources managed or controlled by DOI. Examples of the Secretary's trusteeship include the following natural resources and their supporting ecosystems: migratory birds; anadromous fish; endangered species and marine mammals; federally owned minerals; and certain federally managed water resources. The Secretary of the Interior shall also be trustee for those natural resources for which an Indian tribe would otherwise act as trustee in those cases where the United States acts on behalf of the Indian tribe.

(3) Secretary for the land managing agency. For natural resources located on, over, or under land administered by the United States, the trustee shall be the head of the department in which the land managing agency is found. The trustees for the principal federal land managing agencies are the Secretaries of DOI, USDA, DOD, and DOE.

(4) Head of Authorized Agencies. For natural resources located within the United States but not otherwise described in this section, the trustee is the head of the federal agency or agencies authorized to manage or control those resources.

6.2.2 State. (a) State trustees shall act on behalf of the public as trustees for natural resources, including their supporting ecosystems, within the boundary of a state or belonging to, managed by, controlled by, or appertaining to such state. For the purposes of section 6.1, the definition of the term ''state'' does not include Indian tribes.

(b) The Governor of a state is encouraged to designate a lead state trustee to coordinate all state trustee responsibilities with other trustee agencies and with response activities of the RRT and OSC. The state's lead trustee would designate a representative to serve as a contact with the OSC. This individual should have ready access to appropriate state officials with environmental protection, emergency response, and natural resource responsibilities. The EPA Administrator or USCG Commandant or their designees may appoint the lead state trustee as a member of the Area Committee. Response strategies should be coordinated between the state and other trustees and the OSC for specific natural resource locations in an inland or coastal zone, and should be included in the Fish and Wildlife and Sensitive Environments Plan annex of the ACP.

6.2.3 Indian tribes. The tribal chairmen (or heads of the governing bodies) of Indian tribes, as defined in section 1.5, or a person designated by the tribal officials, shall act on behalf of the Indian tribes as trustees for the natural resources, including their supporting ecosystems, belonging to, managed by, controlled by, or appertaining to such Indian tribe, or held in trust for the benefit of such Indian tribe, or belonging to a member of such Indian tribe, if such resources are subject to a trust restriction on alienation. When the tribal chairman or head of the tribal governing body designates another person as trustee, the tribal chairman or head of the tribal governing body shall notify the President of such designation.

6.2.4 Foreign trustees. Pursuant to section 1006 of the OPA, foreign trustees shall act on behalf of the head of a foreign government as trustees for natural resources belonging to, managed by, controlled by, or appertaining to such foreign government.

6.3 Federal agencies.

(a) Federal agencies listed in this appendix have duties established by statute, executive order, or Presidential directive which may apply to federal response actions following, or in prevention of, the discharge of oil. Some of these agencies also have duties relating to the restoration, rehabilitation, replacement, or acquisition of equivalent natural resources injured or lost as a result of such discharge. The NRT, RRT, and Area Committee organizational structure, and the NCP, RCPs, and ACPs provide for agencies to coordinate with each other in carrying out these duties.

(b) Federal agencies may be called upon by an OSC during response planning and implementation to provide assistance in their respective areas of expertise, consistent with the agencies' capabilities and authorities.

(c) In addition to their general responsibilities, federal agencies should:

(1) Make necessary information available to the Secretary of the NRT, RRTs, Area Committees, and OSCs;

(2) Provide representatives to the NRT and RRTs and otherwise assist RRTs and OSCs, as necessary, in formulating RCPs and ACPs; and

(3) Inform the NRT, RRTs, and Area Committees consistent with national security considerations, of changes in the availability of resources that would affect the operations implemented under the NCP.

(d) All federal agencies must report discharges of oil, as required in 40 CFR part 110, from vessels or facilities under their jurisdiction or control to the NRC.

6.4 Other Federal agencies.

6.4.1 Department of Commerce. (a) The DOC, through NOAA, provides scientific support for response and contingency planning in coastal and marine areas, including assessments of the hazards that may be involved, predictions of movement and dispersion of oil through trajectory modeling, and information on the sensitivity of coastal environments to oil and associated cleanup and mitigation methods; provides expertise on living marine resources and their habitats, including endangered species, marine mammals and National Marine Sanctuary ecosystems; and provides information on actual and predicted meteorological, hydrological, ice, and oceanographic conditions for marine, coastal, and inland waters, and tide and circulation data for coastal and territorial waters and for the Great Lakes. In addition to this expertise, NOAA provides SSCs in the coastal zone, as described under section 3.3.3 of this appendix, Special teams.

6.4.2 Department of Justice. The DOJ can provide expert advice on complicated legal questions arising from discharges, and federal agency responses. In addition, the DOJ represents the federal government, including its agencies, in litigation relating to such discharges. Other legal issues or questions shall be directed to the federal agency counsel for the agency providing the OSC for the response.

6.4.3 Department of Defense. The DOD has responsibility to take all action necessary with respect to discharges where either the discharge is on, or the sole source of a discharge is from, any facility or vessel under the jurisdiction, custody, or control of DOD. In addition to those capabilities provided by SUPSALV, DOD may also, consistent with its operational requirements and upon request of the OSC, provide locally deployed USN oil spill response equipment and provide assistance to other federal agencies upon request. The following two branches of DOD have particularly relevant expertise:

(a) The United States Army Corps of Engineers has specialized equipment and personnel for maintaining navigation channels, for removing navigation obstructions, for accomplishing structural repairs, and for performing maintenance to hydropower electric generating equipment. The Corps can also provide design services, perform construction, and provide contract writing and contract administrative services for other federal agencies.

(b) The U.S. Navy Supervisor of Salvage (SUPSLAV) is the branch of the service within DOD most knowledgeable and experienced in ship salvage, shipboard damage control, and diving. The USN has an extensive array of specialized equipment and personnel available for use in these areas as well as specialized containment, collection, and removal equipment specifically designed for salvage-related and open-sea pollution incidents.

6.4.4 Department of Health and Human Services. (a) The HHS assists with the assessment, preservation, and protection of human health and helps ensure the availability of essential human services. HHS provides technical and nontechnical assistance in the form of advice, guidance, and resources to other federal agencies as well as state and local governments.

(b) The principal HHS response comes from the U.S. Public Health Service and is coordinated from the Office of the Assistant Secretary for Health, and various Public Health Service regional offices. Within the Public Health Service, the primary response to a hazardous materials emergency comes from the Agency for Toxic Substances and Disease Registry (ATSDR) and the Centers for Disease Control (CDC). Both ATSDR and CDC have a 24-hour emergency response capability wherein scientific and technical personnel are available to provide technical assistance to the lead federal agency and state and local response agencies on human health threat assessment and analysis, and exposure prevention and mitigation. Such assistance is used for situations requiring evacuation of affected areas, human exposure to hazardous materials, and technical advice on mitigation and prevention. CDC takes the lead during petroleum releases regulated under the CWA and OPA while ATSDR takes the lead during chemical releases under CERCLA. Both agencies are mutually supportive.

(c) Other Public Health Service agencies involved in support during hazardous materials incidents either directly or through ATSDR/CDC include the Food and Drug Administration, the Health Resources and Services Administration, the Indian Health Service, and the National Institutes of Health.

(d) Statutory authority for HHS/National Institutes for Environmental Health Sciences (NIEHS) involvement in hazardous materials accident prevention is non-regulatory in nature and focused on two primary areas for preventing community and worker exposure to hazardous materials releases: (1) worker safety training and (2) basic research activities. Under section 126 of the SARA, NIEHS is given statutory authority for supporting development of curricula and model training programs for waste workers and chemical emergency responders. Under section 118(b) of the Hazardous Materials Transportation and Uniform Safety Act, NIEHS also administers the Hazmat Employee Training Program to prepare curricula and training for hazardous materials transportation workers. In the basic research arena, NIEHS is authorized under section 311 of SARA to conduct a hazardous substance basic research and training program to evaluate toxic effects and assess human health risks from accidental releases of hazardous materials. Under Title IX, section 901(h) of the Clean Air Act Amendments, NIEHS also is authorized to conduct basic research on air pollutants, as well as train physicians in environmental health. Federal research and training in hazardous materials release prevention represents an important non-regulatory activity and supplements ongoing private sector programs.

6.4.5 Department of the Interior. The DOI may be contacted through Regional Environmental Officers, who are the designated members of RRTs. Department land managers have jurisdiction over the national park system, national wildlife refuges and fish hatcheries, the public lands, and certain water projects in western states. In addition, bureaus and offices have relevant expertise as follows:

(a) United States Fish and Wildlife Service and other Bureaus: Anadromous and certain other fishes and wildlife, including endangered and threatened species, migratory birds, and certain marine mammals; waters and wetlands; and effects on natural resources.

(b) The National Biological Survey performs research in support of biological resource management; inventories, monitors, and reports on the status and trends in the Nation's biotic resources; and transfers the information gained in research and monitoring to resource managers and others concerned with the care, use, and conservation of the Nation's natural resources. The National Biological Survey has laboratory/research facilities.

(c) Geological Survey: Geology, hydrology (ground water and surface water), and natural hazards.

(d) Bureau of Land Management: Minerals, soils, vegetation, wildlife, habitat, archaeology, and wilderness.

(e) Minerals Management Service: Oversight of offshore oil and gas exploration and production facilities and associated pipeline facilities under the Outer Continental Shelf Lands Act and the CWA; oil spill response technology research; and establishing oil discharge contingency planning requirements for offshore facilities.

(f) Bureau of Mines: Analysis and identification of inorganic hazardous substances and technical expertise in metals and metallurgy relevant to site cleanup.

(g) Office of Surface Mining: Coal mine wastes and land reclamation.

(h) National Park Service: General biological, natural, and cultural resource managers to evaluate, measure, monitor, and contain threats to park system lands and resources; archaeological and historical expertise in protection, preservation, evaluation, impact mitigation, and restoration of cultural resources; emergency personnel.

(i) Bureau of Reclamation: Operation and maintenance of water projects in the West; engineering and hydrology; and reservoirs.

(j) Bureau of Indian Affairs: Coordination of activities affecting Indian lands; assistance in identifying Indian tribal government officials.

(k) Office of Territorial Affairs: Assistance in implementing the NCP in American Somoa, Guam, the Pacific Island Governments, the Northern Mariana Islands, and the Virgin Islands.

6.4.6 Department of Justice. The DOJ can provide expert advice on complicated legal questions arising from discharges, and federal agency responses. In addition, the DOJ represents the federal government, including its agencies, in litigation relating to such discharges. Other legal issues or questions shall be directed to the federal agency counsel for the agency providing the OSC for the response.

6.4.7 Department of Labor. The DOL, through OSHA and the states operating plans approved under section 18 of the OSH Act, has authority to conduct safety and health inspections of hazardous waste sites to assure that employees are being protected and to determine if the site is in compliance with:

(a) Safety and health standards and regulations promulgated by OSHA (or the states) in accordance with section 126 of SARA and all other applicable standards; and

(b) Regulations promulgated under the OSH Act and its general duty clause. OSHA inspections may be self-generated, consistent with its program operations and objectives, or may be conducted in response to requests from EPA or another lead agency, or in response to accidents or employee complaints. On request, OSHA shall provide advice and consultation to EPA and other NRT/RRT agencies as well as to the OSC regarding hazards to persons engaged in response activities. OSHA may also take any other action necessary to assure that employees are properly protected at such response activities. Any questions about occupational safety and health at these sites may be referred to the OSHA Regional Office.

6.4.8 Federal Emergency Management Agency. FEMA provides guidance, policy and program advice, and technical assistance in hazardous materials, chemical, and radiological emergency preparedness activities (including planning, training, and exercising). FEMA's primary point of contact for administering financial and technical assistance to state and local governments to support their efforts to develop and maintain an effective emergency management and response capability is the Preparedness, Training, and Exercises Directorate.

6.4.9 Department of Energy. The DOE generally provides designated OSCs that are responsible for taking all response actions with respect to releases where either the release is on, or the sole source of the release is from, any facility or vessel under its jurisdiction, custody, or control, including vessels bareboat-chartered and operated. In addition, under the FRERP, DOE provides advice and assistance to other OSCs/RPMs for emergency actions essential for the control of immediate radiological hazards. Incidents that qualify for DOE radiological advice and assistance are those believed to involve source, by-product, or special nuclear material or other ionizing radiation sources, including radium, and other naturally occurring radionuclides, as well as particle accelerators. Assistance is available through direct contact with the appropriate DOE Radiological Assistance Program Regional Office.

6.4.10 Department of State. The DOS will lead in the development of international joint contingency plans. It will also help to coordinate an international response when discharges or releases cross international boundaries or involve foreign flag vessels. Additionally, DOS will coordinate requests for assistance from foreign governments and U.S. proposals for conducting research at incidents that occur in waters of other countries.

6.4.11 General Services Administration. The GSA provides logistic and telecommunications support to federal agencies. During an emergency situation, GSA quickly responds to aid state and local governments as directed by other Federal Agencies. The type of support provided might include leasing and furnishing office space, setting up telecommunications and transportation services, and advisory assistance.

6.4.12 Department of Transportation. DOT provides response expertise pertaining to transportation of oil by all modes of transportation. DOT, through RSPA, establishes oil discharge contingency planning requirements for pipelines, transport by rail and containers or bulk transport of oil.

6.5 States and local participation in response.

(a) Each state Governor is requested to designate one state office/representative to represent the state on the appropriate RRT. The state's office/representative may participate fully in all activities of the appropriate RRT. Each state Governor is also requested to designate a lead state agency that shall direct state-lead response operations. This agency is responsible for designating the OSC for state-lead response actions, and coordinating/communicating with any other state agencies, as appropriate. Local governments are invited to participate in activities on the appropriate RRT as may be provided by state law or arranged by the state's representative. Indian tribes wishing to participate should assign one person or office to represent the tribal government on the appropriate RRT.

(b) Appropriate state and local officials (including Indian tribes) shall participate as part of the response structure as provided in the ACP.

(c) In addition to meeting the requirements for local emergency plans under SARA section 303, state and local government agencies are encouraged to include contingency planning for responses, consistent with the NCP, RCP, and ACP in all emergency and disaster planning.

(d) For facilities not addressed under the CWA for oil discharges, states are encouraged to undertake response actions themselves or to use their authorities to compel potentially responsible parties to undertake response actions.

(e) Because state and local public safety organizations would normally be the first government representatives at the scene of a discharge or release, they are expected to initiate public safety measures that are necessary to protect the public health and welfare and that are consistent with containment and cleanup requirements in the NCP, and are responsible for directing evacuations pursuant to existing state or local procedures.

[59 FR 47473, Sept. 15, 1994, as amended at 80 FR 37121, June 29, 2015; 83 FR 5209, Feb. 6, 2018; 84 FR 56670, Oct. 22, 2019; 85 FR 22342, Apr. 21, 2020]

EFFECTIVE DATE NOTE: At 88 FR 38356, June 12, 2023, appendix E to part 300 was removed, effective Dec. 11, 2023.

PART 302—DESIGNATION, REPORTABLE QUANTITIES, AND NOTIFICATION

Sec.

AUTHORITY: 33 U.S.C. 1251 *et. seq.*, 42 U.S.C. 9601 *et. seq.*, 42 U.S.C. 9602, 42 U.S.C. 9603.

SOURCE: 50 FR 13474, Apr. 4, 1985, unless otherwise noted.

§ 302.1 Applicability.

This regulation designates under section 102(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (“the Act”) those substances in the statutes referred to in section 101(14) of the Act, identifies reportable quantities for these substances, and sets forth the notification requirements for releases of these substances. This regulation also sets forth reportable quantities for hazardous substances designated under section 311(b)(2)(A) of the Clean Water Act.

§ 302.2 [Reserved]

§ 302.3 Definitions.

As used in this part, all terms shall have the meaning set forth below:

The Act, CERCLA, or *Superfund* means the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Pub. L. 96–510);

Administrator means the Administrator of the United States Environmental Protection Agency (“EPA”);

Animal waste means feces, urine, or other excrement, digestive emission, urea, or similar substances emitted by animals (including any form of livestock, poultry, or fish). The term “animal waste” includes animal waste that is mixed or commingled with bedding, compost, feed, soil, or any other material typically found with such waste.

Consumer product shall have the meaning stated in 15 U.S.C. 2052;

Environment means (1) the navigable waters, the waters of the contiguous zone, and the ocean waters of which the natural resources are under the exclusive management authority of the United States under the Fishery Conservation and Management Act of 1976, and (2) any other surface water, ground water, drinking water supply, land surface or subsurface strata, or ambient air within the United States or under the jurisdiction of the United States;

Facility means (1) any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft, or (2) any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located; but does not include any consumer product in consumer use or any vessel;

Farm means a site or area (including associated structures) that—

(1) Is used for—

(i) The production of a crop; or

(ii) The raising or selling of animals (including any form of livestock, poultry, or fish); and

(2) Under normal conditions, produces during a farm year any agricultural products with a total value equal to not less than $1,000.