Appendix E

Environmental Management Cleanup Strategy Summaries

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Appendix E presents eight of DOE's Operations / Field Office summaries that were not presented in Chapter 3. Each summary contains a discussion of the EM mission managed by the Operation / Field Office. The discussion is broken into five sections: a general overview; a discussion of end state assumptions; the cost and completion dates for the sites and projects; a work scope summary; and the critical closure paths and programmatic risks of the strategy managed under the Operations / Field Office.

Included as part of each work scope summary for the eight Operations / Field Offices is a "Conceptual Summary Disposition Map." These maps show a summary of each office's current conceptual life-cycle approaches for managing EM wastes, nuclear materials and contaminated media — from their current status, through storage, treatment, and disposal — to achieve the assumed site end-states described in the relevant site strategy. In some cases, these conceptual approaches include shipping and off-site treatment and disposal.

The EM cleanup strategy summaries are presented in the following order:

Albuquerque Operations Office

Carlsbad Area Office

Chicago Operations Office

Idaho Operations Office

Nevada Operations Office

Oak Ridge Operations Office

Oakland Operations Office

Ohio Field Office

Additional information on all of the Operations / Field Offices can be found in the site versions of *Paths to Closure* and other supporting documents.

Conceptual Summary Disposition Maps compile information for the sites that report through the Operations or Field Offices. The maps do not reflect Headquarters-directed or national-level strategies for each site, Operations Office, or Field Office. Within each map, activities are organized into "streams," which are defined as groups of materials, media, or wastes having similar origins, management requirements, or barriers to disposition. The following seven waste, material, and media categories are depicted in the maps:

High-level waste

Transuranic waste

Mixed low-level waste

Low-level waste

Environmental restoration activities

Spent nuclear fuel

Nuclear materials

As has always been the case for this planning effort (reflected in December 1996 and October 1997 guidance to sites for environmental management strategy development), implementation of each element of the EM closure strategy is contingent upon the completion of whatever evaluation is required under the National Environmental Policy Act (NEPA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or other statute.

Decisions that remain to be made include those resulting from two DOE Environmental Impact Statements (EISs). Decisions on disposition of certain nuclear materials will be made pursuant to the Department's *Management of Certain Plutonium Bearing Residues and Scrub Alloys at the Rocky Flats Environmental Technology Site Environmental Impact Statement.* Until these decisions are made, the Conceptual Summary Disposition Maps reflect the "to be decided" (or "TBD") status of those materials.

Decisions on five waste types have been or will be made pursuant to the Department's May 1997 Final *Waste Management Programmatic Environmental Impact Statement* (WM PEIS). This nationwide NEPA analysis examined the potential environmental impacts of managing more than 2 million cubic meters of radioactive wastes from past, present, and future DOE activities. The Final WM PEIS identified preferred alternatives for transuranic waste treatment and storage, high-level waste storage, and hazardous waste treatment. The Department has identified preferred management strategies for mixed low-level waste treatment and disposal and low-level waste treatment and disposal. Preferred sites for these management activities have not yet been identified. The Department has committed to publicly identify its

preferred sites at least 30 days prior to issuing any Records of Decision for these two waste streams. As of February 1998, one Record of Decision has been issued from the WM PEIS — that for transuranic waste treatment and storage, and the Conceptual Summary Disposition Maps show specific disposition of transuranic waste consistent with that Record of Decision.

The Conceptual Summary Disposition Maps' depiction of environmental restoration activities differs from other waste or material management activities. Disposition paths for environmental restoration activities begin with "Contaminated Media" and show a "Response Strategy" for the media. All planning assumptions are still being evaluated under CERCLA and/or the Resource Conservation and Recovery Act (RCRA), and may change as more media characterization data becomes available, as comments are received from local stakeholders through public involvement processes, or as the regulatory agencies review and evaluate the various cleanup alternatives.

The Conceptual Summary Disposition Maps represent a "roll-up" from site-, waste-, material-, and media-specific maps. Volumes are approximate and have been rounded to two significant figures.

E.1 Albuquerque Operations Office Summary

The Albuquerque Operations Office is located on Kirtland Air Force Base, directly south of the City of Albuquerque, New Mexico. Historically, the Albuquerque Operations Office's primary mission has been to manage sites that were involved in research, development, production, and maintenance of nuclear weapons. In recent years, this mission has evolved to include environmental management, science and technology, technology transfer and commercialization, and national energy objectives.

The Albuquerque Operations Office provides oversight for environmental management activities to the following sites: the Lovelace Respiratory Research Institute (formerly the Inhalation Toxicology Research Institute); the Los Alamos National Laboratory; the Sandia National Laboratories in New Mexico and California; the South Valley Superfund Site; the Kansas City Plant; the Grand Junction Office; the Pantex Plant; Maxey Flats; the Pinellas Plant; the Monticello Millsite; and uranium mill tailings sites.

The ***Lovelace Respiratory Research Institute*** (formerly the Inhalation Toxicology Research Institute) was established in 1960 to conduct research on the human health consequences of inhaling airborne radioactive materials. Beginning in the 1980s, the program shifted to more basic research on the human respiratory tract and its response to inhaled toxicants.

Los Alamos National Laboratory was established in 1943 to design, develop, and test nuclear weapons. Research programs in nuclear physics, hydrodynamics, conventional explosives, chemistry, metallurgy, radiochemistry, and life sciences supported this mission. In addition to research, an important function of the Laboratory has been processing plutonium metal and alloys from nitrate solution feedstock provided by other production facilities. Processing plutonium metal took place from 1945 to 1978. Other operations included reprocessing nuclear fuel, processing polonium and actinium, and producing nuclear weapons components.

The ***Sandia National Laboratories*** were established in the 1940s as the engineering arm of the nuclear weapon development program. Sandia National Laboratories - New Mexico is a multi-program national laboratory with research and development programs in a broad range of scientific and technical fields, including fundamental energy research, energy conservation and renewable energy, nuclear reactor safety and reliability, nuclear waste management, and magnetic-confinement fusion. Sandia National Laboratories - California was established in 1956 to conduct research and development in the interest of national security, with principal emphasis on nuclear weapons development and engineering, excluding nuclear materials. It was provided to establish a close working relationship with Lawrence Livermore National Laboratory.

The ***Kansas City Plant*** was constructed in 1942 to build aircraft engines for the Navy. After World War II, it was used for storage, and in 1949 it was selected for its current mission, the manufacturing of nonnuclear components for nuclear weapons. Electrical, electromechanical, mechanical, and plastic components are manufactured or procured by this facility.

Maxey Flats was opened under a lease arrangement between the Commonwealth of Kentucky and the Nuclear Engineering Company (now U.S. Ecology, Inc.) of Louisville, Kentucky, in January 1963. The site contains long-lived radionuclides brought to the site from research laboratories, electric utilities, government and private health care facilities, manufacturing companies, and nuclear powerplants throughout the United States. DOE has no management responsibilities for the cleanup of this site, but pays a share of the costs.

The ***Pantex Plant*** was built by the United States Army in 1942 as a conventional bomb plant. The mission of the Pantex Plant involves fabricating high explosives for nuclear weapons, assembling nuclear weapons, maintaining and evaluating nuclear weapons in the stockpile, and dismantling nuclear weapons as they are retired from the stockpile. At present, the principal operation is the disassembly of nuclear weapons.

The ***Pinellas Plant*** has been part of the Department of Energy's (DOE) nuclear weapons complex since 1957. The plant's former mission was component fabrication. In September 1994, the plant stopped producing weapons-related components and began the transition from a defense mission to an environmental management mission. In 1997 this facility was closed and transferred to Pinellas County.

Grand Junction Office was established in 1943 under the Manhattan Engineer District. Between 1943 and 1946, the U.S. Vanadium Corporation constructed and operated a uranium refinery for the federal government at the site. As a result of past uranium-related activities, surface and near-surface soils, buildings (wood, concrete/brick and metal), and related equipment were contaminated with uranium mill tailings and ore. In addition to the cleanup of this contamination, the Grand Junction Office also serves as a central office for managing long-term surveillance and monitoring at some DOE sites.

Monticello Millsite was transferred to the Department of Energy's Environmental Management Program in 1987 for the remediation of contamination caused by past vanadium and uranium milling at the site. The Grand Junction Office is responsible for managing the cleanup activities at Monticello.

The ***Uranium Mill Tailings Remedial Action (UMTRA) Surface Projects and UMTRA Groundwater Projects*** manage the implementation of the Uranium Mill Tailing Radiation Control Act (UMTRCA). The United States Congress passed the UMTRCA in 1978 in response to public concern regarding potential health hazards of long-term exposure to radiation from uranium mill tailings. The Act authorized the Department to stabilize, dispose of, and control uranium mill tailings and other contaminated material at 24 uranium mill processing sites and approximately 5,200 associated vicinity properties. The 24 UMTRA sites include: Ambrosia Lake (New Mexico), Belfield (North Dakota), Bowman (North Dakota), Canonsburg (California), Durango (Colorado), Falls City (Texas), Grand Junction (Colorado), Green River (Utah), Gunnison (Colorado), Lakeview (Oregon), Lowman (Idaho), Maybell (Colorado), Mexican Hat (Utah), Monument Valley (Arizona), Naturita Site (Colorado), New Rifle (Colorado), Old Rifle (Colorado), Riverton (Wyoming), Salt Lake City (Utah), Shiprock (New Mexico), Slick Rock - Old North Continent (Colorado), Slick Rock - Union Carbide (Colorado), Spook (Wyoming), and Tuba City (Arizona).

E.1.1 End State

The Albuquerque Operations Office planned end states for each site at completion are compliance-based and can be achieved with currently available technology. Therefore, they are not likely to be modified as new technologies become available. While economics are likely to affect schedules, the Albuquerque Operations Office does not expect economic feasibility issues to affect impact planned end states significantly. Unanticipated new regulatory requirements have the greatest potential to change the planned end states at Albuquerque Operations Office sites.

The landlord programs at non-Office of Environmental Management (EM) sites will have responsibility for determining future use and final end state at the completion of EM activities. Facilities being decontaminated or decommissioned under EM programs will revert to landlord control upon completion. Plans call for EM control of active waste management facilities to be transferred to the generator or landlord program by 1999. So, while EM activities will terminate, these facilities will continue to operate with the final end state to be determined by the landlord program. Also, at these sites, DOE will maintain stewardship and overall land use will likely continue as is for the foreseeable future. Exhibit E-1 provides a summary of the anticipated end states for sites managed by the Albuquerque Operations Office.

Exhibit E-1
Summary of Albuquerque Operations Office End States

Site Name	End State Description
Ambrosia Lake (completed UMTRA site)	A Nuclear Regulatory Commission (NRC)-licensed disposal cell with a radon barrier cover and surface layer of rock rip-rap for erosion control will remain on site. Under the provisions of the UMTRCA, public access to the disposal cell will be restricted but future land use at the site is undetermined.
Belfield, Bowman (UMTRA sites)	At the request of the state of North Dakota, the Department plans to revoke the designation of these two sites under UMTRCA. As a result of the revocation, these sites will no longer require remediation under the UMTRCA and DOE will have no long-term stewardship requirements. Active groundwater remediation is not planned at this time.
Canonsburg, Falls City, Green River, Lakeview, Lowman, Shiprock, Spook (all completed UMTRA sites), Maybell (UMTRA site)	A NRC-licensed disposal cell will remain. Under the provisions of the UMTRCA, public access to the disposal cell will be restricted but future land use at the site is undetermined. Active groundwater remediation is not planned at this time.
Durango, Grand Junction/Cheney Cell (UMTRA sites)	The tailings have been disposed of in off-site disposal cells licensed by the NRC. Under the provisions of the UMTRCA, public access will be restricted but future land use at the site is undetermined. Site assumptions are that groundwater will undergo natural attenuation until the site meets EPA standards.
Grand Junction Office	Under the Grand Junction Office Remedial Action Project (GJORAP), all radiological contamination will be removed and disposed of off site. Contaminated buildings will be decontaminated or demolished so that the site can be released for unrestricted use. The remaining land and buildings will be transferred to private or other use, with no restrictions. Administrative control of groundwater will continue until it is verified that passive remediation has achieved cleanup goals.
Gunnison (completed UMTRA site)	All contaminated surface materials have been removed from the site and stabilized in a disposal cell licensed by the NRC. Site assumptions are that groundwater will undergo natural attenuation until the site meets EPA standards.

Exhibit E-1 (Continued)

Site Name	End State Description
Lovelace Respiratory Research Institute (LRRI)	This site was cleaned to industrial standards and closed in 1996 with neither surveillance nor monitoring activities required. Contaminated soil was shipped off site, but groundwater contamination exceeds the cleanup level of 10 ug/L set by the New Mexico Environmental Department. Natural attenuation of the nitrates is expected to reduce groundwater contamination levels below the cleanup standard. LRRI is located on land which the U.S. Air Force leases to DOE. DOE's Office of Energy Research is the current operational landlord and will likely make future mission and end state decisions. LRRI will continue to manage DOE generated waste as long as a DOE mission continues.
Kansas City Plant	Soil contamination will be contained or removed by the end of FY 1998. Groundwater contamination, primarily dense non-aqueous phase liquids, will be cleaned up primarily through the use of innovative technologies; however, final contaminant levels are undecided. Groundwater treatment and monitoring is expected to continue from as little as two years to potentially hundreds of years, depending on the outcome of the ongoing negotiations between DOE and EPA. Future land use is expected to be commercial. Defense Programs is the landlord.
Los Alamos National Laboratory	Los Alamos has an ongoing research mission. Legacy mixed low-level waste will be sent off site by 2004. Decommissioning and decontamination of the two on-site TRU reduction and repackaging facilities will be complete by FY 2017. The site will maintain most of its 43 square mile property but is considering transfer of up to 7,000 acres to the county for industrial use. Land and facilities that DOE will retain will be remediated to allow for industrial use. The land that has been released or is scheduled to be released will be remediated to allow for unrestricted use. The Los Alamos environmental restoration project will be complete by 2008.
Maxey Flats Disposal Site	In accordance with the CERCLA ROD, planned cleanup levels will result in natural stabilization with waste remaining on site. DOE has no control or management responsibility. There is no further DOE liability after DOE makes its final payment, currently scheduled for 2001. The Commonwealth of Kentucky is responsible for long-term stewardship. The site will remain a permanent low-level waste disposal site, and will be under controlled access.

Exhibit E-1 (Continued)

Site Name	End State Description
Monticello Millsite & Vicinity Properties	DOE-owned land on the mill site is expected to be deeded to the City of Monticello for recreational use. The Monticello Mill Tailings Site and the Monticello Vicinity Properties Site will be remediated to the radium 226 standards established in 40 CFR 192. Tailings and tailings-contaminated soil will be excavated and placed in a permanent repository on DOE-owned property. A cover will be placed over the tailings to control radon emissions, infiltration of precipitation, and erosion. EPA and the State have approved supplemental standards, with some qualifications, for some vicinity and peripheral properties. Areas that meet radium 226 standards will be released for unrestricted use. Final land use restrictions for other areas are being determined by DOE, EPA, and the state. The on-site repository will remain under DOE control. The remedy for contaminated sediment, surface water, and groundwater has not yet been selected.
Monument Valley (completed UMTRA site)	Surface materials have been shipped to the Mexican Hat UMTRA site for disposal. Site assumptions are that groundwater at Monument Valley will undergo active remediation through 2010 in order to meet EPA groundwater standards.
Naturita Site (UMTRA site)	All buildings at the site have been demolished. Residual radioactive surface materials have been transported to the Uravan disposal site and disposed of in a disposal cell at the Upper Burbank Repository. Site assumptions are that groundwater will undergo natural attenuation until the site meets EPA standards.
New Rifle Site, Old Rifle Site (UMTRA sites)	Surface materials have been excavated, transported, and disposed of at the Est Gulch disposal cell. Groundwater will undergo natural attenuation until the site meets EPA standards. It is expected that the State of Colorado will transfer ownership to the city or county for public use with restrictions; this will allow DOE access to continue the UMTRA groundwater project.
Pantex Plant	Site closure under the Environmental Management program is not anticipated in the foreseeable future. As a result, facility decontamination and decommissioning and future land use are not addressed in *Paths to Closure*. Current land use (industrial) will remain unchanged. Waste management operations will continue in support of the site's ongoing mission. Legacy waste will be dispositioned by FY 2004. All currently identified release sites will be remediated to achieve closure designation in accordance with cleanup levels contained in the Texas Risk Reduction Standards Guidance. Groundwater pump and treat operations will continue until FY 2015. However, long-term efficiency and capability of the groundwater extraction and treatment system to capture the contaminant plume is uncertain, and additional time could be required to fully achieve groundwater remediation objectives.

Exhibit E-1 (Continued)

Site Name	End State Description
Pinellas Plant	This site was sold to Pinellas County Industrial Council (PCIC) in FY 1995, and DOE completed surface remediation in FY 1997. Pinellas' liability under CERCLA for former off-site waste disposal was transferred to the Grand Junction Office as of October 1997. The site will require treatment of contaminated groundwater where high levels of groundwater contamination exist to meet the "industrial with unrestricted access" classification. Groundwater will be cleaned to Clean Water Act maximum contaminant levels. When site groundwater is remediated to the specified level, DOE's responsibility will be terminated.
Riverton (completed UMTRA site)	Site assumptions are that groundwater at Riverton has been determined a non-drinking water source and will undergo natural attenuation until the site meets EPA standards (up to 100 years).
Salt Lake City (completed UMTRA site)	Tailings have been shipped off site for disposal. The site remains in private hands. Current planning is that Clean Water Act alternate concentration limits will be accepted for achieving groundwater compliance.
Sandia National Laboratories - California	Sandia will have an ongoing mission under the responsibility of the Office of Defense Programs. The Sandia Environmental Restoration Project intends to complete remediation and associated waste disposal for all 23 release sites by 1999. All designated solid waste management units and areas of concern will be remediated or placed under management controls such that no further action is necessary. The Environmental Restoration Project is planning to close the Navy Landfill in 1998.
Sandia National Laboratories - New Mexico	This site will have an ongoing mission under the responsibility of the Office of Defense Programs. All identified environmental restoration sites will have been remediated and associated waste disposed of in a Corrective Action Management Unit (CAMU) disposal cell or at an off-site location. All 183 sites except the chemical waste landfill, mixed waste landfill, and the CAMU disposal cell will be released for reapplication by Defense Programs. By 2001 disposal of all historical waste, waste generated within permit regulatory limits, and closure of excess waste management facilities will be complete. Some mixed low-level mixed waste streams for which there are no existing or available treatment technologies will remain. Nearly all of the land is expected to be available for reapplication for DOE/SNL programmatic uses (industrial) beginning in 2001, with security safeguards remaining in place. Some future land use may include recreational activities, although there will be controlled access for the landfills and CAMU.

Exhibit E-1 (Continued)

Site Name	End State Description
Slick Rock - Old North Continent and Union Carbide (UMTRA sites)	A NRC-licensed disposal cell with a radon barrier cover and surface layer of rock rip-rap for erosion control will remain on site at Old North Continent. Under the provisions of the UMTRCA, public access to the disposal cell will be restricted, but future land use at the site is undetermined. Tailings from both sites have been relocated to an off-site disposal cell. Site assumptions are that groundwater at Old North Continent and Union Carbide has been determined a non-drinking water source and will undergo natural attenuation until the site meets EPA standards (up to 100 years). Albuquerque Operations Office assumes that NRC will complete licensing review by 1999. The sites will be returned to their owners upon NRC certification of compliance with Subpart B of the EPA groundwater protection standards.
South Valley Superfund Site	The surface remediation of this site was completed in 1996. Groundwater contamination continues to threaten local drinking water supplies and private wells. Remediation includes removing the contamination from the groundwater and preventing migration of contamination. Groundwater remediation will take place until 8 consecutive groundwater samples indicate all cleanup levels have been achieved or a waiver of technical impracticability is approved by the EPA. DOE, the U.S. Air Force, and General Electric entered into a settlement agreement to reimburse General Electric for environmental restoration services performed at the site.
Tuba City (completed UMTRA site)	A NRC-licensed disposal cell with a radon barrier cover and surface layer of rock rip-rap for erosion control will remain on site. Under the provisions of the UMTRCA, public access to the disposal cell will be restricted. Site assumptions are that groundwater at Tuba City will undergo active remediation through 2010 in order to meet EPA groundwater standards.

E.1.2 Cost and Completion Dates

The Albuquerque Operations Office has divided its environmental management work into 20 discrete projects including the two Uranium Mill Tailings Remedial Action (UMTRA) projects (one for surface water and one for groundwater.) A Project Baseline Summary exists for each project and contains detailed information, including cost, schedule, scope, end state, and interim milestones. A summary of the Albuquerque cost and schedule information is illustrated in Exhibit E-2. For additional information about these projects, refer to the Project Baseline Summaries.

The estimated total EM life-cycle cost of cleanup of the sites managed by the Albuquerque Operations Office $4.1 billion (constant 1998 dollars). This estimate does not include approximately $4.5 billion (constant 1998 dollars) of non-EM costs.

The overall site completion dates are as follows:

Site	Date
Grand Junction Office Site	2002
Kansas City Plant	1999
Los Alamos National Laboratory	2017
Lovelace Respiratory Research Institute	2000
Maxey Flats Disposal Site	2002
Monticello Remedial Action Project	2001
Pantex Plant	2002
Pinellas Plant	1997
Sandia National Laboratories - CA	1999
Sandia National Laboratories - NM	2001

Within the UMTRA Surface Project, tailings remediation has been completed at 20 processing sites. Two sites (Naturita and Maybell) will be completed in 1998. At the request of the State of North Dakota, DOE plans to revoke the designation of Belfield and Bowman under UMTRCA in 1998. Sites requiring active groundwater remediation will be retained in the UMTRA Groundwater Project until FY 2011, at which time they will be transferred to the long-term surveillance and monitoring program managed by the Grand Junction Office. Presently, three sites are proposed for active remediation, nine sites are proposed for passive remediation, and the remaining ten sites are proposed for no action.

The projected cost profile for environmental management associated with the Albuquerque Operations Office is developed by combining the cost estimates in each of the Project Baseline Summaries. Exhibit E-3 displays the resultant baseline cost profile.

E.1.3 Work Scope Summary

The EM cleanup mission at Albuquerque focuses on the safe and efficient cleanup of national laboratories and production plants within its complex. The scope of work at Albuquerque consists of projects at numerous sites, including the Albuquerque Operations Office, the Lovelace Respiratory Research Institute, the Los Alamos National Laboratory, the Sandia National Laboratories, the South Valley Superfund Site, the Kansas City Plant, the Grand Junction Office, the Pantex Plant, the Maxey Flats Disposal Site, the Pinellas Plant, the Monticello Millsite, and the UMTRA sites. Cleanup activities include the management of groundwater contaminated with residual radioactive materials at UMTRA sites, disposal of low-level waste at Los Alamos National Laboratory, and the disposal of soils and sediments contaminated with radioactive residual materials at the Monticello Mill site. The sections below describe the major waste, material, and contaminated media volumes to be addressed by the Albuquerque Operations Office. The volumes reported are approximate, and correspond to the major waste, material, and media flows, potential treatment processes, and off-site disposal destinations presented in Exhibit E-4, the Albuquerque Operations Office Conceptual Summary Disposition Map.

Transuranic Waste

Approximately 8,600 cubic meters of transuranic waste are currently in inventory and 12,000 cubic meters are expected to be generated over the life cycle of cleanup operations. After sorting, repackaging, and some treatment, 21,000 cubic meters are expected to be disposed of at the Waste Isolation Pilot Plant (WIPP).

Other Waste

Approximately 620 cubic meters of mixed low-level waste are currently in inventory, and 2,900 cubic meters are expected to be generated over the life cycle of operations. These waste volumes will be subject to a range of different treatment options, including incineration at DOE sites. After treatment, 3,100 cubic meters are expected to be disposed of at an off-site commercial facility, and an additional 3,600 cubic meters are expected to be disposed of at an off-site location to be determined later.

Approximately 880 cubic meters of low-level waste are currently in inventory and over 590,000 cubic meters are expected to be generated over the life cycle of operations. Waste volumes will be subject to a range of treatment and processing activities, including transfer to the Oak Ridge Reservation for treatment. After treatment, 8,500 cubic meters are expected to be disposed of at the Nevada Test Site and an off-site commercial facility, and an additional 580,000 cubic meters are expected to be disposed of at the Los Alamos National Laboratory.

Remedial Action and Facility D&D

Approximately 6.1 million cubic meters of environmental media, including groundwater, soils, and sediments contaminated with hazardous substances will be managed. Some of this media will be subject to a range of treatment activities, while other waste streams will be disposed of directly. Approximately 11,000 cubic meters are expected to be sent to an off-site commercial facility, 220,000 cubic meters are expected to be either capped in-place or disposed of in an on-site facility, and 16,000 cubic meters are expected to be subject to access control.

Approximately 44 million cubic meters of environmental media including groundwater and soil contaminated with radionuclides and hazardous substances will be managed. Approximately 90,000 cubic meters of environmental media will be subject to monitoring and 14 million cubic meters of groundwater are expected to be treated in-situ.

The sum of life-cycle costs at the Albuquerque sites is illustrated in Exhibit E-5, broken out by major work scope category.

The primary tasks at the Albuquerque sites involve the assessment and remediation of inactive / surplus facilities and contaminated sites; the treatment, storage, and disposal of delete transuranic, hazardous, and low-level wastes; and the surveillance, environmental monitoring, maintenance, site security, and emergency response for completed environmental cleanup sites from various programs.

E.1.4 Critical Closure Path and Programmatic Risk

The critical closure path schedule presented as Exhibit E-6 sets forth the timetable for completing closure activities at Albuquerque Operations Office. In the exhibit the bars represent critical activities. The Albuquerque Operations Office's critical closure path reflects those cleanup activities, excluding long-term surveillance and monitoring, which are key to achieving completion of the sites cleanup mission and end states.

Completion of the EM mission at Albuquerque Operations Office as scheduled will depend on the timely accomplishment of critical activities and milestones. Sites have assigned programmatic risk scores to each of the critical activities / milestones. Appendix D provides a complete definition of programmatic risk. Exhibit E-7 presents a summary of activities and milestones on the critical closure path that have high programmatic risk (programmatic risk scores of 4 or 5 in any category). The Albuquerque Operations Office version of *Paths to Closure* provides more details on the management approach for these high programmatic risk issues.

Exhibit E-7
Summary of High Programmatic Risk Activities/Milestones:
Albuquerque Operations Office

Site	Project, Activity, Event	Start/End Dates	Programmatic Risk Categories		
			Technological	Work Scope Definition	Intersite Dependency
GJO	Supplemental limits must be approved on Bldg. 7	Oct 99/ Oct 00	1	5	1
	Supplemental limits must be approved on Bldg. 20	Oct 99/ Oct 00	1	5	1
	Buried utilities must be investigated and any contamination found must be minimal	Oct 01/ Sep 01	1	5	3
KCP	Complete 95th Terrace Assessment	Jan 98/ Jun 99	1	4	1
SNL	WIPP opens in May 1998	May 98	1	4	4
	Operation of Auxiliary Hot Cell Facility for packaging of remote-handled TRU	Oct 97/ Sep 99	1	4	4
	Develop system to ship remote-handled TRU to WIPP or Los Alamos National Laboratory	Oct 99/ Sep 00	2	4	5
	Complete mixed waste treatment per Site Treatment Plan (except for mixed TRU waste)	Oct 97/ Sep 02	4	4	5
	Work off of historical MW	Oct 97/ Sep 06	3	4	5
South Valley	Long-term buy-out	Apr 03/ Sep 03	1	4	1
UMTRA	Maybell site construction completion	Sep 98	3	4	5
	Maybell site certification license and transfer to GJO for long-term surveillance and monitoring	Sep 99	5	5	5

E.2 Carlsbad Area Office Summary

The mission of the Carlsbad Area Office (CAO) is to protect human health and the environment by opening and operating the Waste Isolation Pilot Plant (WIPP) for safe disposal of transuranic (TRU) waste and by establishing an effective system for management of TRU waste from generation to disposal. It includes personnel assigned to CAO, WIPP site operations, transportation, and other activities associated with the National TRU Program (NTP). The CAO develops and directs implementation of the TRU waste program, and assesses compliance with the program guidance, as well as the commonality of activities and assumptions among all TRU waste sites.

A cornerstone of the Department of Energy's (DOE) national cleanup strategy, WIPP is designed to permanently dispose of TRU waste generated by defense-related activities. Located in southeastern New Mexico, 26 miles east of Carlsbad, project facilities include disposal rooms excavated 2,150 feet underground (about a half mile) in an ancient, stable salt formation. TRU waste consists primarily of tools, gloves, clothing and other such items contaminated with trace amounts of radioactive elements, mostly plutonium. WIPP is scheduled to begin disposing of defense-generated TRU waste in May 1998 after receiving approval from the Environmental Protection Agency (EPA) that the facility meets the criteria established in 40 CFR 194.

E.2.1 End State

WIPP is neither a "cleanup" nor "closure" site. It is the only TRU waste disposal site in the world. TRU waste management activities for both contact-handled (CH) and remote-handled (RH) TRU wastes are projected to be completed by FY 2039 after completing the Disposal Phase in FY 2033, five years for decommissioning of the surface facilities, and permanently closing the underground. In accordance with the Land Withdrawal Amendment Act of 1996 (LWAA), DOE will have disposed of 175,600 cubic meters of TRU waste in WIPP. Starting in FY 2039, a reduced Federal staff and technical contractor support will maintain records of WIPP and the active

institutional controls associated with the land withdrawal. Monuments and markers will be built at the site to warn people of the presence of radioactive waste. Active institutional controls over the site will be maintained for 100 years. Low risk has been assigned to this project based upon performance assessments included in the permitting of the facility, which requires no migration of hazardous or radioactive material for 10,000 years. Following completion of the project, there will be no access to the underground. The surface area will be unrestricted for recreational and agricultural uses with the exception of 124 acres which constitute the exclusive-use passive institutional control area.

E.2.2 Cost and Completion Dates

Carlsbad Area Office has divided its environmental management work into five discrete projects. A Project Baseline Summary exists for each project and contains detailed programmatic information, including cost, schedule, scope, end state, and interim milestones. A summary of the cost and schedule for these projects is illustrated in Exhibit E-8. For additional information on these projects, refer to the Project Baseline Summaries.

The estimated EM life-cycle cost of Carlsbad Area Office's TRU waste management and disposal activities is $7.7 billion (constant 1998 dollars) through FY 2070[1]. The overall completion date for disposal operations at the WIPP is 2033, with dismantling and decommissioning taking another five years and active institutional controls continuing for 100 years thereafter.

[1] The Carlsbad baseline includes an additional $0.6 billion for active institutional controls after 2070. The *Paths to Closure* only captures scope and cost through 2070.

The projected cost profile for environmental management associated with the Carlsbad Office is developed by combining the cost estimates in each of the Project Baseline Summaries. Exhibit E-9 displays the resultant baseline cost profile.

E.2.3 Work Scope Summary

The EM mission at Carlsbad consists of the following work scope:

The operations of the TRU waste disposal facility — This scope includes all activities required to maintain waste receipt and disposal operations including mining, waste handling and facility operations. Also included in this project are activities required to maintain and operate WIPP that are not directly related to waste disposal.

The five year recertification cycle of the scientific performance of the facility by the Environmental Protection Agency — This scope includes all of the Managing and Operating (M&O), Scientific Advisor and supporting laboratories' experimental, compliance, and performance assessment work in support of certification and operational performance improvement for the WIPP site and the national TRU system. The scope also includes the establishment of a focused international nuclear waste disposal research development program.

The TRU waste transportation system development and operations — This scope includes all site activities required to meet the National TRU Waste Management Plan (NTWMP), Rev. 1, associated with the maintenance and

operations of a transportation system. These activities include: emergency response training; establishing and opening transportation corridors; Ch-TRU and RH-TRU waste packaging initiatives; carrier services; and stakeholder interfaces related to transportation.

The primary locations where TRU waste is currently stored are: Idaho National Engineering and Environmental Laboratory (INEEL), Los Alamos National Laboratory (LANL), Rocky Flats Environmental Technology Site (RFETS), Oak Ridge National Laboratory (ORNL), Savannah River Site (SRS), Hanford Reservation (Hanford), Nevada Test Site (NTS), Lawrence Livermore National Laboratory (LLNL), Argonne National Laboratory - East (ANL-E), and the Miamisburg Environmental Management Project (Mound). Other sites have small quantities of TRU waste that will be disposed of at WIPP. The TRU waste sites scheduled to initially ship CH-TRU waste to WIPP in FY 1998, are INEEL, LANL, and RFETS. Using the shipment schedules in the NTWMP, Hanford, ANL-E, Mound, SRS, and selected small quantity sites will begin shipping waste to WIPP in FY 1999, while LLNL and NTS will begin shipments in FY 2000. By FY 2000, the WIPP facility will be at a full throughput rate of 17 CH shipments per week. In FY 2003, CAO will begin receiving shipments of RH-TRU waste from ORNL and LANL at a rate of two shipments per week and work up to ten shipments per week by FY 2004.

The cost of opening transportation corridors includes cooperative agreements with all Native American tribes along each corridor, state emergency response training, and agreements with the Western Governor's Association and the Southern States Energy Board. CAO also coordinates transportation schedules and plans through the National Governor's Association.

CAO must open and maintain transportation corridors across the United States between each TRU waste site and WIPP. Currently, one corridor from INEEL, RFETS, and LANL is open. Activities to open other corridors require approximately two years prior to shipment campaigns beginning at the sites. The phasing of corridors corresponds with site shipping schedules and eliminates the need for corridor maintenance thus reducing TRU waste complex costs.

The management activities necessary to direct and integrate the Department's National TRU waste sites activities from generation to disposal including all quality assurances oversight activities — This scope includes ongoing TRU integration activities and programs which are directed by the CAO civilian work force. The CAO is the lead office for the management, planning, and integration of the integration of the TRU waste program .

E.3 Chicago Operations Office Summary

The Chicago Operations Office, located at the Argonne National Laboratory site in Illinois, is responsible for the safe and efficient cleanup of national laboratories and other sites under its management. Laboratories managed by Chicago Operations Office have primary missions relating to energy, nuclear, basic fusion, and high-energy physics research.

The Chicago Operations Office currently manages environmental restoration and waste management at Ames Laboratory, Argonne National Laboratory-East and West, Brookhaven National Laboratory, Fermi National Accelerator Laboratory, and Princeton Plasma Physics Laboratory.

Ames Laboratory was established in the 1940s to develop efficient uranium production processes for the Manhattan Project. The Laboratory's programs now emphasize research in the preparation, characterization, and evaluation of properties of metals and their alloys, especially rare earth metals.

Argonne National Laboratory - East (ANL-E) has been involved in research and development activities in support of the Department of Energy (DOE) and its predecessor agencies since 1943. Currently, it serves as a multi-disciplinary research and development laboratory that conducts basic and applied research to support the development of energy-related technologies.

Argonne National Laboratory - West's (ANL-W) primary mission was to support liquid metal reactor research and development for the Integral Fast Reactor Program until the program was terminated. Activities at the laboratory now include technology development for spent nuclear fuel and waste treatment, reactor and fuel cycle safety, and facility decommissioning.

Brookhaven National Laboratory has been involved in research and development activities in support of DOE and its predecessor agencies since 1947. Its current

mission is to conduct fundamental research, including conception, design, construction, and operation of large, complex research facilities to carry out both basic and applied research in high energy and nuclear physics.

Fermi National Accelerator Laboratory began its mission as a single-program research and development facility for the Atomic Energy Commission in 1972, when the first accelerator at the laboratory began operations. The laboratory's current mission is to conduct research in high-energy physics under the direction of DOE's Office of Energy Research.

Princeton Plasma Physics Laboratory (PPPL) has historically provided research and development for the DOE's fusion energy programs. Currently, activities at the site are devoted to the research and development of plasma fusion energy.

E.3.1 End State

The end state for Environmental Management program activities at all Chicago sites is completion of all environmental restoration activities by 2006 or sooner and transfer of all waste management activities to the Office of Energy Research, which has landlord responsibilities at the Chicago sites, by FY 2000. All landlord site stewardship and future land use issues will be managed by DOE's Office of Energy Research, with the exception of Argonne National Laboratory-West which will be managed by the Office of Nuclear Energy. Exhibit E-10 provides a summary of anticipated end states for the sites managed by Chicago Operations Office. In addition to the sites discussed in Exhibit E-10, the Chicago Operations Office supported surveillance and monitoring activities at Site A/Plot M, the Hallam Nuclear Power Facility, and the Piqua Nuclear Power Facility. Those activities will be transferred to the Grand Junction Office by the end of Fiscal Year 1998. Also, the Chicago Operations Office is responsible for payments to support the Princeton Site A/B Project. The responsibility for the payments will be transferred to the Office of Energy Research in FY 2000.

Exhibit E-10

Summary of Chicago Operations Office End States

Site Name	End State Description
Ames Laboratory	Environmental Restoration will complete its mission in FY 1998 and the Waste Management program will be transferred to Energy Research in 2000. The wastes from the former Chemical Waste Disposal Site, which accepted radiological and chemical wastes, were removed in FY 1995. All of Ames's waste is treated and/or disposed of off site.

Exhibit E-10 (Continued)

Site Name	End State Description
Argonne National Laboratory - East	Argonne-East will have an ongoing mission, with Energy Research acting as the landlord. The Waste Management Program will be transferred to Energy Research in FY 2000. Corrective action for some release sites will require on-site containment of residual contamination. ANL-E hopes to bring the surplus reactor and nuclear support facilities to meet Nuclear Regulatory Commission unrestricted use standards and remove all postings and warnings by 2002. The majority of work will be complete in 2000.
Argonne National Laboratory - West	ANL-W has an ongoing mission, and the land is expected to be used for industrial/commercial operations. The Waste Management program was transferred to Nuclear Energy in early FY 1998. Remediation of eight release sites and one facility is in progress. The Central Liquid Processing Area will be decontaminated and decommissioned in FY 1998. Groundwater remediation will be ongoing. The site will become the responsibility of Nuclear Energy in FY 2000.
Brookhaven National Laboratory	Energy Research is the landlord for Brookhaven's ongoing research mission. The Waste Management Program will be transferred to ER in FY 2000. By 2006, soil remediation will be complete, the Boneyard wastes will be disposed of off site, and long-term monitoring will be in place. The groundwater remediation system will be operational and DOE will maintain public water hookups provided for residents with groundwater wells. Decontamination and decommissioning of the reactor will be complete. The reactor will be safely and permanently closed, but the final end state for the reactor is not yet defined. Three former on-site landfills have been capped, and one is currently being reused for recreational purposes. Any wastes generated as part of an ongoing mission will be disposed of off site.
Fermi National Accelerator Laboratory	As of the end of FY 1997, EM has no further obligations to Fermi. Funding for managing waste activities at Fermi was transferred to Energy Research in the beginning of FY 1998. All waste is sent off site for appropriate treatment and disposal, as required. As long as Fermi Laboratory is in operation, waste management will be a necessary program function.

Exhibit E-10 (Continued)

Site Name	End State Description
Princeton Plasma Physics Laboratory	PPPL will continue to conduct research, and generate of hazardous waste. The Waste Management program will be transferred to Energy Research in FY 2000. Soil and groundwater are the media of concern. Contaminated soil and sediment was excavated, treated, and disposed of off site. No active groundwater remediation is currently required; natural attenuation will augment the on-site dewatering pumps. Energy Research will be the site steward starting in FY 2000.
Site A/Plot M	Site A was returned to the Forest Preserve District of Cook County, IL in FY 1997 for unimproved recreational use by the public. Plot M, which was capped in 1973, was returned to the Forest Preserve in 1956 with ongoing surveillance and monitoring (S&M) performed by DOE. S&M activities are being transferred to the DOE Grand Junction Office by FY 1998.

E.3.2 Cost and Completion Dates

The Chicago Operations Office has divided its environmental management work into 20 discrete projects. A Project Baseline Summary (PBS) exists for each project and contains detailed programmatic information, including cost, schedule, end state, and interim milestones. A summary of the Chicago cost and schedule information is illustrated in Exhibit E-11. For additional information about these projects, refer to the Project Baseline Summaries.

The estimated EM life-cycle cost of Chicago Operations Office's site cleanups is $0.3 billion (constant 1998 dollars). This estimate does not include approximately $1.1 billion (constant 1998 dollars) of non-EM costs. Overall site completion dates for EM work scope are as follows:

Site	Date
Ames Laboratory	1999
Argonne National Laboratory - East	2002
Argonne National Laboratory - West	2000
Brookhaven National Laboratory	2006
Fermi National Accelerator Laboratory	1997
Princeton Plasma Physics Laboratory	1999
Site A / Plot M	1997

The projected cost profile for environmental management associated with the Chicago Operations Office is developed by combining the cost estimates in each of the Project Baseline Summaries. Exhibit E-12 displays the resultant baseline cost profile.

E.3.3 Work Scope Summary

Cleanup activities at the sites managed by the Chicago Operations Office include the management of groundwater contaminated with radionuclides and hazardous substances and soils and debris contaminated with radionuclides at Brookhaven National Laboratory, and rubble & debris contaminated with hazardous substances at Argonne National Laboratory-East. The sections below describe the major waste, material, and contaminated media volumes to be addressed by the Chicago Operations Office. The volumes reported are approximate, and correspond to the major waste, material, and media flows, potential treatment processes, and off-site disposal destinations presented in Exhibit E-13, the Chicago Operations Office Conceptual Summary Disposition Map.

Transuranic Waste

Approximately 80 cubic meters of transuranic waste are currently in inventory and 5.1 cubic meters are expected to be generated over the life cycle of operations. After treatment and repackaging, 82 cubic meters are expected to be disposed of at the Waste Isolation Pilot Plant (WIPP). A disposition path has not been determined for 2.5 cubic meters of transuranic waste.

Other Waste

Approximately 140 cubic meters of mixed low-level waste are currently in inventory and 23 cubic meters are expected to be generated annually. Waste will undergo a range of treatment activities as well as incineration at other DOE sites. After treatment, 9.6 cubic meters are expected to be disposed of at an off-site commercial facility.

Nearly 570 cubic meters of low-level waste are currently in inventory and 1,300 cubic meters of low-level waste are expected to be generated annually. Waste will undergo a range of treatment activities as well as incineration and recycling at off-site commercial facilities. After treatment, 780 cubic meters are expected to be disposed of at Hanford, and additional volumes are expected to be disposed of at an off-site commercial facility.

Remedial Action and Facility D&D

A total of 20.7 million cubic meters of contaminated environmental media will be managed through a variety of remedial responses. This volume includes 4.3 million cubic meters of soils, rubble & debris contaminated with radionuclides, 410,000 cubic meters of soils and sediments contaminated with radionuclides and hazardous substances, and 16 million cubic meters of groundwater contaminated with hazardous substances. After a range of treatment activities, 35,000 cubic meters are expected to be sent to an off-site commercial recycling facility, 100,000 cubic meters are expected to be disposed of at an off-site DOE facility and an off-site commercial facility, and 470,000 cubic meters are expected to be contained in place.

Exhibit E-14 illustrates the Chicago Operations Office environmental management costs by major work scope categories.

E.3.4 Critical Closure Path and Programmatic Risk

The critical closure path schedule presented as Exhibit E-15 sets forth the timetable for completing the closure activities at the Chicago Operations Office. In the exhibit, the bars represent critical activities, and the diamond represents a critical event / milestone. The critical closure path identifies the major cleanup activities that have little scheduling flexibility and must occur without delays if the EM cleanup mission is to be completed by 2006.

Completion of the EM mission at Chicago Operations Office as scheduled will depend on the timely accomplishment of critical activities and events. Sites have assigned programmatic risk scores to each of the critical activities / milestones. Appendix D provides a complete definition of programmatic risk. Exhibit E-16 presents a summary of activities / milestones on the critical closure path that have high programmatic risk (programmatic risk scores of 4 or 5 in any category).

Exhibit E-16
Summary of High Programmatic Risk Activities/Milestones: Chicago Operations Office

Site	Project, Activity, Event	Start/End Dates	Programmatic Risk Categories		
			Technological	Work Scope Definition	Intersite Dependency
Argonne National Laboratory - East	Juggernaut, ZPR/ATSR, Bldg. 310 and Bldg. 301 projects	Aug 99/ Sep 02	1	3	4
Brookhaven National Laboratory	OU-III - Source Areas	Oct 96	2	4	2
	Complete Shipments	Aug 00	2	4	4
	OU-I - HWMF	Oct 96/ Sep 00	2	4	5
	OU-V - Sewage Treatment Plant	Oct 96/ Aug 06	2	5	5
Operations Office	Nuclear Criticality Predictability Program	Oct 97/ Sep 06	1	5	1

E.4 Idaho Operations Office Summary

The Idaho Operations Office manages environmental management activities at the Idaho National Engineering and Environmental Laboratory (INEEL), a site that occupies 890 square miles in a remote desert area in southeastern Idaho. The Laboratory consists of 10 major operating areas at the site and several facilities in the City of Idaho Falls, located 42 miles east of the Laboratory.

The Idaho National Engineering and Environmental Laboratory is committed to completing several Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remediation sites by FY 2006, while pursuing longer-term projects to accomplish cleanup of transuranic and high-level wastes, spent nuclear fuel disposition, and closure of remaining CERCLA remediation sites after FY 2006. The Laboratory has four programs in place to complete its environmental mission: the Waste Management Program, the Environmental Restoration Program, the Nuclear Materials and Facilities Program, and the Infrastructure and Deactivation Program.

In addition to completing the environmental management mission in Idaho, the Idaho National Engineering and Environmental Laboratory has implemented a long-range plan which will transform the laboratory from a Department of Energy (DOE) multi-program national laboratory focused on site cleanup to a national multi-program engineering and environmental laboratory. The near-term focus of the long-range plan is to support key capabilities and competitiveness necessary to ensure INEEL's future by leveraging the cleanup mission and making other long-term investments.

E.4.1 End State

The Idaho National Engineering and Environmental Laboratory's final end state is described in the *INEL Comprehensive Facilities and Land Use Plan* issued March 1996. The laboratory will continually work with their stakeholders and jointly review the *Land Use Plan* for accuracy and adequacy. The Idaho National Engineering and Environmental Laboratory's end-state objective is to complete cleanup per Federal Facility Agreement and Consent Order requirements and disposition all waste and other materials in accordance with existing and future agreements; meet the milestones of the Idaho Settlement Agreement; and complete the work covered under the Site Treatment Plan.

The Idaho National Engineering and Environmental Laboratory is planning to restore its site to an industrial and open space end state based on an analysis of site land use for the next 100 years. The site will contain an on-site disposal cell for contact-handled low-level waste. Currently, the site is also planning to store spent nuclear fuel until 2035 and treat and store high-level waste until 2070. High-level waste will be ready for shipment in 2035.

E.4.2 Cost and Completion Profile

Idaho Operations Office has divided its environmental management work into 43 discrete projects. A Project Baseline Summary exists for each project and contains detailed programmatic information, including cost, schedule, scope, end state, and interim milestones. A summary of the cost and schedule information for these projects is illustrated in Exhibit E-17.

The estimated EM life-cycle cost of for Idaho is $16.3 billion (constant 1998 dollars) with the last project ending in September 2070. However, the majority of the work scope will be completed by 2050, with only monitoring and other essential functions continuing beyond 2050.

The projected cost profile for environmental management associated with the Idaho Operations Office is developed by combining the cost estimates in each of the Project Baseline Summaries. Exhibit E-18 displays the resultant baseline cost profile.

E.4.3 Work Scope Summary

The Idaho cleanup mission requires projects to accomplish the cleanup of transuranic and high-level wastes, the disposition of spent nuclear fuel, and the cleanup and closure of CERCLA remediation sites. Work in these areas is driven by the Idaho Settlement Agreement, the Federal Facility Agreement and Consent Order, the Idaho National Engineering and Environmental Laboratory Site Treatment Plan, and other Consent Orders.

Work is conducted using the seven criteria established by the DOE Environmental Management Program: (1) eliminate the most urgent risks; (2) reduce "mortgage" and support costs to free up funds for further risk reduction; (3) protect worker health and safety; (4) reduce the generation of wastes; (5) create a collaborative relationship between DOE, its regulators, and its stakeholders; (6) focus science and technology development on cost and risk reduction; and (7) integrate spent nuclear fuel and waste treatment and disposal across the INEEL. Four environmental management programs have been established at the INEEL to accomplish these projects.

1. The **Waste Management Program** will treat, store, and dispose of low-level waste, mixed low-level waste, transuranic waste, and high-level waste in compliance with agreements and the Site Treatment Plan.

2. The **Environmental Restoration Program** will remediate all Federal Facility Agreement/Consent Order (FFA/CO) identified contaminated land/facilities as determined under CERCLA. Contaminated facilities used for previous INEEL nuclear reactor testing, spent nuclear fuel reprocessing, and waste treatment, storage, and disposal will undergo decontamination and decommissioning (D&D).

3. The **Nuclear Materials and Facilities Stabilization Program** will receive and store spent nuclear fuel until final disposition. This includes moving all DOE-owned spent nuclear fuel from wet to dry storage by 2006.

4. The **Infrastructure and Deactivation Programs** ensure adequate infrastructure support for the above-mentioned programs.

The sections below describe the major waste, material, and contaminated media volumes to be addressed by the Idaho Operations Office Environmental Management program. The volumes reported are approximate, and correspond to the major waste, material, and media flows, potential treatment processes, and off-site disposal destinations presented in Exhibit E-19, the Idaho Operations Office Conceptual Summary Disposition Map.

Transuranic Waste

Approximately 65,000 cubic meters of transuranic waste are currently in inventory and 3,700 cubic meters are expected to be generated over the life cycle of operations. After on-site characterization and repackaging and AMWTP treatment, 50,000 cubic meters are expected to be disposed of at WIPP.

High-Level Waste

Approximately 35 cubic meters of high-level waste are expected to be received from off-site. Currently, there are 10,000 cubic meters in inventory. Nearly 11,000 cubic meters of high-level waste are expected to be generated over the life cycle of operations.

After removal of high-level waste, 11 tanks and 42 bins are expected to be stabilized and closed.

Other Waste

Approximately 22,000 cubic meters of low-level waste are expected to be received from off site. Currently, there are 9,400 cubic meters of low-level waste in inventory. Over 100,000 cubic meters of low-level waste are expected to be generated over the life cycle of operations. After treatment,

including on-site and commercial stabilization, compaction, and incineration, the low-level waste is expected to be disposed of at an undetermined off-site low-level waste disposal facility and at the on-site Radioactive Waste Management Complex (RWMC) disposal facility.

Approximately 3,200 cubic meters of mixed low-level will be received from off-site. Currently, there are 850 cubic meters of mixed low-level waste in inventory. Approximately 7,300 cubic meters of mixed low-level waste are expected to be generated over the life cycle of operations. After treatment, an undetermined amount of treatment residues are expected to be disposed of at an off-site commercial Subtitle C disposal facility.

Remedial Action and Facility D&D

Approximately 4.7 billion cubic meters of mixed low-level and low-level contaminated environmental media will be managed through a variety of remedial response strategies: following stabilization and treatment, 580,000 cubic meters are expected to be capped on-site and 470 cubic meters are expected to be disposed of off site; 430,000 cubic meters are expected to be disposed of at an undetermined on-site disposal facility, and 4.7 billion cubic meters will remain on site under access/institutional controls.

Approximately 290,000 cubic meters of environmental media contaminated with transuranic elements will be processed. After treatment, 270,000 cubic meters are expected to be capped in-place and 23,000 cubic meters are expected to be disposed of at WIPP.

Nuclear Material

Nuclear materials quantities are classified and cannot be disclosed in this document.

Spent Nuclear Fuel

Approximately 60 metric tons heavy metal of spent nuclear fuel will be received from off-site sources. Currently, there are 240 cubic meters of spent nuclear fuel in inventory. After on-site storage, drying, and packaging, an undetermined quantity of spent nuclear fuel is expected to be shipped off-site to a repository for disposal.

Exhibit E-20 shows the distribution of life-cycle costs by major work scope category for the Idaho Operations Office.

E.4.4 Critical Closure Path and Programmatic Risk

The critical closure path schedule presented as Exhibit E-21 sets forth the timetable for completing the closure activities at the Idaho Operations Office. The highlighted activities show the critical closure path, which represents the series of events that drive the overall completion date for the site and must occur without delay if the EM cleanup mission at the INEEL is to meet the requirements of the Idaho Settlement Agreement, other regulatory compliance agreements, and court orders. In Exhibit E-21, the bars represent critical activities, and the triangles represent critical events / milestones.

Completion of the EM mission at the Idaho Operations Office as scheduled will depend on the timely accomplishment of critical activities and events. Sites have assigned programmatic risk scores to each of the critical activities / milestones. Appendix D provides a complete definition of programmatic risk. Exhibit E-22 presents a summary of activities / milestones on the critical closure path that have high programmatic risk (programmatic risk scores of 4 or 5 in any category). The Idaho Operations Office version of *Paths to Closure* provides more details on the management approach for these high programmatic risk issues.

Exhibit E-22
Summary of High Programmatic Risk Activities/Milestones: Idaho Operations Office

Project, Activity, Event	Start/EndDates	Programmatic Risk Categories		
		Technological	Work Scope Definition	Intersite Dependency
Draft Work Plan Addendum A sent by DOE-ID to EPA/ IDHW for review and comment	Mar 98	4	2	3
OU 7-10 Alternative Stage I Work Plan sent by DOE-ID to EPA/IDHW for review and comment	Mar 98	4	2	3
OU 7-10 [RA] Draft RA Work Plan sent by DOE-ID to EPA/IDHW for review and comment	Apr 98	5	1	3
OU 7-10 [RA] Pre-Final Comprehensive Remedial Design sent by DOE-ID to EPA/IDHW for review	Apr 98	5	1	3
Issue a Record of Decision for shipment and ultimate disposal of SNF outside Idaho	Apr 99	2	3	5
OU 7-10 [RA] Draft RA Report sent by DOE-ID to EPA/IDHW for review and comment	Apr 99	5	1	3
OU 7-10 [RA] Draft O&M Report sent by DOE-ID to EPA/IDHW for review and comment	Aug 00	5	1	3
Draft Work Plan Addendum B sent by DOE-ID to EPA/ IDHW for review and comment	Dec 01	4	2	3
OU 7-10 [RA] Decontamination and Decommission of Pit 9 Facility Complete (Project Mission Complete)	May 01	5	1	3
Convert pretreated waste to final disposable form	Oct 20/ Sep 35	4	3	4
Store vitrified waste containers until repository is ready	Oct 20/ Sep 70	2	3	4