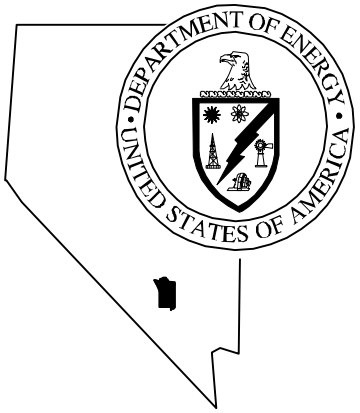
Nevada
Environmental
Restoration
Project

DOE/NV--536



Project Execution Plan

Controlled Copy No: ___

Revision No: 0

April 1999

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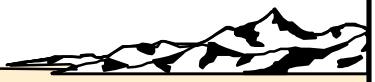
Environmental Restoration
Division



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PROJECT EXECUTION PLAN

Environmental Restoration Division
U.S. Department of Energy, Nevada Operations Office
Las Vegas, Nevada

Controlled Copy No.: ___

Revision No.: 0

April 1999

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Approved by: Signatrure Approved Date: 3/22/99

Bobbie K. McClure, Coordinator
Program Integration

Approved by: Signature Approved Date: 3/22/99

Runore C. Wycoff, Division Director
Environmental Restoration Division

Preface

This plan addresses project activities encompassed by the U.S. Department of Energy, Nevada Operations Office Environmental Restoration Division and conforms to the requirements contained in the *Life Cycle Asset Management*, U.S. Department of Energy (DOE) Order O430.1A (DOE, 1998b); *The Joint Program Office Policy on Project Management* in support of DOE Order O430.1 (1996a); the *Project Execution and Engineering Management Planning Guide*, GPG-FM-010 (DOE, 1996b); and the philosophies contained in the DOE/EM--0362, *Accelerating Cleanup: Paths to Closure* (DOE, 1998a).

The plan also reflects the milestone philosophies of the *Federal Facility Agreement and Consent Order*, as agreed to by the State of Nevada; and traditional project management philosophies such as the development of life cycle costs, schedules, and work scope; identification of roles and responsibilities; and baseline management and controls.

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List of Acronyms and Abbreviations

BN	Bechtel Nevada
CFR	*Code of Federal Regulations*
CNTA	Central Nevada Test Area
DOE	U.S. Department of Energy
DOE/HQ	U.S. Department of Energy, Headquarters
DOE/NV	U.S. Department of Energy, Nevada Operations Office
DRI	Desert Research Institute
EM	Environmental Management
EPA	U.S. Environmental Protection Agency
FFACO	*Federal Facility Agreement and Consent Order*
FY	Fiscal year
IT	IT Corporation
LCAM	Life Cycle Asset Management
NAFR	Nellis Air Force Range Complex
NDEP	Nevada Division of Environmental Protection
NEPA	*National Environmental Policy Act*
NPMIS	Nevada Project Management Information System
NTS	Nevada Test Site
NV ERP	Nevada Environmental Restoration Project
RCRA	*Resource Conservation and Recovery Act*
TTR	Tonopah Test Range
UGTA	Underground Test Area
USGS	U.S. Geological Survey
WBS	Work Breakdown Structure

1.0 MISSION NEED

The U.S. Department of Energy's (DOE's) Environmental Management (EM) Programs, created in 1989, has grown rapidly to address the environmental liabilities of over 50 years of nuclear weapons production in the United States. The environmental liabilities include future cleanup costs associated with environmental contamination, hazardous and radioactive materials and wastes, contaminated buildings and facilities, and the associated risks. The costs are collectively referred to as the Department's "environmental mortgage." The Environmental Management Program is embarked on an ambitious, decade-long effort to reduce this environmental mortgage.

The mission of the U.S. Department of Energy, Nevada Operations Office (DOE/NV), Nevada Environmental Restoration Project (NV ERP) is to complete applicable corrective actions at inactive contaminated sites and facilities managed by DOE/NV while protecting human health and the environment. This mission will be accomplished by adhering to the following core values:

- Ensure protection of workers, the public, and the environment
- Serve as a model steward of natural and cultural resources
- Comply with federal, state, and local statues
- Use taxpayers' money prudently in achieving tangible results
- Focus on customer satisfaction and collaborative decision making

Approximately 2,000 sites both on and off the Nevada Test Site (NTS) that were used primarily for nuclear testing are addressed in the NV ERP. Sites include the underground areas where tests were conducted, contaminated surface soils that resulted from aboveground testing and sites that supported testing activities (e.g., underground storage tanks, leachfields, landfills, contaminated waste sites, injection wells, muckpiles and ponds).

2.0 PROJECT/STRATEGIC SYSTEM DESCRIPTION

The following is the Strategic System Description.

2.1 Purpose and Scope

The DOE/NV maintains environmental restoration responsibility for historical nuclear test areas on the NTS and the Nellis Air Force Range (NAFR), including the Tonopah Test Range (TTR). Both the TTR and NAFR are located on restricted federal government lands adjacent to the NTS. DOE/NV also has environmental restoration responsibility for eight inactive United States nuclear test sites: Amchitka Island, Alaska; Rio Blanco and Rulison sites, Colorado; Salmon site, Mississippi; Gasbuggy and Gnome Sites, New Mexico; and the Central Nevada Test Area (CNTA) and Project Shoal Area, Nevada. Maps depicting the location of these sites and the relative size of the NTS are in Figures 2-1 through 2-3. The DOE/NV is responsible for the assessment and corrective actions associated with these sites and facilities to meet applicable regulatory requirements.

2.2 Project Description

For over 40 years, the primary mission of the DOE/NV was to conduct tests of both nuclear and conventional explosives in connection with the research and development of nuclear weapons. Field testing was primarily conducted at the NTS. In addition to weapons tests, the NTS has also hosted secondary missions, including neutron and gamma-ray interaction studies; open-air nuclear reactor, nuclear engine, and nuclear furnace tests; hazardous materials spill response testing; and experiments involving radioactivity and nonradioactive materials conducted by the U.S. Department of Defense. In the 1950s, aboveground atmospheric tests were the predominate NTS activity. Aboveground testing of nuclear weapons ceased in 1963, and off-site tests ceased in 1973. Since July 1962, all nuclear tests conducted at the NTS have been underground. Underground nuclear testing was suspended in October 1992, although a readiness posture is maintained by presidential mandate.

The DOE EM Program was established in 1989 at DOE offices around the country to address environmental liabilities associated with nuclear weapons production and testing in the United States within the DOE EM, the Environmental Restoration program encompasses activities that assess the degree of contamination resulting from the testing program and perform corrective actions required by federal and state regulations. DOE/NV environmental restoration activities fall under the purview of the DOE/NV Environmental Restoration Division

For management purposes, these environmental restoration responsibilities have been combined into the NV ERP, which is, in turn, subdivided into the following site-specific projects: Program Integration, Agreements, Soils, Underground Test Area (UGTA), Industrial Sites, and Off-Sites.

The objectives of the NV ERP are to identify the nature and extent of the contamination; determine its potential risk to the public and the environment; and perform the necessary corrective actions in compliance with applicable regulatory guidelines and requirements. Project activities include literature searches, field investigations, preparation of required documentation, decontamination and decommissioning of facilities, surveillance and maintenance, monitoring, and related regulatory compliance and waste management activities.

2.3 Participants

The NV ERP Team includes key personnel from DOE/NV; IT Corporation (IT), which provides project management and character-

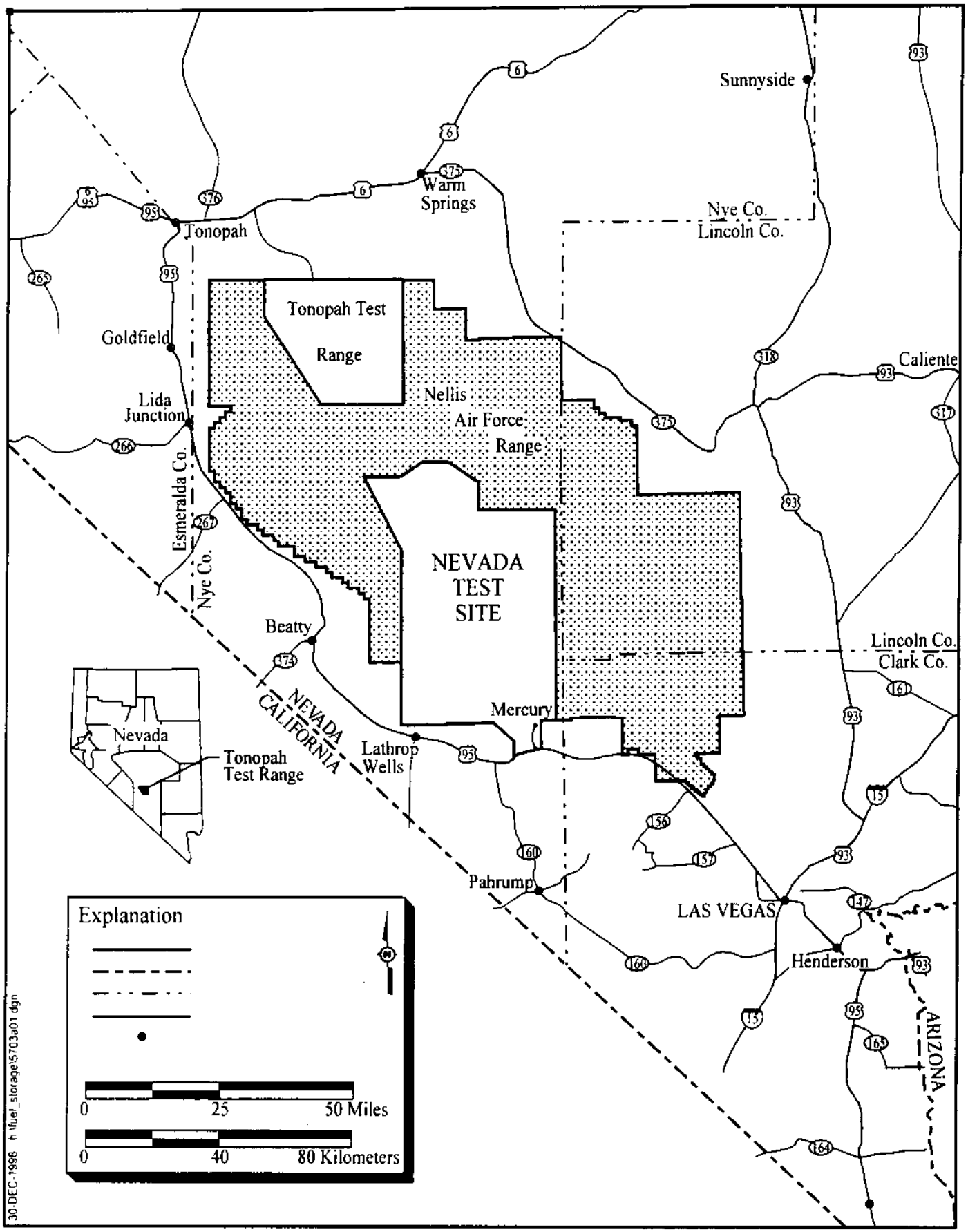


Figure 2-1
Nevada Test Site Location Map

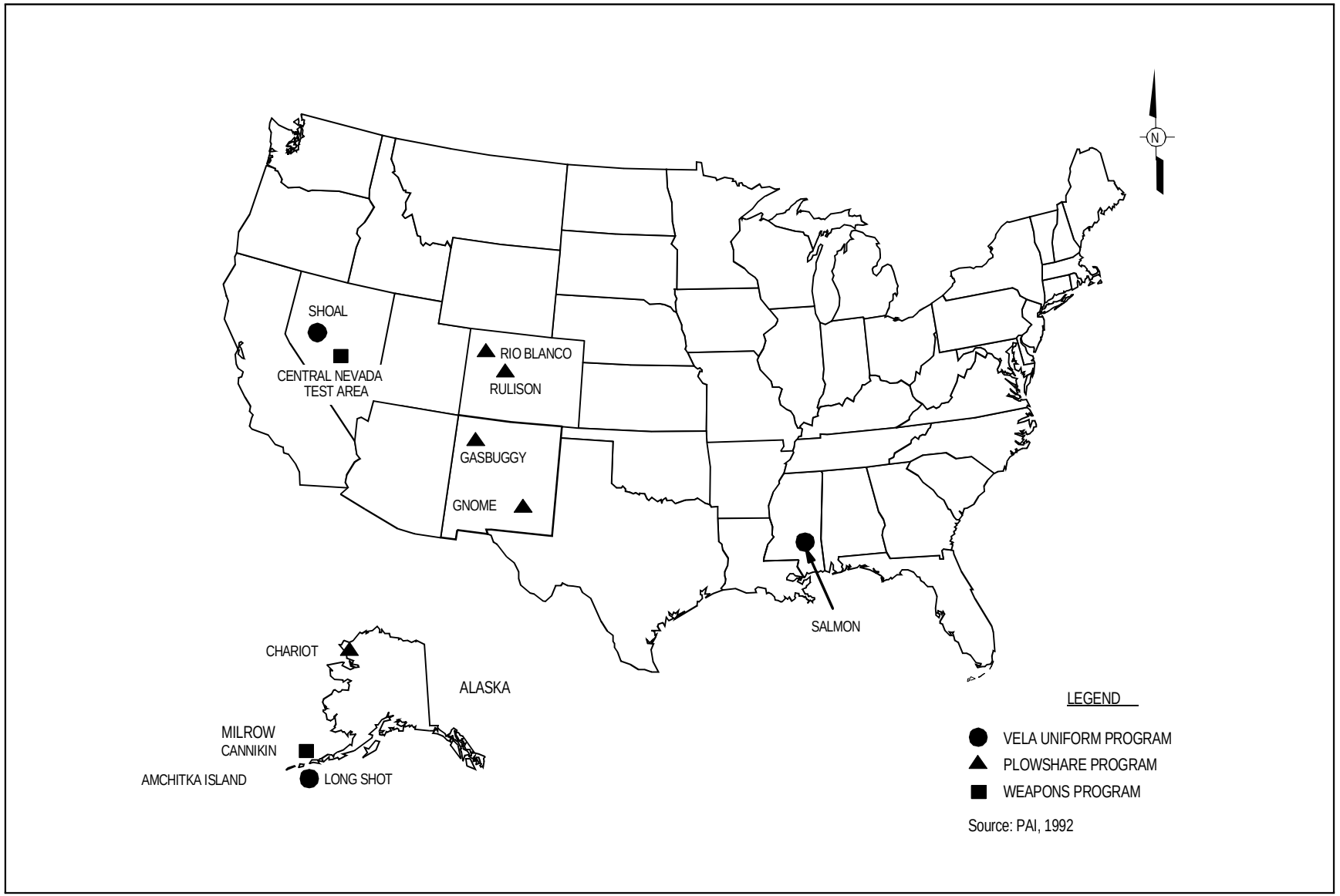
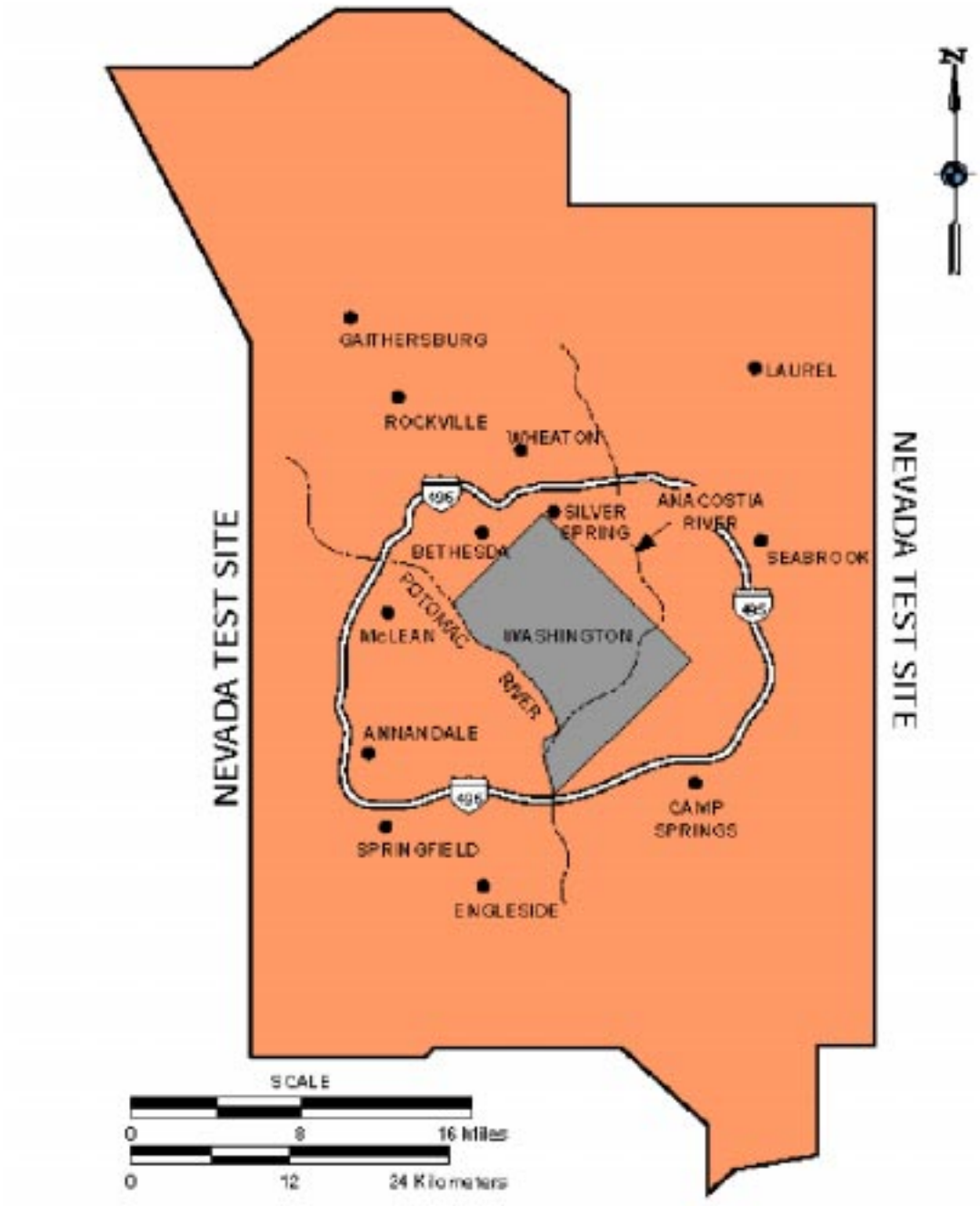


Figure 2-2
DOE/NV Environmental Restoration Division Off-Sites Locations



Source: DOE/NV, 1998

Figure 2-3
Nevada Test Site Size Compared to the Washington, DC Area

ization support; Bechtel Nevada (BN), which is responsible for corrective actions within the state of Nevada (BN is also the management and operation contractor for the DOE/NV); and the national laboratories and federal agencies that provide technical and scientific support. Regulators and stakeholders also participate in the development and implementation of NV ERP efforts through state agreements, the Community Advisory Board, and other public forums.

2.4 Regulatory Guidelines

The *Federal Facility Agreement and Consent Order* (FFACO) was entered into in May 1996 by the State of Nevada, DOE, and the U.S. Department of Defense. The facilities for which DOE is responsible and which are subject to the FFACO guidelines include the NTS, parts of the TTR, parts of the NAFR, the CNTA, and the Project Shoal area. The agreement establishes the framework for grouping and prioritizing project activities, defines the corrective action strategy for each specific project, identifies all sites and facilities requiring investigation and possible corrective action, provides definition of the required deliverables, and defines the mechanisms for dispute resolution. Also included is the approach for appropriate public involvement activities.

Deliverables required under the FFACO include a *Corrective Action Investigation Plan* that provides or references all specific information for planned investigation activities; a *Corrective Action Decision Document* that describes the corrective action that is selected as the result of investigation activities and the rationale for its selection; a *Corrective Action Plan* that provides the plan for implementing the selected corrective action alternative; a *Streamlined Approach for Environmental Restoration Plan* that provides a plan for initiating and completing corrective actions at Corrective Action Units where enough information exists to predict the appropriate corrective action; and a *Closure Report* that states the completed corrective action was conducted in accordance with the approved *Corrective Action Plan* and provides all necessary support data to confirm the appropriate corrective action took place.

Regulatory guidelines that also affect the technical objectives include, but are not limited to, the *Resource Conservation and Recovery Act* (RCRA) (CFR, 1996); the *Comprehensive Environmental Response, Compensation, and Liability Act* (1996); the Hazardous and Solid Waste Amendments to RCRA; *National Environmental Policy Act* (NEPA) (NEPA, 1969); the *Safe Drinking Water Act* (SDWA, 1988); and applicable state statutes and administrative codes.

3.0 OBJECTIVES

3.1 Environmental Restoration Objectives

The overall objective of the NV ERP is to effectively implement project activities in a manner that is consistent with regulatory requirements and agreements and that provides for the continued protection of human health and the environment. Supporting the overall objective are project-specific objectives that are discussed in detail below.

3.1.1 Technical Objectives

The technical objectives of the NV ERP are:

A. Identify and characterize inactive or abandoned DOE sites that are in the FFACO inventory.

B. Plan and implement deactivation and decommissioning of applicable facilities. Maintain facilities in a safe configuration that will also prevent serious physical degradation.

C. Develop strategies for applicable corrective action for sites through site investigations and alternative evaluations and the development of corrective action plans.

D. Implement a long-term monitoring program to ensure that containment boundaries for the underground are consistent with model predictions for UGTA and the Off-Site Projects.

E. Implement selected remedial strategies in a timely manner.

F. Establish a comprehensive program to develop and evaluate innovative technologies for site characterization and corrective actions.

Each specific project within the DOE/NV will have site- or task-specific technical objectives defined as part of project specific plans. Performance against these objectives is measured by the degree to which all work products and related remedial action decisions can be technically defended using data that meet established Data Quality Objectives (EPA, 1994). The data quality objective process is depicted in Figure 3-1.

3.1.2 Schedule Objectives

This document was prepared in support of the DOE EM objectives contained in *Accelerating Cleanup: Paths to Closure* (hereafter referred to as the *Paths to Closure*) (DOE, 1998a).

The overall schedule objective for the NV ERP is to complete corrective actions of identified sites as outlined in the *Paths to Closure* document. Specific schedule objectives are contained within the NV ERP Life Cycle Baseline.

3.1.3 Cost Objectives

The cost objective for the NV ERP is to complete project activities within identified funding levels. Accuracy of currently identified costs is highly dependent on future findings of the nature and extent of contamination, regulatory interpretations of data sufficiency and cleanup levels, and the selected corrective action remedies. Total project costs based on available data are part of the NV ERP Life Cycle Baseline, and are outlined in *Paths to Closure* documentation.

The methodology used to develop the NV ERP Life Cycle Baseline was as follows:

A. Parametric cost estimates were developed for similar release sites to estimate Baseline costs.

B. Cost models were developed based on experience gained during assessment

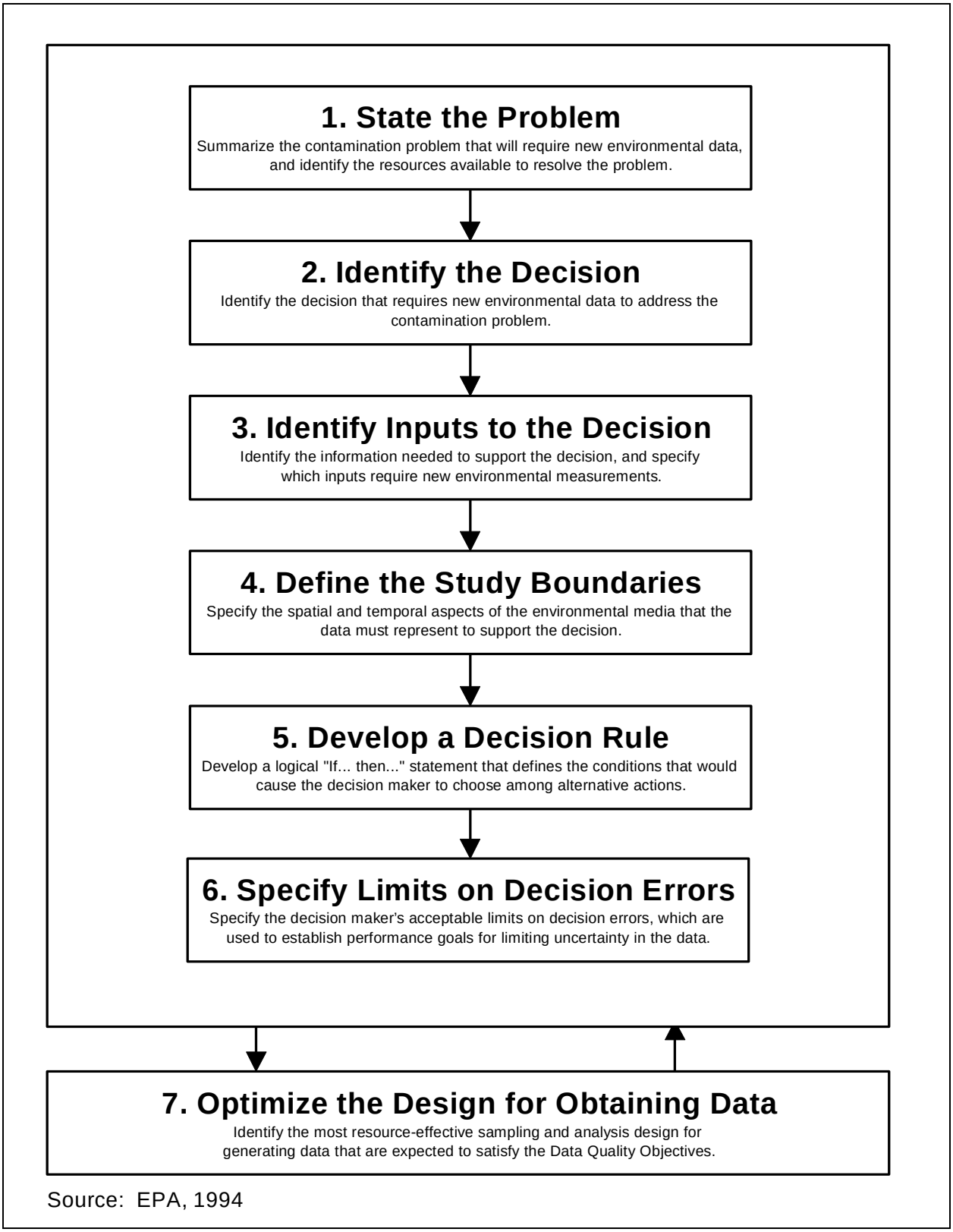


Figure 3-1
Data Quality Objective Process

and corrective activities performed at completed sites. The costs were adjusted up or down based on the estimated areas, volumes, and other factors as specified in the individual project sections.

C. Similar remediation sites were grouped into Corrective Action Units and costs were summarized at this level.

D. Costs for closing each Corrective Action Unit within the State of Nevada were separated into the following six phases which are named for the documents or activities performed within the phase: the *Corrective Action Investigation Plan*, the *Corrective Action Decision Document*, the *Corrective Action Plan*, the *Closure Report*, the *Streamlined Approach for Environmental Restoration Plan* Process, and the housekeeping process.

E. Costs required to complete each phase were further divided into work packages which include schedule durations and costs for labor, equipment, materials, subcontracts, and travel.

F. In the Soils Project, estimated costs for each Corrective Action Unit were developed based on the actual costs for the Double Tracks and Clean Slate 1 Corrective Action Units.

G. For the UGTA Project, a detailed estimate was first developed for the Frenchman Flat Corrective Action Unit based on costs experienced for well installations, data collection, and modeling activities. The estimate was used as a model and scaled to the other Corrective Action Units based on the number of wells, depths, geology, and other factors associated with each Corrective Action Unit.

H. In the Industrial Sites Project, sites were organized into like waste units or Corrective Action Units. Corrective Action Units were further organized into major categories, and detailed cost estimates were developed for each Corrective Action Unit.

I. In the Off-Sites Project, cost estimates for each site were developed based on actual costs experienced at Project Chariot in Alaska, the Rulison site in Colorado, the Salmon site in Mississippi, and Project Shoal in Nevada.

J. All costs within the Life Cycle Baseline database are in nonescalated current fiscal year (FY) 1999 dollars. Information in Paths to Closure documentation reflects the latest guidance regarding development of costs.

3.1.4 Environmental, Health, and Safety Objectives

The NV ERP is committed to ensuring that risks to the environment and to human health and safety are either eliminated or reduced to acceptable levels. All work performed will be consistent with regulatory requirements and agreements, and applicable DOE Orders.

3.1.5 Quality Assurance Objectives

The overall quality assurance objective of the NV ERP is to ensure compliance with applicable quality assurance requirements. All quality assurance manuals and procedures will be consistent with current DOE Orders, American National Standard Institute's *Specifications & Guidelines for Quality Systems for Environmental Data Collection &*

Equipmental Technology Programs (1994) and applicable state requirements.

3.1.6 Project Management Objectives

The *Life Cycle Asset Management* (LCAM), DOE Order O430.1A (DOE, 1998b), is the DOE's directive on implementing project management principals. The LCAM is transitioning the management of projects from a compliance-based system to a performance-based system. In support of the LCAM, the Nevada Project Management Information System (NPMIS) is used to control the activities within the NV ERP. The NV ERP Work Breakdown Structure (WBS) established the basis for required project management and control systems. A responsibility assignment matrix for the project has been established to ensure direct DOE project management control over the contractors through all elements of the WBS. Project progress is measured against cost and schedule parameters developed within the framework of the WBS, subject to approval levels established in the Baseline Change Control process. These parameters will be used as the criteria for measuring performance and determining the need for control actions by successively higher levels of management.

4.0 PROJECT ORGANIZATION

4.1 Project Team and Organizational Interfaces

The NV ERP Team is composed of organizations from the public and private sectors. Figures 4-1 and 4-2 show the DOE/NV overall organization and the DOE/NV Environmental Restoration Division organizational structures respectively. Additional descriptions of the participants and their roles can be found below.

4.1.1 U.S. Department of Energy, Nevada Operations Office Participants

A. Office of Assistant Manager for Environmental Management - Develops policies and procedures and provides the programmatic planning and centralized management for all DOE/NV EM activities. These activities are assigned to DOE/NV by the DOE Headquarter's (DOE/HQ) Assistant Secretary for Environmental Management and include assessments and Corrective Actions.

B. Office of Assistant Manager for Technical Services - Develops, interprets, and provides matrix support for Environmental, Safety, and Health and safeguards and security policies, procedures, and practices to ensure DOE/NV operations are conducted in a manner that complies with statutes, regulations, orders, mandated standards, and DOE/HQ program direction.

C. Assistant Manager for Business and Financial Services - Responsible for ensuring the financial integrity of DOE/NV by developing and implementing appropriate policies and procedures to provide advice and assistance for effective management of DOE/NV finances and related activities. In addition, this office develops and maintains integrated financial accounting and financial management systems and provides oversight of all financial management activities relating to programs and operations.

D. Office of Chief Counsel - Provides legal advice and assistance on matters of law and legal policy which arise in connection with functions administered by DOE/NV. This office also assists in the development of solutions to technical and administrative problems in accordance with legal policies and responsibilities and coordinates the investigation and resolution of complaints and claims.

E. DOE Defense Programs - The landlord program for DOE at the NTS.

F. Office of Public Affairs and Information - Develops and administers programs for public information and education and serves as the primary interface with the media and the public. This office coordinates all external interviews, community meetings, and public outreach programs.

G. Environmental, Safety and Health Division - Oversees environmental, safety, and health compliance activities.

H. Other DOE/NV Organizations - Provide advice and guidance to ensure that all DOE policies, requirements, and procedures are met. They also provide matrixed support in specialized areas such as information management, security, and procurement.

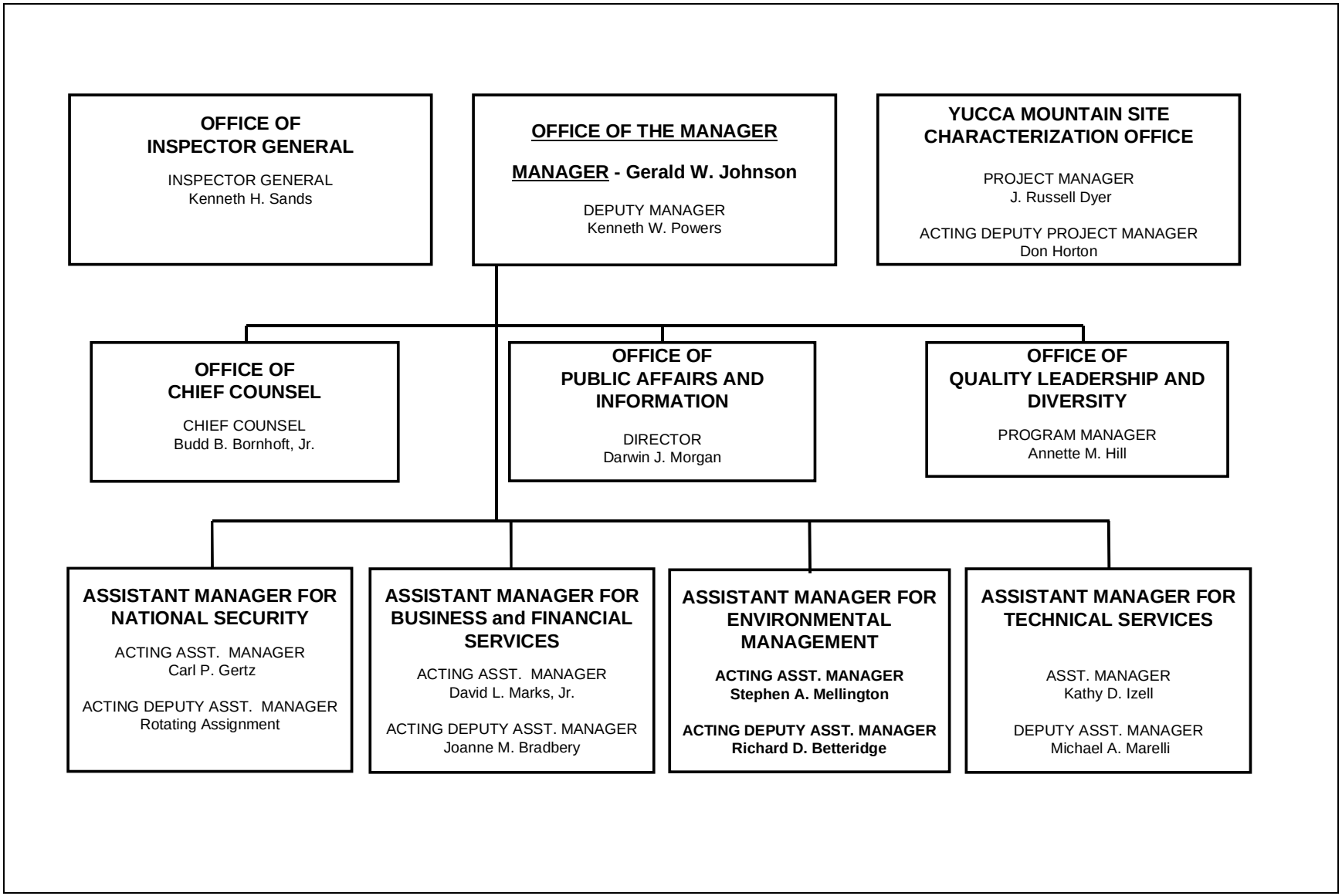


Figure 4-1
Nevada Operations Office Organizational Structure

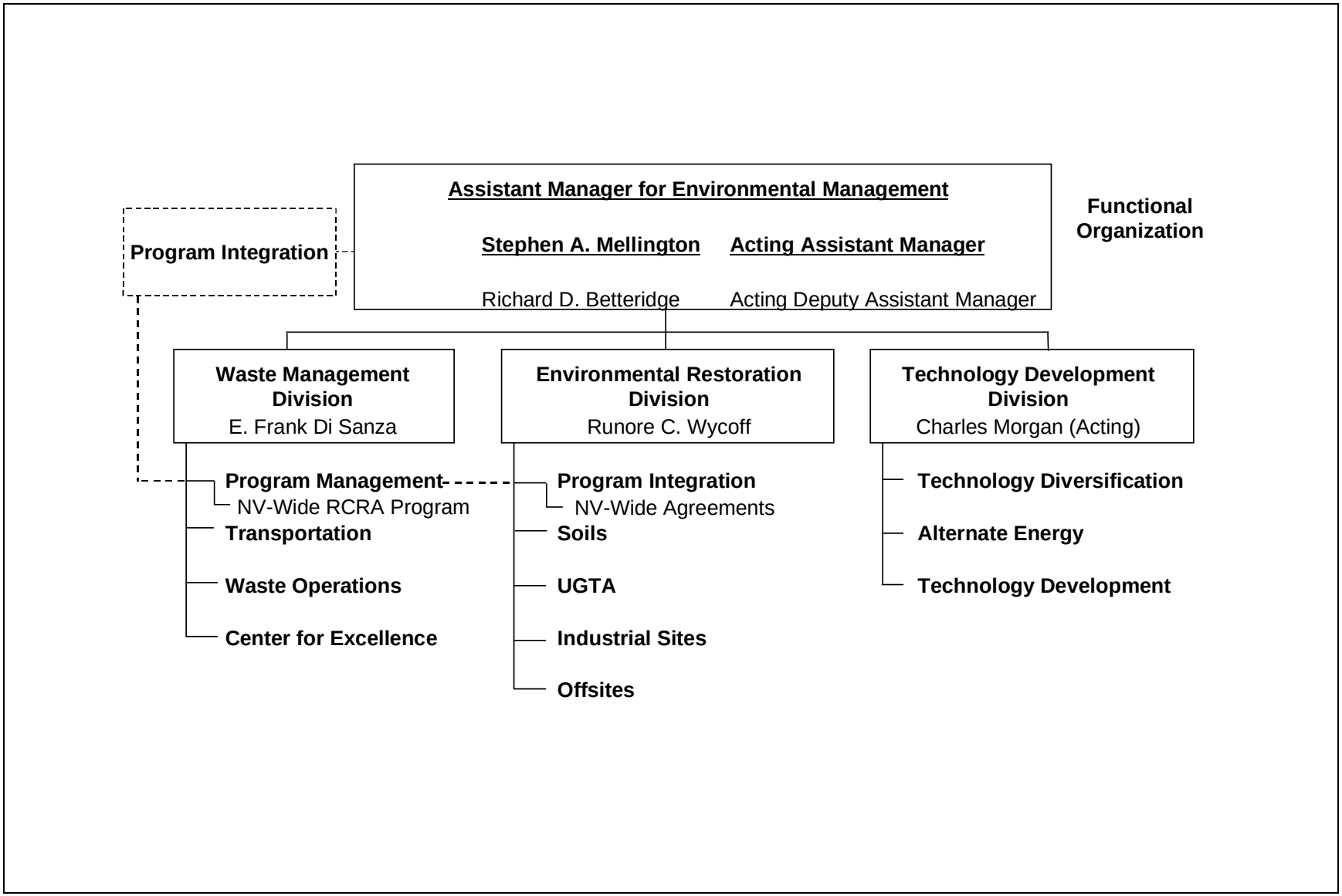


Figure 4-2
Nevada Environmental Restoration Division Organizational Structure

4.1.2 Other Project Participants

Numerous organizations share responsibilities in the NV ERP.

A. IT Corporation - Provides assessments/ characterization and environmental engineering services for work performed at the NTS, TTR, and NAFR. IT also prepares permit documentation for Corrective Action Units; determines the physiography, geography, and hydrology of each Corrective Action Unit; determines the nature (including the physical, chemical, and radiological constituents), extent, volume of contamination, and concentration in soil or groundwater through the performance of site investigation activities; and identifies and evaluates candidate technologies for treatability studies.

   IT provides project planning and management support including preparation of Work Plans, Technical Strategy Plans, Characterization Plans, Corrective Action Investigation Plan, Corrective Action Decision Documents, Quality Assurance Plans, and Health and Safety Plans. IT develops the total project cost and schedule baseline and budget submittals, prepares the environmental restoration components of DOE/HQ planning initiatives, and provides technical expertise and support in the development of associated project technical and management plans. Other services include: supporting the development of NEPA documents, regulatory agreements, and Agreements in Principle; providing support for public involvement activities; acquiring, integrating, managing, and analyzing technical and nontechnical project data; developing corrective action criteria; and verifying corrective actions for off-site locations.

B. Bechtel Nevada - Performs corrective actions at project sites within the State of Nevada. BN provides architectural, engineering, and inspection services, including design drawings and detailed cost estimates for corrective actions and deactivation and decommissioning of inactive facilities. BN provides support for the drilling, completion, and testing of characterization and monitoring wells and provides site development activities. Other support includes field survey and materials testing laboratory services for design and construction activities and project control and reporting support.

   BN provides overall operations support at the NTS such as radiological monitoring and control; maintenance, operations, and drilling support services as required during drilling, completion, and testing of wells; construction services including roads and utilities; closure or remediation of RCRA treatment, storage, and disposal units; removal of underground storage tanks; support for decontamination and decommissioning of identified facilities; and preparing Corrective Action Plans and construction management for conducting corrective actions.

   Bechtel Nevada is also responsible for endangered species surveys; airborne, ground, and multispectral remote sensing services; soil stabilization and revegetation studies; and is the interface between the existing NTS Geographic Information System and the comprehensive database management system being developed for the project.

C. Desert Research Institute (DRI) - Provides technical support and consultation, including laboratory and field analytical support; specialty borehole geophysical logging and field liaison support; modeling support for subsurface activities within the State of Nevada cultural resource surveys; and studies prior to any ground-disturbing activities. The DRI is also involved in technology development activities such as optimized well-siting research, development of *in situ* moisture and tritium sensors, and tritium removal technologies.

D. Wackenhut Services Incorporated - Provides security services for DOE/NV facilities.

E. National Laboratories - Lawrence Livermore National Laboratory and Los Alamos National Laboratory provide technical support, independent review, parallel investigations, and radiochemistry analysis support to groundwater characterization activities.

F. U.S. Geological Survey (USGS) - The USGS provides technical support for hydrologic measurements of water table depth, aquifer characterization, borehole geophysical logging, field geophysics, and regional and local geologic interpretations of groundwater characterization activities. The agency also conducts parallel investigations to validate the primary results from groundwater characterization studies.

G. U.S. Environmental Protection Agency (EPA) - The EPA's Environmental Measurement Systems Laboratory performs monitoring activities at the eight off-site locations where nuclear testing activities occurred in the past. Further involvement of the agency in project activities is dependent on negotiations of the final regulatory authority for project activities with the applicable states.

H. Community Advisory Board - This stakeholder organization provides recommendations and advice to resolve difficult issues within environmental restoration activities. This includes site-specific cleanup criteria and risk assessment, land use, priority setting, management effectiveness, cost versus benefit analysis, and strategies for site waste management and disposal facilities.

I. Nevada Division of Environmental Protection (NDEP) - The NDEP has regulatory and oversight responsibility for Nevada. The NDEP ensures that the impacts associated with the release of hazardous substances, pollutants, solid wastes, and hazardous waste into the environment are thoroughly investigated and remediated per applicable regulations and agreements.

5.0 PUBLIC PARTICIPATION

The public's interest in past, current, and future activities at the NTS has increased. To keep interested parties informed, the following efforts have been undertaken:

- A Community Advisory Board for NTS programs, comprised of local and affected stakeholders, has been established. The board addresses and provides advice to the DOE on environmental restoration, waste management, and technology development issues.

- Numerous fact sheets are available to the public, which explain environmental restoration, waste management, and technology development activities.

- The *Environmental Management Update*, a publication dealing with environmental restoration and waste management activities, is distributed to stakeholders in Nevada and other affected areas.

- Tours of the NTS are conducted for environmental groups; leadership groups; legislative bodies; media; local, state, and federal agencies; and other members of the public.

- Applicable documents are issued to stakeholders for their review.

- A DOE/NV EM Exhibits Program provides local and state governments, universities, and the general public with portable exhibits that can be set up and manned at a variety of locations including libraries, shopping malls, city halls, and other locations.

- An EM Speakers Bureau provides audiences with information about environmental restoration, waste management activities, and technology development activities.

- Community interviews were conducted in the spring of 1994 to gain a better understanding of the public's attitudes, opinions, and knowledge of DOE/NV environmental management activities.

- Public meetings are periodically held to discuss the DOE/NV EM Program including issues such as budgets and transportation of waste.

6.0 ENVIRONMENTAL RESTORATION STRATEGY

6.1 Introduction

The strategy for environmental restoration is based on commonality of work and the DOE EM Program vision to remediate, as much as possible, the contaminated sites within the Department's control in a ten-year time period. To implement this vision, programmatic assumptions were developed to guide all sites in developing their specific plans.

6.2 National Program Assumptions

A. Complete remediation of all sites by the year 2006, yet realize DOE's landlord responsibilities for surveillance and monitoring would extend past the ten-year period.

B. Recognize the value of strong stakeholder involvement in the planning and understanding of the decisions to be made.

C. Eliminate the most urgent health risks first.

D. Optimize integration across programs and sites.

E. Use innovative technology to reduce costs and improve effectiveness.

F. Maximize use of cost-effective privatization.

6.3 Site-Specific Program Assumptions

A. Institutional control of the NTS is assumed in perpetuity at the existing boundaries, and for the foreseeable future, the landlord is assumed to be DOE Defense Programs. If the agency should cease to exist, DOE assumes another federal agency will become the landlord.

B. The DOE/NV, NTS Development Corporation, BN, and the Nevada Alliance for Defense, Energy & Business are currently developing future land and facility uses for the NTS in accordance with the NTS Environmental Impact Statement and off-site locations in the state of Nevada (DOE/ NV, 1996), the Resource Management Plan, and land-use planning processes. At this time, businesses seeking economic development partnerships with NTS appear most interested in the southwestern portion of the NTS due to the proximity to Route 93. Decisions involving resource management, future land use, and private development will be done in partnership with the interests of DOE, national laboratories, U.S. Air Force, U.S. Bureau of Land Management, State of Nevada and local agencies, and stakeholders.

C. Technology development for the NV ERP is focused primarily on the following: (1) deep well sampling; (2) soil volume reduction; (3) downhole, real-time monitoring for radiation (mainly tritium) in boreholes; (4) long-term monitoring of upward and downward pathways in the vadose zone and closure caps; (5) oversize transuranic waste size reduction; (6) long-term, flexible arid site closure cover; (7) long-term stability of void space, containers, and disposed waste forms; (8) classified transuranic shapes sanitation; (9) improved detection and characterization of radioactive contamination on large concrete and metal surfaces; (10) development of method-

ology for sampling soils for volatile organic compounds for the NTS and other carbonaceous soils; (11) vadose zone tritium monitoring; (12) nonintrusive surveys in pipes and vessels; and (13) roof stabilization for contaminated facilities.

D. Renegotiation of the FFACO will not be required.

E. Full definition of the components of the long-term monitoring program will be developed as corrective actions are completed. Monitoring will focus on soil, water, air, plants, animals, and cultural resources; and monitoring to evaluate the nature and extent of underground contamination.

6.4 Soils Project

Most Soils sites have sufficient background data available regarding the sources of contamination. But some of the data are classified, and few of the sites have been characterized. All assessment activities focus on determining the extent of contamination. Most radiological assessment activities will involve *in situ* measurements using a wide array of instruments. Some discrete sampling is required to determine the extent of such contamination by wet chemical analysis. Once corrective action levels that are based on future land use and related risks are established, corrective action scenarios will be evaluated, and documentation will be prepared for negotiating corrective action procedures, if required.

Characterization of soils sites will only occur for those areas which were identified in Alternative 3 of the Environmental Impact Statement (that is, areas identified as having the greatest potential for future use). Characterization activities will focus on developing typical contaminant exposure profiles; detailed characterization activities will be performed at sites that are exceptions to these profiles. Characterization will include, as appropriate, two or more of the following activities: helicopter-based radiological survey, ground-base radiological survey, ground zero geophysics survey, ground zero soil borings, ground zero land survey, fission product sampling, and nonfission product sampling.

Assessment activities in the past have centered on the following:

A. Determining the extent of plutonium-contaminated soils.

B. Preliminary testing of soil removal technologies.

C. Performing experiments on soil stabilization and revegetation at sites that may contain plutonium-contaminated soil to be excavated.

D. Retrofitting an existing NTS facility into a Treatability Test Facility at which five bench-scale soil volume reduction tests were conducted.

E. Completion of a final corrective action includes completion of the characterization effort in support of an Interim Corrective Action status for the Double Tracks site on the NAFR.

Assessment efforts over the next few years will concentrate on Clean Slate II and III Sites on the TTR and Project 57.

Corrective actions in the Soils Project will range from removal of contaminants above corrective action levels for sites that are off the NTS or that straddle the boundary of the NTS to containment. For sites on the NTS, hot spot materials located in small selected areas will be removed. Corrective actions at larger surface soil areas will require the use of

mechanical excavation to remove contaminated materials. Processes are being investigated to reduce soil volumes.

In the Soils Project, surveillance and monitoring will be performed in accordance with closure documents for the Soils Corrective Action Units outside the NTS. Corrective Action Units where *in situ* stabilization was the chosen corrective action will be maintained and monitored for the stabilization of contaminant surface migration. Corrective Action Units in future testing areas will be monitored according to site monitoring plans which will include maintaining institutional controls that will limit access to the site and monitoring the site for contaminant migration.

Current planning activities and assumptions are:

- Currently no cleanup standards exist for these sites; it is assumed that a final corrective action level will be negotiated. For the long term, it is assumed that some areas on NTS will remain under institutional control and that contamination will be contained in an economically feasible manner.

- Restoration activities will primarily encompass corrective actions, including interim actions, designed to clean up Clean Slate Sites I, II, and III; Project 57; Gadgets and Mechanics Experiment; and Schooner. Corrective actions within the NTS proper will encompass appropriate assessment activities, removal of hot spots where risk to workers and the public may be a factor, controlled access, and applicable monitoring.

6.5 Underground Test Area

The objective of the UGTA Project is to define the regional and site-specific hydrologic boundaries encompassing groundwater resources that may be unsafe for domestic or municipal use. The first part of the investigation is a regional evaluation. The overall objectives of the regional evaluation are to estimate current and near-term risk to the public and environment from potential groundwater contamination downgradient from the underground nuclear testing areas, to determine if interim actions are needed, and to provide focus and priorities for ongoing local investigations. Secondly, local investigations will focus on estimating contaminant movement and site-specific boundaries that encompass the extent of contamination from the underground testing.

Planned corrective actions include the development of specific groundwater flow and solute transport modeling for six geographic areas: (1) Frenchman Flat, (2) Western Pahute Mesa, (3) Yucca Flat, (4) Central Pahute Mesa, (5) Climax Mine, and (6) Rainier Mesa/Shoshone Mountain. From this effort, a regulatory compliance zone will be established. Field activities in each area will provide data collection in the near-field environment, including installation of monitoring wells in locations specified by modeling results. The effort will include near-field groundwater flow and solute transport modeling, risk assessment, stakeholder/regulatory concerns, and a monitoring network design.

The UGTA remediation effort will consist of two phases. The first phase will be a verification program including a five-year, proof-of-concept period that validates the model's predictions. The second phase will start after acceptable results from Phase I verify that the contamination will be controlled within the agreed-to areal extent of contamination. The current assumption is that sufficient wells will exist as a result of data acquisition points (or wells) developed in the course of conducting characterization. If additional monitoring wells are necessary, plans for their installation will be detailed in the *Corrective Action Plan*,

which will include maintenance plans for the monitoring system during the monitoring period.

Once a Corrective Action Unit completes the interval of preclosure monitoring, the results of that monitoring will be assessed. If the results fall within limits previously defined in the *Corrective Action Plan*, a *Closure Report* will propose that the Corrective Action Unit be designated as closed. The *Closure Report* will also establish long-term monitoring requirements for the Corrective Action Unit, including contingency plans for actions to be taken if long-term monitoring results are not acceptable.

A part of the modeling effort in the UGTA Project is groundwater monitoring of the sites. To ensure protection of the public and the environment, the DOE/NV has established a long-term program to monitor the groundwater quality for radionuclides. Although sampling results show that no contamination from underground tests in shafts and tunnels have been found at off-site locations, contamination has been found in groundwater samples from wells located near the nuclear test locations on the NTS. Changes in patterns of water use or increased development will require that the potential for contaminant migration be re-evaluated. The areas will be closed in place, assuming there is no threat to the environment or natural barrier failure. Long-term monitoring is assumed to continue in perpetuity.

Current planning activities and assumptions are as follows:

- Computer modeling predictions will be the primary basis for determining contaminant boundaries and designing the monitoring network.

- No new technology or methodology will be required.

- Activities within the UGTA program will follow the Corrective Action Strategy outlined in the FFACO (1996). The strategy assumes that existing data combined with new data from existing wells is sufficient to model all Corrective Action Units and to define contaminant boundaries.

- Underground contaminants in and around the cavities created by underground nuclear tests will be closed in place because cost-effective groundwater technologies have not yet demonstrated an ability to effectively remove or stabilize radioactive contaminants at the various Corrective Action Units. In the future, such technologies may be developed, and the choice of corrective action may be altered at that time.

- Because stakeholders and the State of Nevada regulators have placed a high priority on understanding the extent of subsurface contamination, funding of the UGTA modeling/monitoring program is assumed to be the highest priority environmental restoration activity.

- Questions regarding future land use and responsibility for characterization and remediation of portions of Pahute Mesa will be resolved during preparation of the NAFR Environmental Impact Statement which is anticipated to be published in 2001.

6.6 Industrial Sites

Industrial Sites contamination areas generally include surface and subsurface soils that have been impacted by contaminants from aboveground testing, and leachfields, sumps, disposal wells, leaking tanks, and other sources of industrially generated waste from testing support activities. Contaminants may include petroleum hydrocarbons, RCRA (40 *Code of Federal Regulations* [CFR] Parts 260-271

[CFR, 1996]) identified hazardous substances, low-level radioactive materials, and mixed wastes from testing support activities. In general, it is assumed that most of the soil contamination related to the units in question is confined to the vadose zone.

In the Industrial Sites Project, most sites and facilities have not yet been characterized because of their extensive number, thus details regarding remedial actions are not yet known in most cases.

When characterization is completed and the applicable correction action selected, Closure Plans are developed. Corrective actions may be in the form of "clean closure" (i.e., excavation or removal of all contamination and/or *in situ* remediation), or closure in place (i.e., leaving the waste in place, covered with an engineered cap). Some closures may be achieved through a combination of removal, remediation, and closure in place. In some cases, no action will be necessary.

Closure using the Streamlined Approach for Environmental Restoration is implemented at Corrective Action Units where the parties agree that enough information exists about the nature and extent of contamination to propose an appropriate corrective action prior to the completion of a corrective action investigation. In such cases, the contaminants of concern at the affected sites and facilities have been previously identified.

Conventional, unexploded ordnance and explosive residue is detonated in place rendering nonhazardous debris, recyclable debris, or nonhazardous solid waste. Decontamination and decommissioning activities include one or more of the following options: decontamination, dismantlement, demolition, encapsulation, entombment, administrative control, or other operations to achieve the designated disposition alternative for each facility.

Post-closure monitoring activities are an essential element of the Industrial Sites Project. The activities consist of collecting periodic measurements and/or samples from monitoring wells and effluent streams, as stipulated in each unit's Post-Closure Care Permit. Condition inspection and maintenance of any remedial systems, such as caps or active systems, are included in estimates of scheduled activities. Sample analysis and preparation of a report for each monitoring period are also included. Post-closure monitoring is determined on a case-by-case basis depending on the specific closure action. The length of time for monitoring at each site is negotiated with the State of Nevada under its RCRA authority.

Current planning activities and assumptions are as follows:

- Since the majority of industrial sites and facilities have not yet been characterized, details regarding the potential corrective actions are yet to be determined.

- NTS testing areas will be characterized, but corrective actions may not be performed except in areas where the greatest potential for health risks exists as the result of direct exposure, inhalation, and/or resuspension of contaminants. Final decisions regarding corrective action in these areas will be determined based on final discussions with the state regulator.

- DOE/NV Defense Programs facilities (approximately 1,500 in number) will not be accepted into the DOE/NV EM Program at this time per *Path to Closure* guidance and national assumptions.

6.7 Off-Sites Project

Beyond the NTS, nuclear testing activities have been conducted at seven locations in five different states as part of the Plowshare and Vela Uniform Programs.

As part of the Vela Uniform Program, nuclear tests were conducted near Fallon, Nevada (Shoal); at the CNTA, Nevada (Faultless); and Hattiesburg, Mississippi (Projects Salmon and Sterling); and on Amchitka Island, Alaska. Long Shot was the only Alaskan test that was part of the Vela Uniform Program. Projects Milrow and Cannikin at Amchitka were part of the nuclear weapons testing program. As part of the Plowshare Program, nuclear tests were conducted near Rifle, Colorado (Rio Blanco); near Grand Valley, Colorado (Rulison); near Farmington, New Mexico (Gasbuggy); and near Carlsbad, New Mexico (Gnome).

For Amchitka, Shoal, CNTA, Salmon, and Gnome, the strategy will be to characterize groundwater subsurface flow and area of contamination, assess risk, and model containment movement away from the shot cavities. The focus will be on tritium because it is the most mobile of the potential radiological contaminants. Other radionuclides will be evaluated, provided tritium migration indicates the need for other radionuclides to be included in the source evaluation.

For Rulison, Rio Blanco, and Gasbuggy, the subsurface strategy will be to characterize the subsurface conditions at the site. Natural gas, not groundwater, is considered to be the main contaminant migration pathway from the shot cavity. A reservoir analysis of the natural gas and subsurface conditions will be conducted to provide data for use in the subsurface model to establish contaminant fate and transport. A radiological risk analysis will be conducted to provide the model a risk-based compliance boundary. The focus will be on krypton gas because of the radiological half-life and mobility in a gaseous state. Other radionuclides may be evaluated, provided krypton migration indicates the need for other radionuclides to be included in the source evaluation.

Corrective actions for sites outside of the NTS will vary with the type of test performed and requirements imposed by state regulatory agencies. The surface will be restored for unrestricted use. Corrective actions for surface test sites and facilities will be done in accordance with regulatory requirements. Resulting wastes will be closed in place, treated and disposed of on site, or transported off site dependent upon the type and quantity of contamination and the available technologies and their effectiveness. At present, regulatory drivers and stakeholder interests for sites outside of the State of Nevada are not defined. As a result, technical requirements, corrective actions, and corrective action levels may affect scope, life cycle costs, and schedule.

For Amchitka, CNTA, Shoal, Salmon, and Gnome, a part of the corrective action for the underground off-sites program will be continuation of the existing monitoring network for long-term groundwater surveillance and monitoring. In addition to groundwater monitoring, groundwater use and development will also be monitored for changes in the patterns of water use. Should increased development occur, groundwater modeling and long-term monitoring networks will be reevaluated.

For Rulison, Rio Blanco, Gasbuggy, a part of the corrective action for the subsurface off-sites program will be the continuation of the existing monitoring network for long-term groundwater surveillance and monitoring. In addition to the monitoring, natural gas development and production will also be monitored for any changes to the subsurface model. Should increased development occur, the model will be reevaluated.

The environmental regulations in the various states may require additional wells or studies to address public and environmental concerns about subsurface and groundwater contamination. Existing wells and equipment require periodic maintenance to keep systems running. The costs associated with installing new monitoring wells and performing additional tests or studies at a site are assumed to be post closure costs. Activities that require additional testing for possible contamination are considered assessment costs. The annual sampling and maintenance activities at each site are assumed to be part of the Long-Term Hydrologic Monitoring Program.

The post-closure land-use assumption for the off-site locations is that the surface will be restored for alternative uses with restricted subsurface intrusions.

Current planning activities and assumptions are:

- The Corrective Action Units will be segregated into surface and subsurface areas.
- Corrective action will be completed for surface contamination at all off-site locations within the ten-year period.
- Waste in and around the test cavities will be modeled, but will not be removed, and long-term monitoring and surveillance will continue in perpetuity.
- Subsurface site information will be evaluated to establish the subsurface conditions at the sites. Based on this evaluation, a technical-based decision will be made on the technical need and utility to install wells and conduct testing to fill potential data gaps.
- As assessment and corrective action work is planned, consideration will be given, where drilling is involved, to placing wells necessary for assessment data or corrective activities in strategic locations that would enhance or fill gaps in the Long-Term Hydrologic Monitoring Program networks.

7.0 PROJECT SCHEDULE AND CONTROL

Project Management, Measurement, and Planning and Control Systems

Project management, progress measurement, control, and reporting of project activities to DOE/HQ is structured by the WBS. The NV ERP project activities are planned, managed, measured, controlled, and reported through the NPMIS.

7.1 Work Authorization

The DOE/HQ has established a number of policies and requirements that govern project work. Planning processes include development of Project Baseline Summary Sheets, Life Cycle Project Baselines, and Task Plans. These processes involve establishing work scope, resource requirements, schedules, and milestones; identifying project assumptions, issues, and constraints; and specifying project control parameters. Project control functions established by DOE/HQ include issuance of performance measurements that identify performance that DOE/HQ wishes to track within EM programs at the field level.

Authorization of work scope for the NV ERP is a process that combines planning, cost estimation, budget allocation, and budget approval processes. Work scope at this level is accomplished through task agreement plans that establish the scope, costs, schedule, milestones, and spending plan for specific work to be accomplished by a contractor or user organization within a given fiscal year. Upon approval of the task agreement plans, work scope is incorporated into Task Orders that become a contractor's programmatic authorization to perform work for the project. Modifications to task plans are through formal change control processes.

7.2 Funds Management

Cost estimates within task plans follow guidance established in the following documents:

- *EM CAT Handbook* (DOE, 1990)
- *Cost Estimation Guide, MA0063,* Volumes 1-6 (DOE, 1982)
- *Cost Estimating Guide - Office of Infrastructure Acquisition,* FM-50, Vol. 6, Rev. 0 (DOE, 1994b)

Cost estimates form the basis for budget requests. The annual budget request considers both the required resources and the annual distribution of the estimated costs within the *Paths to Closure* document. Budget formulation and execution are accomplished in accordance with DOE Order O130.1, *Budget Formulation Process* (DOE, 1995). Upon designation of funding by DOE/HQ EM, work authorization is reviewed and revised, as applicable, based on the funding received. Allocated funds are tracked by DOE/HQ through the Paths to Closure process. The NV ERP input to the system is coordinated with the DOE/NV Resource Management Division to ensure that reported funds reflect information in the Financial Information System.

7.3 Performance Measurement and Control

Performance measurement consists of monitoring progress against the established project baselines, analyzing variances and the impacts of the variances, and implementing corrective actions. The project life cycle baselines and Task Agreement Plans provide the basis against which project performance is measured and controlled. The DOE/NV NPMIS provides the foundation for reporting information to DOE/HQ.

The task planning effort establishes the baseline scope, budget, and schedule for each task where contractor performance is measured and controlled for the current year. The NPMIS is depicted in Figure 7-1. Contractors are responsible for monitoring performance on assigned tasks and reporting to DOE/NV on a monthly basis. Contractor performance measurement and control systems retain flexibility, but must be capable of providing the following information at a minimum:

- Cost Performance:
  - Budgeted cost of work scheduled
  - Actual cost of work performed
  - Budgeted cost of work performed (earned value)
  - Cost variances
  - Estimates at completion
  - Variance analysis
- Schedule Performance:
  - Approved baseline schedule
  - Schedule variances
  - Major commitment tracking
  - Milestone tracking

Specific performance measurement and control requirements are contained in DOE Order O430.1A (DOE, 1998b) and further defined in the *Joint Program Office Direction on Project Management in Support of DOE Order O430.1* (DOE, 1996a).

The NV ERP total project cost and the baseline schedules are depicted in the Life Cycle Baseline.

All contractor reporting must be consistent with the project's WBS. Variances from baseline budgets and schedules are reported using a Variance Analysis Report, in addition to a recommended corrective action or proposed change control action.

The WBS depicts the Statement of Work in a hierarchy in which the work is subdivided into increasingly detailed work elements or tasks containing each successive lower level of the hierarchy. The WBS breaks down the Statement of Work to the level of detail where responsibility for performance of the work is assigned to individual contractors. Each WBS work element is assigned a unique number that readily identifies that work element in the total WBS. The WBS numbering system logically relates lower-level work elements to their upper-level parent elements. The WBS is depicted in Figure 7-2. The WBS Dictionary describes the content of each work element in the WBS. The WBS Dictionary lists the WBS element code, title, index line number, revision number and authorization, approved changes, and element task description which describes the work to be performed.

The Responsibility Assignment Matrix (Figure 7-3) depicts the NV ERP WBS hierarchy, with the attendant responsible manager for performance of that portion of the WBS.

Centralized site-wide systems for performance measurement, baseline management and change control, policies and procedures, and DOE/HQ reporting requirements have been developed and are being used to track and control thresholds.

Monthly performance data is reviewed by the project managers, the Division Director, and the DOE/HQ EM Site Lead Team to identify potential impacts to technical requirements criteria, the validity of cost estimates, necessary corrective actions for significant variances, and the progress of critical-path activities within the project. Quarterly reports are also prepared to detail project progress against the approved project baseline.

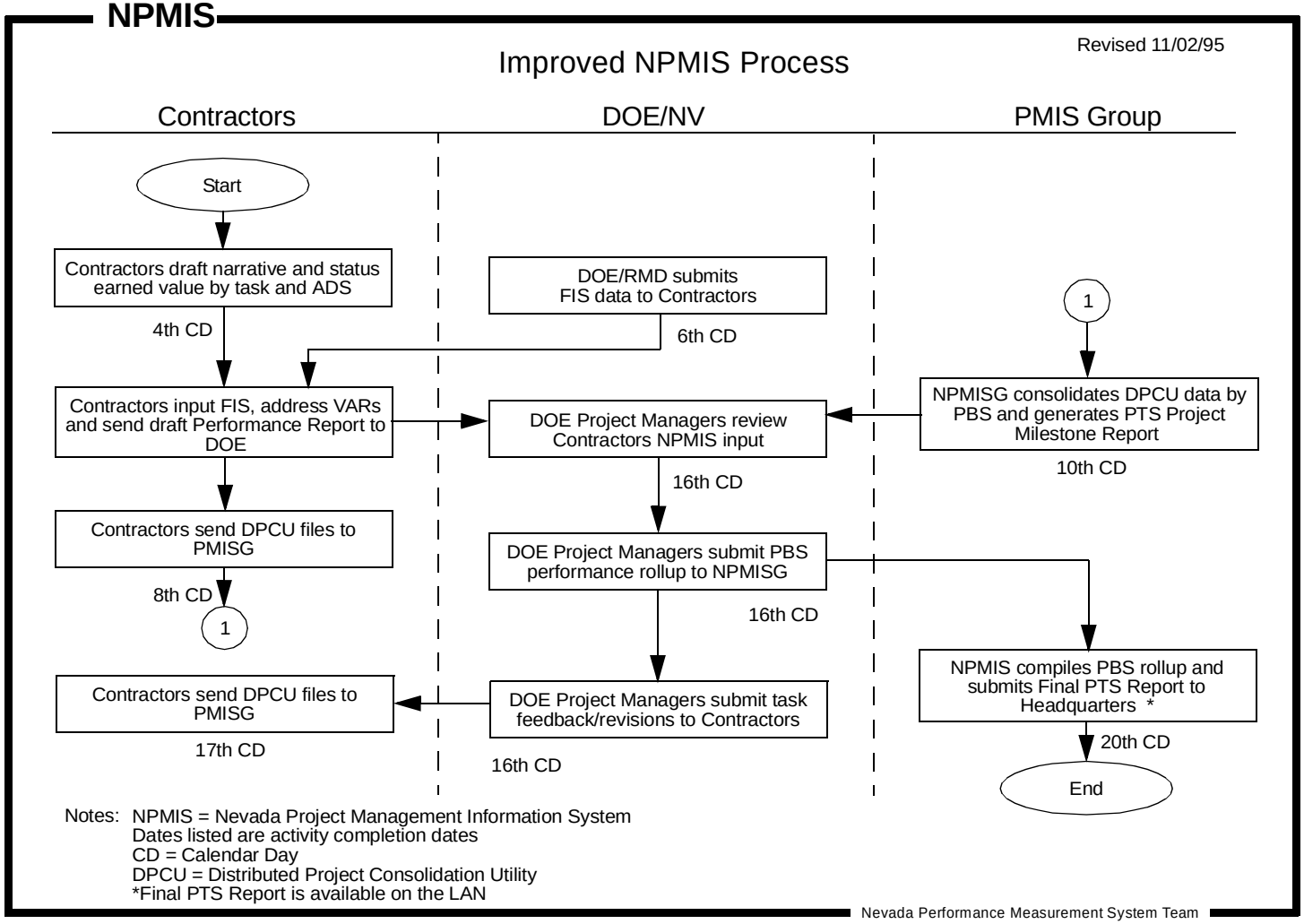


Figure 7-1
Nevada Project Management Information System Process

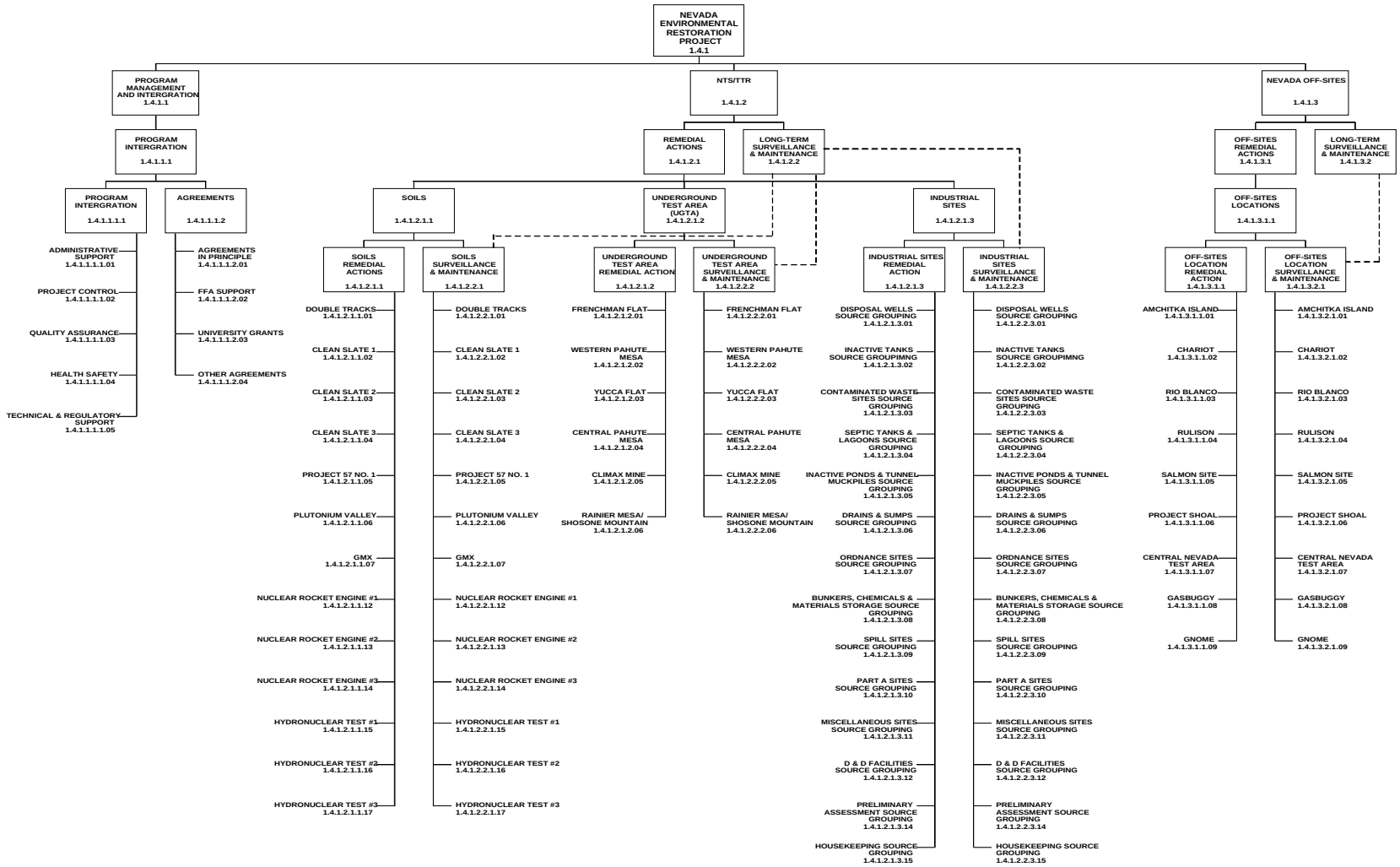


Figure 7-2
Nevada Environmental Restoration Project Work Breakdown Structure

WBS	Name	Location	DOE	IT	BN	DRI	LLNL	LANL	Major-Sub
1.4.1	Nevada Environmental Restoration Project		R. Wycoff	M. Brown	M. Sabbe	D. Shafer			
1.4.1.1	Program Management & Integration		B. McClure	C. Garvin	M. Sabbe				
1.4.1.1.1	Program Integration		B. McClure	K. Hunsinger	P. West-Thompson				
1.4.1.1.1.1	Program Integration		B. McClure	K. Hunsinger	P. West-Thompson				
1.4.1.1.1.2	Agreements		P. Hall	L. Roos	P. West-Thompson				
1.4.1.2	NTS/TTR		R. Wycoff	R. Eastmond	D. Cowser				
1.4.1.2.1	Remedial Actions		R. Wycoff	R. Eastmond	D. Cowser				
1.4.1.2.1.1	Soils		M. Sanchez	P. Gretsky	D. Cowser	D. Shafer			
1.4.1.2.1.2	UGTA		R. Bangerter	J. Wille	P.K. Ortego	C. Russell	G. Pawloski D. Smith	W. Hawkins	D. Trudeau
1.4.1.2.1.3	Industrial Sites		J. Appenzeller-Wing	K. Beach	D. Cowser				
1.4.1.3	Nevada Off-Sites		R. Wycoff	R. Eastmond	D. Cowser				
1.4.1.3.1	Off-Site Remedial Actions		M. Sanchez	P. Gretsky	D. Cowser				
1.4.1.3.1.1	Off-Sites Locations	Nevada	M. Sanchez	P. Gretsky	D. Cowser	J. Chapman			
1.4.1.3.2	Long-Term Surveillance & Maintenance								

Figure 7-3
Responsibility Assignment Matrix

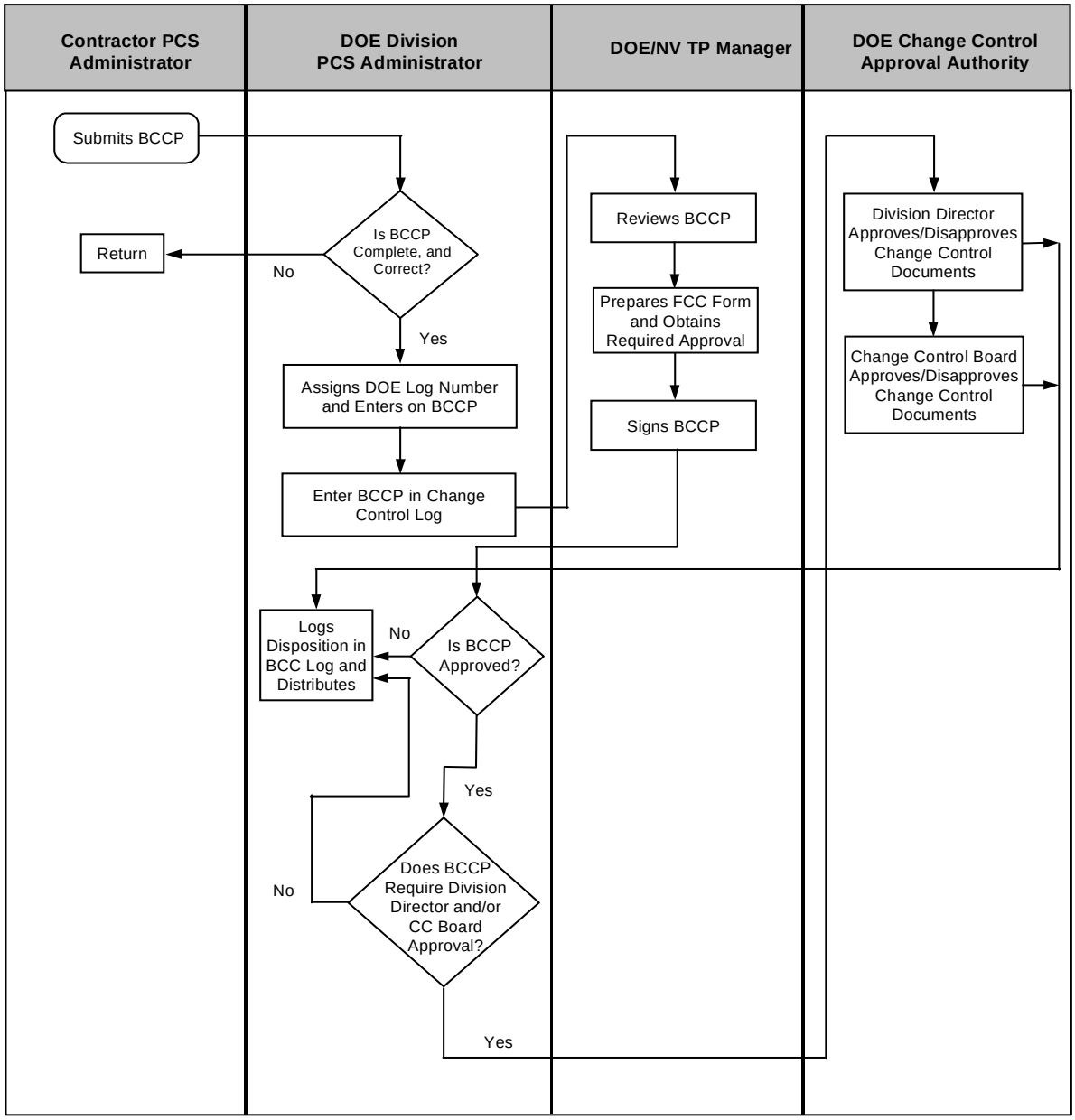
The DOE/HQ EM Site Lead Team conducts mid-year and year-end reviews to assess project status, identify current or impending problems, establish preliminary requirements for the upcoming year, and identify areas where management assistance would be beneficial. Mid-year reviews examine the progress of all activities and their impact on accomplishing approved project plans. Year-end reviews document completed work and detail plans and related funding for the upcoming year.

7.3.1 Change Control

Baseline management is part of a planned program to monitor and control project performance. The process designates variance thresholds above which approvals must be secured as well as the procedural requirements for securing the approvals. Thresholds and approvals vary for the level of the WBS at which the change occurs. When actual or projected variances exceed the variance thresholds for an approved cost, schedule, or technical baseline, formal baseline change control action is initiated in response to requirements established in *DOE/NV Baseline Change Control Process* (DOE/NV, 1999).

Approved changes are incorporated in the NPMIS to ensure that performance measurement for the project reflects the most current cost, schedule, and technical status. The process for change is outlined in Figure 7-4. The approval authority and threshold level are established in the Assistant Manager for Environmental Management Baseline Change Control Process.

Contractor-requested changes at the task level are reviewed by the Contractor's Change Control Board and the DOE/NV Project Manager. Upon approval of the change request, a Task Order Change Order is issued to the contractor. Contractors are not to proceed with any out-of-scope work that is the subject of a change request until the Change Order is issued by DOE/NV.



Source: DOE/NV, 1999

Figure 7-4
Baseline Change Control Process Flowchart

8.0 OPERATIONAL READINESS

Operational readiness is a systematic, documented review of the readiness for startup of a facility, process, or activity. The purpose is to provide a framework for an integrated team effort to effectively complete the task Statement of Work. The NV ERP Project Managers are responsible for ensuring that operational readiness reviews are properly developed, conducted, and documented.

8.1 Definition

Operational readiness is a systematic, documented review of the readiness for startup of a facility, process, or activity. The purpose is to provide a framework for an integrated team effort to effectively complete the task Statement of Work. The NV ERP Project Managers are responsible for ensuring that operational readiness reviews are properly developed, conducted, and documented.

8.2 Planning Documents and Systems

Readiness reviews shall verify that all planning documents and systems are formally approved and in place for the successful and efficient accomplishment of the project objectives. A readiness review checklist shall be completed to document the performance of a readiness review. At a minimum, the Project Manager or a designee shall accomplish the following:

- Review the project plans, the Site-Specific Health and Safety Plan, the Quality Assurance Program Plan, and any applicable procedures to ensure that they are appropriate for the planned activities.

- Verify that variances to procedures and plans are documented on the applicable contractor's Change Notice Process.

- Review the qualifications of potential field personnel to verify that the personnel selected are qualified to perform their assigned duties and that documentation of qualifications is on file.

- Verify that subcontractors have been pre-qualified by Health and Safety and Quality Assurance.

- Verify that subcontractors have had the necessary training and that any required certifications/documentation are in the project files.

8.3 Field Preparations

The Project Manager or Supervisor will conduct a site survey to ensure that plans and procedures are appropriate and that the requirements contained therein can be implemented. At a minimum, the following activities shall be performed prior to initiation of field work:

- Identify required resources (e.g., personnel, equipment, and material) and ensure availability.

- Verify that personnel performing the work have a copy of all appropriate work instructions and procedures, including any applicable change notices.

- Prepare a required reading checklist for project personnel.

- Verify that all periodic calibrations, and calibration standards, used for measuring and test equipment are current and that all calibration and maintenance documentation is on file.

- Verify that proper work authorizations, permits, and site access have been obtained.

- Assemble the necessary equipment, material, and forms.

- Assemble copies of the approved project plans.

8.4 Prefield Briefing

A prefield briefing shall be conducted prior to commencement of field activities. At a minimum, the prefield briefing shall be attended by appropriate personnel, such as project management, project field personnel, any subcontractors involved in the project, a health and safety representative, and a quality assurance representative. Prefield briefings shall be documented on a prefield briefing summary form. The prefield briefing should:

- Present a brief overview of the project and the objectives of the upcoming field activity.

- Establish a clear line of communication for questions or problems that may arise in the field.

- Review the Site-Specific Health and Safety Plan and ensure that all personnel sign the plan.

- Identify the means of emergency communication and "walk through" emergency actions as identified in the Site-Specific Health and Safety Plan.

- Review quality assurance requirements and quality control activities to be performed.

- If appropriate, conduct "dry-runs" or "mock-ups" to demonstrate that health and safety, quality assurance, and activity-related procedures are suitable.

- Define what activities each team or individual shall be responsible for performing. Include contingency plans for reassignment of duties.

- Discuss the work site (a map is desirable) and each location where activity is to take place. Discuss any constraints the site may present.

- For sampling activities, identify what samples are to be collected at each sample location, the number of samples to be collected, and the sample types and analyses. Review the sampling technique to be implemented.

- Identify what equipment requires field decontamination, where decontamination shall take place, and the logistics of the field decontamination process.

- Discuss any waste management issues.

- Identify, to the extent possible, any potential problems that may be encountered, and discuss possible contingencies.

- Discuss any lessons learned from prior field activities or similar events involving other projects.

- Review information required on field documentation and discuss how field variances to plans and procedures should be executed.

9.0 ENVIRONMENTAL SAFETY AND HEALTH

The elements of the environmental safety and health program are discussed in the following subparagraphs.

9.1 Plans and Guidance

Federal and state regulations, DOE Orders and guidance documents, and site-specific health standards mandate activities in this task. Guidance has been provided in the Health and Safety Plan which was written to comply with DOE Order O440.1, *Worker Protection Management for DOE Federal and Contractor Employees* (DOE, 1998c)*;* DOE Order 5480.4, *Environmental Protection, Safety, and Health Protection Standards* (DOE, 1993a); DOE Order 5400.5, *Radiation Protection of the Public and the Environment* (DOE, 1993b); DOE Order 5480.23, *Nuclear Safety Analysis Reports* (DOE, 1994a*)*; *OSHA Training Requirements for Hazardous Waste Operations* (DOE, 1991); Occupational Safety and Health Administration regulations 29 CFR 1910.120 and 1926.65 (CFR, 1998a), 40 CFR 300 (CFR, 1994), 49 CFR (CFR, 1998b), and 10 CFR 1021 (CFR, 1995).

9.2 Work Performance

In order to ensure readiness prior to the start of work, Operational Readiness Reviews, hazard assessments, and as low as reasonably achievable reviews (when required by the *NV/YMP Radiological Control Manual* [Gile, 1996]) are conducted. Measures used to monitor the adequacy of health and safety controls include surveillance of works in progress by project management and health and safety personnel. Site monitoring is used to verify the effectiveness of contamination controls. If unforeseen (not already covered by contingency planning) health and safety hazards arise, work activities are suspended until the hazard is properly addressed by health and safety professionals. Stop Work Orders are issued in the event of an inherent hazard. Change control is a mechanism used to manage major project changes.

As a project progresses from planning through implementation to closure, resource allocation will necessarily shift. Health and safety resources necessary during the planning phase of a project may include industrial hygienists, health physicists, safety professionals, risk assessors, waste management specialists, health and safety and waste handling training programs, and medical surveillance. During this phase health and safety professionals ensure the project planned will be conducted in accordance with 29 CFR 1910 (CFR, 1998a), 29 CFR 1926 (CFR, 1998a), 49 CFR (CFR, 1998b), and 10 CFR 1021 (CFR, 1995) requirements. Resources necessary during the implementation phase will include industrial hygienists, health physicists, safety professionals, waste management specialists, monitoring technicians, internal and external dosimetry programs, respiratory protection programs, medical surveillance programs, personal protective equipment, and engineering controls. During the closure phase of a project, resources may include industrial hygienists, health physicists, safety professionals, waste management specialists, internal and external dosimetry programs, medical surveillance programs, and a records retentions and management program.

9.3 Feedback and Continuous Improvement

Various assessments and surveys of project activities are performed to determine the adequacy and efficiency of performance, and to evaluate the success of an integrated health and safety approach. These assessments and surveys involve oversite reviews, internal self-assessments, external inspections, and audits. This Integrated Safety Management program, and its attendant seven principles, has been adopted and are in use by DOE/NV. The assessments and surveys are conducted for

both administrative functions and field on-site activities. Worker and management feedback is actively sought at all levels during these evaluations and is then directed at project improvement. In addition, the feedback is shared with the involved personnel and evaluated for trends. Appropriate actions are then taken as needed and ongoing monitoring is conducted to ensure success. Management also identifies areas for improvements based on overall performance and budget information for the activities. Workers are requested to identify additional areas for improvement and to provide information and ideas for those improvements.

9.4 Risk Evaluation

Numerous sites across the NTS display a wide list of potential contaminants including hazardous wastes and radioactive wastes. Risk to the public is low as a result of restricted site access. Risk to NTS workers during corrective actions is considered moderate and decreases to low when corrective actions are finished. Contamination exists within shot cavities below ground surface and in some groundwater on the NTS. Based upon recent data from *The Regional Groundwater Flow and Tritium Transport Modeling and Risk Assessment Report* (DOE/NV, 1997), there is a potential for off-site migration of contaminants from the Western Pahute Mesa area. Health risks related to public consumption of contaminated groundwater are rated medium since groundwater may migrate to public and private water supply without being noticed. Additional wells will be drilled in this area to provide data for modeling to reduce the uncertainty and to define the areas of contaminants and monitor the boundary. Risk to site workers is low because drinking water supplies on the NTS are monitored for contamination.

The risk assessment and hazard mitigation process is integral to the entire health and safety structure. This process is mandated by the regulations and guidance documents listed in Section 9.1.

10.0 REFERENCES

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