CHAPTER 2

Operations Overview of Sandia National Laboratories, California

Chapter 2 provides an overview of Sandia National Laboratories, California (SNL/CA) operations, programs, and facilities. It begins with a brief history of the laboratories and site-wide operations, followed by a discussion of SNL/CA support for the United States (U.S.) Department of Energy (DOE) mission lines, programs, and projects. Descriptions of specific facilities and their operations are located at the end of the chapter.

During World War II, nuclear weapons were designed, developed, and tested at Los Alamos National Laboratories (LANL) in New Mexico. In late 1945, LANL began transferring its field-testing and engineering organization, known as Z-Division, to Sandia Base near Albuquerque, New Mexico. This organization was the nucleus of what became Sandia National Laboratories (SNL) in 1949. The initial focus of the newly formed SNL was on nuclear weapons engineering and production coordination, with a growing emphasis on research and development (R&D) to improve weapons design. By 1952, SNL focused on weapons development. The Laboratories undertook extensive field testing of components, supported the atmospheric tests conducted by its partner laboratories, and established an advanced development group to anticipate future nuclear weapons proliferation, weapons development, and treaty monitoring technological projects.

In 1956, SNL established the SNL/CA location to provide a closer relationship with Lawrence Livermore National Laboratory (LLNL) design work. The SNL/CA facility evolved into an engineering research and development laboratory by the early 1960s and into a multiprogram engineering and science laboratory during the 1970s.

As international arms control efforts increased in the late 1970s and throughout the 1980s, the U.S. emphasized treaty monitoring, safety, security, and control of the national nuclear weapons stockpile. With the end of the Cold War in the late 1980s, the role of SNL/CA to support stockpile stewardship ensuring nonproliferation and continued safety, security, and reliability, took on greater importance.

The DOE uses management and operating (M&O) contractors to manage its facilities, including SNL/CA. SNL/CA (Sandia Corporation) was managed and operated by American Telephone and Telegraph (AT&T) from 1956 to 1993. In 1993, the M&O contract was awarded to Martin Marietta Corporation, now known as Lockheed Martin Corporation.

2.1 SANDIA NATIONAL LABORATORIES, CALIFORNIA SUPPORT FOR THE U.S. DEPARTMENT OF ENERGY MISSION LINES

As discussed in Chapter 1, the DOE is responsible for ensuring the safety, reliability, and effectiveness of the nation's nuclear deterrent; fostering a secure and reliable energy system that is environmentally and economically sustainable; reducing the environmental, safety, and health risks and impacts from the DOE facilities and materials; maintaining leadership in basic research; and advancing scientific knowledge.

SNL/CA's primary capabilities are:

- Supporting stockpile surveillance activities of hardened weapons systems and components to ensure these systems function properly when exposed to radiation from hostile sources, whether encountered by satellites and reentry vehicles in space or by the conditions created by nuclear detonations. SNL/CA integrates experimentation and computational simulation in support of radiation effects testing, radiation transport, diagnostics, and analyses to certify that electrical, mechanical, energetic, and other nonnuclear components will operate as designed in such hostile radiation environments.
- Developing specific, limited "piece parts" required to repair deterioration or defects in existing weapons components or to make modifications essential to maintaining deterrent credibility as the existing stockpile continues to shrink and age.
- Developing fundamental capabilities required to take advantage of technologies in state-of-the-art large computers and networked computers. Expertise ranges from fundamental, broadly applicable efforts to those of a developmental nature, all of which support both high-end computing and specific stockpile systems simulations.
- Conducting computer science research that addresses computational methods and technologies such as numerical methods for designing and processing new stockpile materials, new massively parallel (many calculators working simultaneously) numerical algorithms (repetitive calculations), and new strategies for code reusability, portability, and debugging.
- Providing sensor development and technical analysis support for the control and prevention of nuclear and nonnuclear (chemical, biological, explosive, and missiles) proliferation. Detection technology capabilities include airborne, satellite, seismic, and chemical-based monitoring systems.

- Conducting fundamental energy research in a wide variety of energy resources including electrical energy, energy storage, hydrogen storage (fuel cells), fossil fuels, geothermal technology (wireless telemetry), solar energy technology, and applied wind power technology.
- Conducting numerous projects that contribute to the DOE's science and technology mission. These include activities in scientific computing and basic energy conducting sciences; developing methods using computational science research for solving scientific and engineering problems with state-of-the-art software; using massively parallel computers (many computers working simultaneously) to meet critical DOE mission requirements in advanced computing; conducting scientific research, development, and applied engineering on materials and systems in areas of chemistry, physics, material science, biology, and environmental sciences.
- Developing technology to improve waste processing and reduce impacts to the environment, including pollution prevention projects.

The DOE directs SNL/CA activities in support of its programs and missions. In turn, SNL/CA's facilities and operations are designed to meet the requirements of the programs, projects, and activities assigned to the laboratory.

2.1.1 Sandia National Laboratories, California Support for the U.S. Department of Energy's National Security Mission Line

SNL/CA's principal DOE assignments under the National Security mission line focus on the nuclear stockpile and reducing the vulnerability of a reduced stockpile; managing nonnuclear components; and reducing the vulnerability of the U.S. to threats of proliferation and the use of weapons of mass destruction, nuclear incidents, and environmental damage.

2.1.2 Sandia National Laboratories, California Support for the U.S. Department of Energy's Energy Resources Mission Line

SNL/CA supports the DOE assignments under the Energy Resources mission line to enhance the safety, security, and reliability of energy supplies. This work focuses on implications for our nation's security related to the increasing interdependencies among domestic elements and global resources. SNL/CA helps develop strategies to protect the supply of the nation's energy resources. SNL/CA applies science and technology capabilities to develop various technologies.

2.1.3 Sandia National Laboratories, California Support for the U.S. Department of Energy's Environmental Quality Mission Line

SNL/CA supports the DOE assignments under the Environmental Quality mission line with onsite waste operations and by developing technology for national environmental problems. Activities include treatment (such as elemental neutralization), temporary storage, and offsite disposal of hazardous waste, low-level waste (LLW), low-level mixed waste (LLMW), and solid wastes generated by ongoing mission-related activities. Environmental restoration activities at SNL/CA were completed in 1999. However, monitoring activities and regulatory agency interaction are expected to continue.

2.1.4 Sandia National Laboratories, California Support for the U.S. Department of Energy's Science and Technology Mission Line

SNL/CA's facilities and expertise are used in support of the Science and Technology mission line through R&D in modeling and simulation testing, physical sciences, and advanced chemical and materials sciences. SNL/CA activities include developing microelectronic components, computer-based testing, modeling, and simulation.

2.2 SANDIA NATIONAL LABORATORIES, CALIFORNIA SUPPORT FOR OTHERS

SNL/CA performs work for other sponsors, which falls into three general categories: Laboratory Directed Research and Development (LDRD), Work for Others (WFO), and Partnerships. This work must be compatible with the DOE mission work conducted at SNL/CA and must be work that cannot reasonably be performed by the public sector. Details regarding this type of support activities and projects are provided in SNL/CA's *Facilities and Safety Information Document* (FSID) (SNL/CA 2002a), and the *SNL Institutional Plan* FY 2002-2007 (SNL 2001a). Each category is discussed below.

2.2.1 Laboratory Directed Research and Development

The *National Defense Authorization Act* (P.L. 103-160) for fiscal year (FY) 1991 established the LDRD Program at DOE national laboratories. This Act authorized expenditures up to six percent of a laboratory's total budget to "maintain the scientific and technical vitality of the laboratories; enhance the laboratory's ability to address future DOE missions; foster creativity and stimulate exploration of forefront science and technology; serve as a proving ground for new research; and support high-risk,

potentially high-value R&D." LDRD supports DOE's four primary mission lines identified in Section 2.1.

2.2.2 Work for Others

SNL/CA performs reimbursable work for other Federal agencies and sponsors, including the private sector. This work, also known as WFO, must be compatible with the DOE mission work conducted at SNL/CA and must be work that cannot reasonably be performed by the public sector. SNL/CA activities support major agencies including the Department of Defense (DoD), U.S. Nuclear Regulatory Commission (NRC), U.S. Department of Transportation (DOT), National Aeronautics and Space Administration (NASA), Department of State, and U.S. Environmental Protection Agency (EPA).

2.2.3 Partnerships

SNL/CA performs research and development under several teaming efforts including Established Partnerships, cooperative Research and Development Agreements (CRADA), Funds-in Agreements, Licenses, Memoranda of Understanding, and other mechanisms including teaming with universities for foundation grants. Universities and approved researchers are allowed to use select SNL/CA facilities to conduct research.

2.3 SANDIA NATIONAL LABORATORIES, CALIFORNIA FACILITIES: A FRAMEWORK FOR IMPACTS ANALYSIS

As discussed above, SNL/CA provides a diverse set of capabilities that support DOE's mission lines through various programs. The major consideration in deciding to analyze impacts by facility rather than by program was the complexity of the analysis. Any given program may use operations in more than one facility, and SNL/CA facilities serve multiple programs. An analysis of environmental impacts requires knowledge of particular activities in a particular place over a known span of time in order to project the effect those activities will have on the surrounding environment. A presentation of impacts by program would require that impacts from operations at each facility be subdivided into the contribution from each program using the facility. The resulting impacts would then have to be reassembled by program. The complexity of analysis would greatly increase, and the clarity of the presentation would suffer. Therefore, the National Nuclear Security Administration (NNSA) chose to group the operations to be analyzed by facility.

The operations within these facilities or areas are the basis for differentiating among the three alternatives analyzed in the SWEA and any associated environmental impacts. Taken together, these facilities and areas represent the majority of exposure risks associated with continuing operations at SNL/CA.

2.3.1 Framework for Analysis

The SWEA evaluates SNL/CA facilities, operations, and their effects on environmental conditions under the three alternatives. Because of their importance, potential environmental impacts from some facilities are described and evaluated in greater detail than from other SNL/CA facilities. This in-depth look at these specific facilities provides the framework for analyzing impacts.

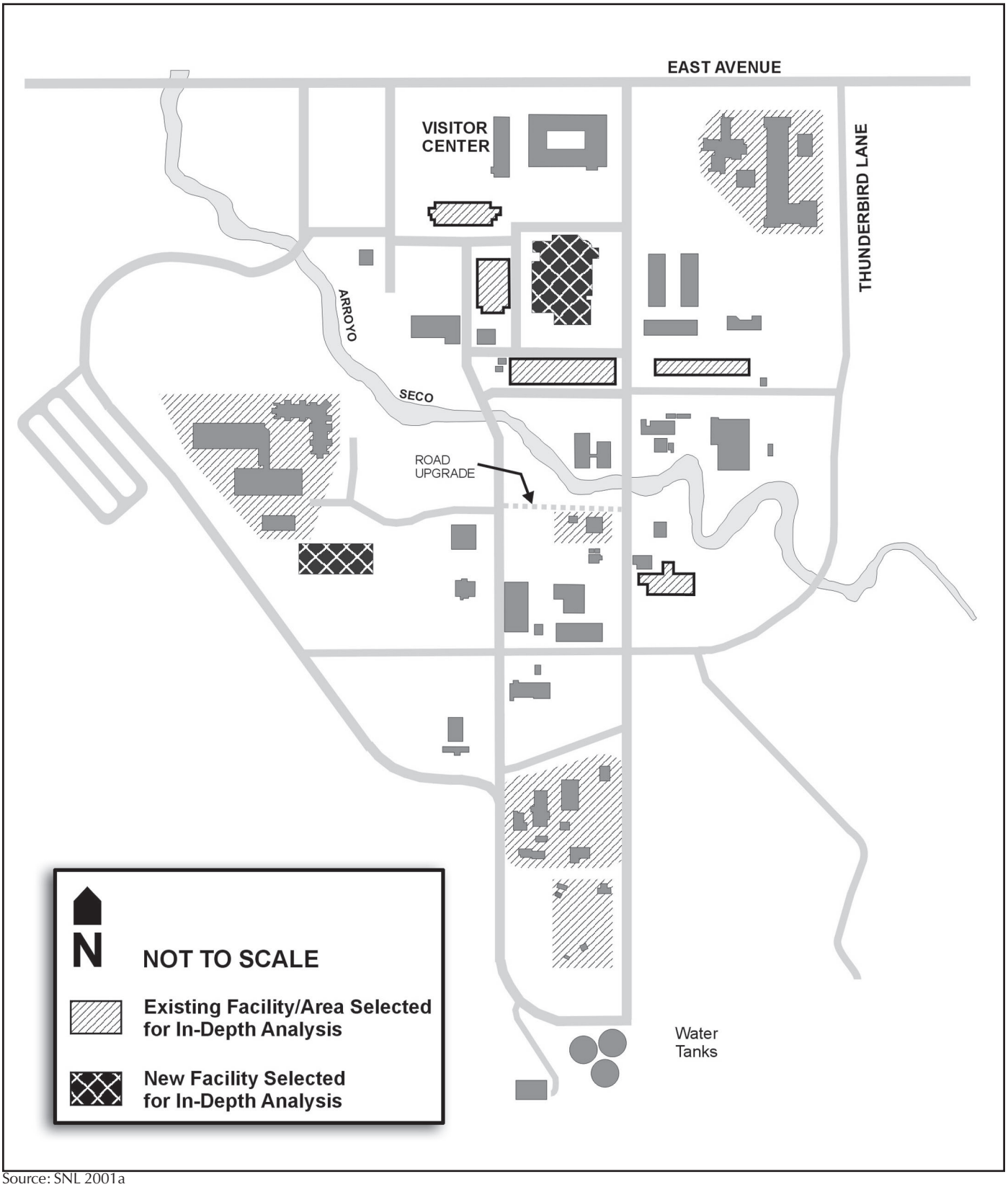
For completeness of analysis, the DOE also gathered information on the balance of operations at SNL/CA. Information regarding other facilities, site support services, water and utility use, waste generation, hazardous chemicals purchased for use, and process wastewater data were incorporated into the analysis. The NNSA examined preliminary hazard screening for SNL/CA facilities. In addition, facility walk-throughs and interviews were performed to ensure that hazards and safety concerns were properly captured in the accident analysis. This information is included in the current environmental consequences (Chapter 5).

The following sections provide an overview of the facilities and areas at SNL/CA and describe the facilities the DOE identified for detailed analysis.

2.3.2 Site-Wide Environmental Assessment Facilities

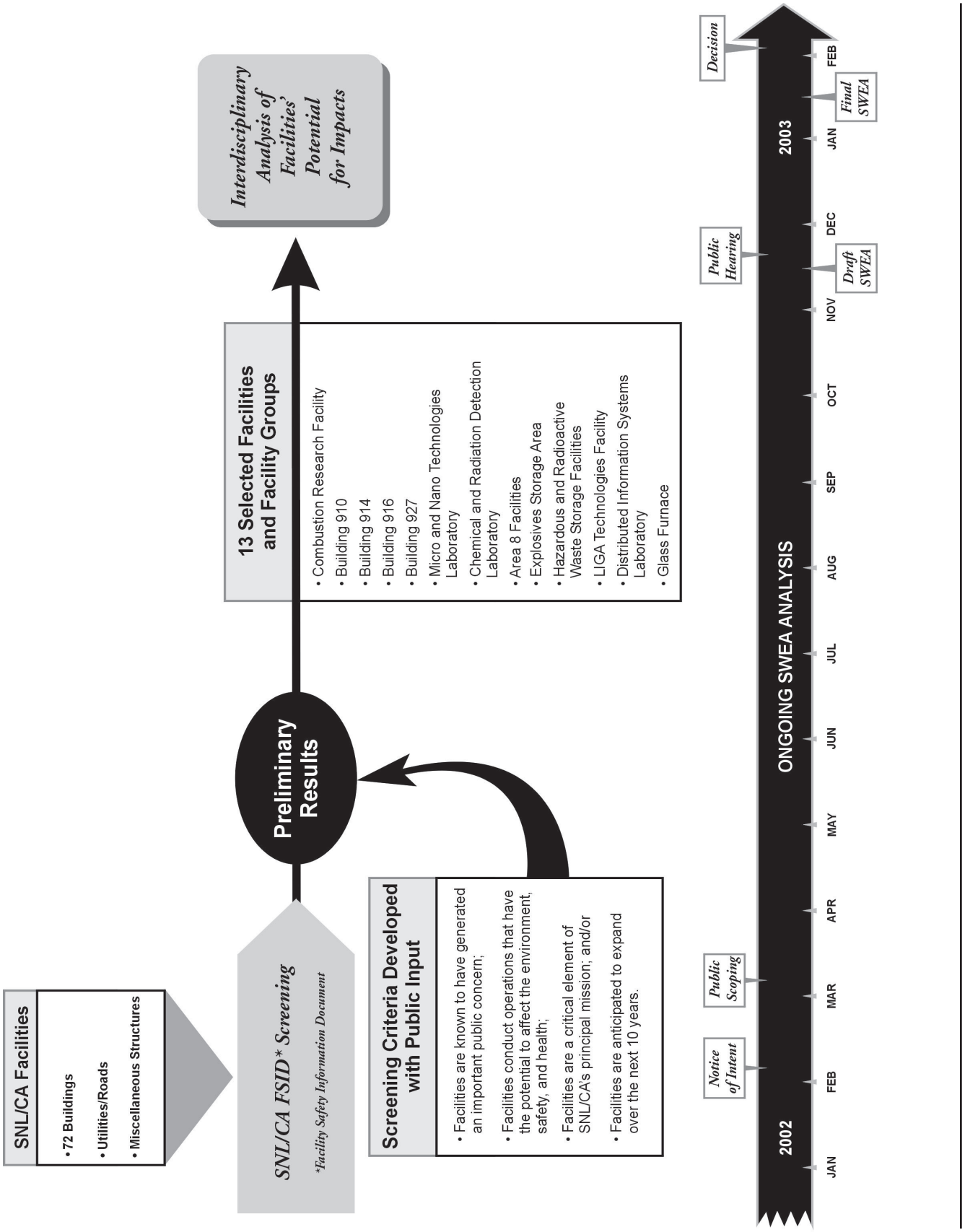
The 13 facilities or areas selected for in-depth analysis are identified below. Taken together, these facilities represent the main activities at SNL/CA that have the potential to affect the environment, safety, and health have generated public concern, are critical to SNL/CA's missions, or are anticipated to expand over the next 10 years. Figure 2-1 is a site map. Figure 2-2 illustrates the SNL/CA facility selection process used during the SWEA analysis of potential impacts.

1. ***Combustion Research Facility (CRF)***—Supports R&D in combustion science and technology.
2. ***Building 910***—Supports R&D in science-based engineering and technology in a wide variety of sciences including advanced electronics prototype and development, surface physics, neutron detector research, and telemetry systems.
3. ***Building 914***—Conducts weapons test, assembly, and machine shop activities.
4. ***Building 916***—Provides R&D of ceramics, semiconductors, organic polymers, and metals, including thin film interface science, mechanics, ion implantation, gases in metals, hydrogen storage, plasma, annealing, detectors, science-based modeling, extreme ultraviolet lithography, microsystems, and fluidics.



Source: SNL 2001a

Figure 2-1. A Number of Sandia National Laboratories, California Facilities/Areas were selected for In-Depth Analysis



Source: Original

Figure 2-2. Conceptual Illustration of the Site-Wide Environmental Assessment Analysis

LIGA–What is it?

LIGA is an acronym derived from *Lithographie* and *Galvanoformung* and *Abformung,* which mean electroforming and molding, respectively. This technology allows for defining high aspect ratio structures in nickel. The process consists of exposing a sheet of film bonded to a wafer using X-ray lithography. The film is then developed and the exposed material is removed. Nickel is then electroplated onto the open areas of the film. The nickel over-plate is removed by polishing, leaving high aspect ratio nickel parts. The film is removed, and the nickel parts may remain anchored to the substrate or be released. The actual X-ray lithography is done at the Stanford linear accelerator or Lawrence Berkeley National Laboratory.

5. ***Building 927***—Stores nuclear and classified materials, assembles subsystems, conducts system verification, and stores equipment.
6. ***Micro and Nano Technologies Laboratory (MANTL)***—Supports a wide variety of operations involving micromachining, miniature component fabrication, fuel cell R&D, sensors, and signal processing, and extreme ultraviolet lithography.
7. ***Chemical and Radiation Detection Laboratory (CDRL)***—Supports R&D and fabrication of chemical and radiation detection systems.
8. ***Area 8 Facilities***—Provides testing activities involving high-pressure hydrogen, mechanical, high explosives, vibration, climate, temperature, and high acceleration.
9. ***Explosive Storage Area***—Receives, handles, packages and stores explosives, and onsite transports.
10. ***Hazardous and Radioactive Waste Storage Facilities***—Supports waste generation, waste management, and waste disposal.
11. ***LIGA Technologies Facility (LTF)***—A new facility, for providing microfabrication processes involving electrodeposition and replication. Activities would focus on R&D, and prototyping of LIGA and LIGA-like microdevices necessary to meet defense program objectives.
12. ***Distributed Information Systems Laboratory (DISL)***—A new facility, for supporting a wide variety of technologies including secure networking, high performance distributed computing, visualization and collaboration technologies, and design and manufacturing of productivity environments.
13. ***Glass Furnace Combustion and Melting Laboratory (part of the CRF)***—A new facility, for conducting studies in glass manufacturing processes. The R&D would focus on increasing production efficiency, improving product quality, and maintaining industry competitiveness.

2.3.3 Activities Common to All Alternatives

Some activities at SNL/CA are not expected to change significantly, regardless of which alternative the NNSA selects for continued operations. In general, these balance of operations activities involve little or no toxic materials, and are of low hazard. Balance of operations analyses were included for each resource area. These analyses are evaluated along with the more detailed analyses of the specific facilities for each alternative to provide the total impacts from SNL/CA operations. The balance of operations activities include other R&D activities, maintenance support, material management, chemical material management, explosive material management, radioactive material management, waste management, pollution prevention, recycling, and fire hazard management. Other common activities include balance of operations, safety and health enhancements, environmental monitoring, asbestos management, custodial services, D&D projects, modification of research facilities, and infrastructure projects.

The following sections provide brief descriptions of these common activities.

2.3.3.1 Research and Development Activities

R&D activities at SNL/CA are focused in materials and process science, computational and information sciences, microelectronics and microsystems, basic sciences, engineering sciences, and bioagent sciences. Many aspects of the missions described in Section 2.1 are R&D activities conducted in facilities other than those described in Section 2.3. This section is intended to capture those activities, including testing of subassemblies under extreme "G" forces (see Chapter 11 of the FSID for additional details) (SNL/CA 2002a, SNL 2001b).

SNL/CA's research expertise in materials and process science develops the scientific basis for current and future mission needs. New and replacement materials are created for refurbished weapons components, enhanced safety subsystems, and advanced energy storage devices.

SNL/CA's research expertise in computational and information sciences develops technology using model- and simulation-based life-cycle engineering. Increases in supercomputing capabilities are needed to analyze complicated accident scenarios, to design weapons components and systems, and to predict the aging of key stockpile materials.

SNL/CA's research expertise in microelectronics and microsystems provides the science and technology to ensure implementation of its electronics systems. This research ranges from fundamental solid-state physics to design and fabrication of radiation-hardened integrated circuits.

SNL/CA's research expertise in engineering sciences focuses on model- and simulation-based, life-cycle engineering. Life-cycle engineering at SNL/CA occurs within a comprehensive validated modeling and simulation environment required for validation and verification of simulations.

SNL/CA's research expertise in micro- and nanotechnology applies various technological advances in conjunction with other DOE laboratories, U.S. industry, and universities.

SNL/CA supports science-based experiments to certify the survivability of strategic systems in the stockpile. SNL/CA has produced a unique opportunity to collaborate with LLNL in weapons physics and experimentation. These capabilities are especially critical in the absence of underground nuclear testing for certification of weapons survivability and performance (SNL 2001b).

Other areas include extreme ultraviolet lithography, fuel cell prototyping, lightweight components, signal processing, modeling and simulation sensors, information systems, micro parts, and bench- and small-scale chemical, bioagent, and radiation detection research (DOE 2001a, DOE 2001b).

2.3.3.2 Maintenance Support Activities

Maintenance and support activities are frequently and routinely requested services for operational support of SNL/CA facilities and associated DOE properties (see Table 2-1). Activities range from ongoing custodial services to corrective, preventive, predictive, and training actions required to maintain and preserve buildings, structures, roadways (including widening in disturbed areas), and equipment in a condition suitable for fulfilling their designated purposes. While these activities are intended to maintain current operations, they would not substantially extend the life of a facility or allow for substantial upgrades or improvements.

2.3.3.3 Material Management and Operations

Routine operations at SNL/CA require the management of hazardous, industrial, commercial, and recyclable materials. Both the FSID and the SNL/CA *Environmental Information Document* (EID) (SNL/CA 2002b) contain information regarding the responsible organizations, regulatory requirements, and types and quantities of material at SNL/CA. SNL/CA standards, which were developed in accordance with the DOE, Occupational Safety and Health Administration (OSHA), U.S. Environmental Protection Agency (EPA), DOT, and State of California policies, determine if a material constitutes an onsite hazard.

Four types of hazardous material regulated by the DOT are tracked by SNL/CA: radioactive materials, chemicals, explosive materials, and fuels.

2.3.3.4 Chemical Materials Management and Control

The primary goal for managing and controlling chemicals at SNL/CA is to protect the health and safety of workers, the public, and the environment.

Chemical Materials

SNL/CA handles more than 8,000 chemicals in 35,000 chemical containers annually (SNL/CA 2002b). Chemicals defined as hazardous materials are listed in 29 CFR Parts 1900-1999, 40 CFR Parts 300-372, and 49 CFR Part 172. 101. Chemicals are managed using administrative and physical controls designed to minimize exposure to an identified hazard. Facilities that use and store chemicals are evaluated using SNL's Integrated Safety Management System to determine appropriate approaches to managing and controlling hazards.

Historic Chemical Materials Use

SNL/CA previously maintained inventories of hazardous chemicals at levels sufficient to meet immediate needs that could arise at any time. This approach involved economical bulk chemical purchases; however, this approach also led to the shelf life of some chemicals expiring before they could be used. These chemical procurement practices created legacy chemicals that had to be disposed of properly. Now, SNL/CA orders chemicals on an as-needed basis (SNL/CA 2002b).

Baseline Hazardous Chemical Materials Use

SNL/CA tracks chemicals using a chemical inventory tracking system known as the *Chemical Information System* (CIS). This system requires bar coding of chemical containers as they enter SNL/CA that allows tracking of individual containers by an online chemical inventory database. This system interfaces readily with other environment, safety, and health programs, including those for industrial hygiene, hazardous waste management, radioactive and mixed waste management, waste minimization, emergency preparedness, fire protection, and NEPA. For NEPA, the CIS database provides essential information on the chemical inventory and is a necessary element for calculating potential health effects.

The CIS database is used for the Federal *Emergency Planning and Community Right-to-Know Act* (EPCRA), also known as *Superfund Amendments and Reauthoriza-*

tion Act, Title III (SARA) (42 U.S.C. §11001), reporting, and the California Community Right-to-Know regulations. Both the Federal and state regulations require that a facility generate an annual list documenting the presence of certain hazardous chemicals in quantities exceeding prescribed safety thresholds and provide the list to emergency planning officials in the state and local community.

2.3.3.5 Explosive Material Management and Control

SNL/CA manages explosive material through the *Explosive Inventory System*, a comprehensive database that tracks explosives and explosive-containing devices and assemblies from acquisition through use, storage, reapplication, and transfer or disposal. It provides information on material composition, characteristics, shipping requirements, life-cycle cost, plan of use, and duration of ownership. This system includes an inventory of explosive material owned or controlled by SNL/CA line organizations.

2.3.3.6 Radioactive Material Management and Control

SNL/CA uses a twofold approach to radioactive material management: reduce surplus legacy radioactive material inventories and manage current nuclear material inventories at mission-essential levels. SNL/CA maintains an inventory of radioactive isotopes used in laboratory research and radiation monitoring activities.

2.3.3.7 Waste Management and Operations

Waste Operations

This section generally describes waste operations that are not analyzed in detail, as noted in Section 2.3.3. SNL/CA manages all wastes in accordance with applicable Federal, state, and local laws and regulations and DOE Orders. The EPA, the DOE, and the California Department of Toxic Substance Control (DTSC) primarily regulate these wastes. All current waste operations are implemented following SNL/CA policies established to ensure worker and public safety and compliant management of regulated waste. These policies clearly define waste acceptance and disposal criteria, limit the number of workers who handle wastes, provide appropriate waste-specific training, and centralize waste handling areas.

Hazardous Waste

Hazardous wastes managed at the Hazardous Waste Storage Facility include wastes regulated under *Resource Conservation and Recovery Act* (RCRA) (42 U.S.C. §6901) and wastes regulated under the *Toxic Substances Control Act* (TSCA) (15 U.S.C. §2601); wastes regulated by the state of California that are not RCRA wastes, and biohazardous wastes. The hazardous waste generated at SNL/CA is predominantly from experiments, testing, other R&D activities, and infrastructure fabrication and maintenance. Decontamination and Decommissioning (D&D) activities also generate hazardous waste. Hazardous waste generated at each facility is usually coordinated by the facility user's department, with the exception of waste from large projects focused on asbestos abatement, which is managed separately through subcontracts.

Radioactive Waste

Radioactive wastes managed at the Radioactive Waste Storage Facility include low-level waste (LLW) and low-level mixed waste (LLMW). No transuranic (TRU) waste or mixed transuranic waste is managed or generated at SNL/CA. No high level waste is managed or generated at SNL/CA. In general, LLW and LLMW are generated during laboratory experiments and component tests. As noted in the Sandia National Laboratories/New Mexico Site-Wide Environmental Impact Statement (SNL/NM SWEIS) (DOE 1999b), LLMW generated at SNL/CA has been shipped to SNL/NM for management in accordance with a New Mexico Environment Department (NMED) compliance order issued under the *Federal Facility Compliance Act* (FFCA) (42 U.S.C. §6961).

2.3.3.8 Pollution Prevention and Waste Minimization

SNL/CA has implemented a Pollution Prevention Program to comply with State of California and DOE requirements. SNL/CA's Pollution Prevention Program applies to all pollutants generated by routine and nonroutine operations. It consists of activities that encourage pollution prevention or waste source reduction, recycling, resource and energy conservation, and procurement of EPA-designated recycled products.

2.3.3.9 Recycling

SNL/CA recycles plain paper, cardboard, used oil, scrap metal, batteries, fluorescent light bulbs, solvents, mercury,

Low-hazard Nonnuclear

The term "low-hazard nonnuclear" is applied to facilities or project activities that have the potential for minor onsite impacts (within the boundaries of SNL/CA controlled areas) and negligible offsite impacts (outside the boundaries of SNL/CA-controlled areas) to people or the environment. SNL/CA uses primary hazards screening to identify hazards, hazard classifications, training requirements, and required safety documents. A "low-hazard nonnuclear" facility does not require additional safety documentation. All facilities at SNL/CA meet this definition.

landscaping waste, aluminum cans, tires, and used toner cartridges (SNL/CA 2002b).

2.3.3.10 Fire Hazard Management and Control

SNL/CA has implemented a fire hazard management program to reduce wildfires and accidental brush fires. Vegetation control includes mowing in grassland areas and application of herbicides along fence lines and roads.

2.3.3.11 Other Common Activities

Table 2-1 provides brief descriptions of other common activities.

2.3.4 Sandia National Laboratories, California Facilities

Following Chapter 2 are a series of facility descriptions that provide additional detail for all of the facilities that are named in Section 2.3.2. They consist of a brief description of the location, hazard class (low-hazard nonnuclear), primary purpose, and the major types of activities performed at the facility. Also identified are the basic processes performed at the facility, the programs and activities currently being supported, and the hazards and hazard controls associated with the facility. For 10 of the facilities/areas described here, the FSID contains more

Table 2-1. Other Common Activities

Project/Activity Title	Project/Activity Description (partial listing).
Safety and Health Enhancements at Existing Facilities Modifications	Replacement, installation, and modification of lighting, heating, ventilation, and air conditioning
	Replacement and installation of air and water filters and filtering systems
	Replacement, installation, and modifications of radiation monitoring devices and shielding
Asbestos Management	Building surveys
	Sampling and analysis of potential asbestos containing materials
	Asbestos abatement (for example, encapsulation, removal, and repair of friable and nonfriable material)
Maintenance Activities and Custodial Services	Landscaping, interior and exterior painting of surfaces, and equipment maintenance
	Minor seismic reinforcement, building maintenance, and custodial actions
	Site maintenance and routine decontamination of surfaces
Characterization, Decontamination, and Demolition of Buildings and Structures that are less than 20,000 gross square feet	Building surveys (information audit, site inspection, sampling)
	Safe removal of utilities, foundations, walkways, and landscaping
	Decontamination, demolition, and disposal
Modifications of Research Facilities and Relocation of Laboratory Operations	Removal, renovation and upgrade of utility, security, and fire safety systems
	Trenching in support of utility system modifications
	Removal, replacement, and installation of exhaust systems and fume hoods
Siting, Construction, Modification, Operation, Relocation and Consolidation of Support Structures, Infrastructure, and Equipment	Installation, construction, modification, relocation, replacement, and operation of security-related equipment
	Remodeling and renovation of existing structures and site infrastructure
	Construction and operation of new support structures
Environmental Monitoring	Sampling and analysis of environmental media (such as ground water)
	Installation, modification, and replacement of environmental monitoring-related equipment
	Environmental surveys (information gathering, site surveys, sampling)

Sources: DOE 2000a, b, c; 2001c, d, e
NEPA: *National Environmental Policy Act*

detail including estimated quantities specific radioactive and hazardous chemicals used and emissions or waste generated by a facility's operations. Additional information is available in the document *Comparison of Parameters to be Used to Analyze SNL/CA Facilities under the No Action, Planned Operations, and Maximum Operations* (TtNUS 2002a). For the three new facilities, additional sources contain more details (DOE 1998b, 1999c, 2001f). All of these sources were considered in completing the consequence analysis in Chapter 5.

2.3.4.1 Major Facility Changes

Three major facility changes have occurred at SNL/CA since the 1992 LLNL SWEIS. The Defense Engineering Laboratory changed to the Integrated Manufacturing Technology Laboratory and recently changed again, to become the MANTL; the Tritium Research Laboratory is now the Chemical and Radiation Detection Laboratory (CRDL); and Building 913 was demolished and the work was consolidated and relocated to various other buildings on site. Additional information is available in the FSID.