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Existing and Potential Energy Demands for Los Alamos National Laboratory

Compiled by Concerned Citizens for Nuclear Safety
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Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory
DOE/EIS-0238, January 1999

1.6.3.1 Emerging Actions at LANL

"…DOE and other users of electric power in the area have been working with suppliers to resolve foreseeable power supply and reliability issues. Some specific solutions to these issues are currently being examined for feasibility. In particular, DOE is examining the potential for constructing a power line that would extend from the existing Public Service Company of New Mexico (PNM) Norton substation southeast of LANL to existing LANL substations, and potentially to a new LANL substation (which would be constructed if this is determined to be a feasible solution)." pg. 1-25.

2.1.2.2 Infrastructure and Central Services

"The natural gas and electric power needs at LANL are interdependent and are presented in this SWEIS by alternative. Options to meet the increased capacity, as well as reliability needs, are being studied and involve multiple organizations and communities in the area. Beyond simple maintenance and replacement as needed for components of these systems, a project-specific [National Environmental Policy Act] review will be conducted when sufficient definition for the specific options to meet projected needs has been developed.

"While demand for water and electricity differs among alternatives, there are no changes proposed in this SWEIS with respect to DOE operations to provide and distribute these resources at LANL. Thus, these operations do not change across the alternatives analyzed and are included in all alternatives." pg. 2-6.

Table 3.6.1-22 Parameter Difference Among Alternatives for Continued Operation of the Los Alamos Neutron Science Center (TA-53)

The SWEIS indicates that LANL's preferred sitewide alternative, the Expanded Operations alternative, requires more than two-times the amount of electrical power used at the Los Alamos Neutron Science Center (LANSCE) between the six-year period 1990-1995, from 29 megawatts to 63 megawatts.

The SWEIS also indicates that LANL's preferred alternative requires more than four times the amount of electricity used at LANSCE between the six-

year period 1990-1995, from 104 gigawatt-hours to 437 gigawatt-hours. pg. 3-108.

Table 3.6.1-24 Parameter Difference in Alternatives for Continued Operation of the Health Research Laboratory (TA-43)
The SWEIS indicates that LANL's preferred sitewide alternative requires nearly two-times the average amount of electrical power used at the Health Research Laboratory for 1994 (0.44 megawatts) and 1995 (0.45 megawatts), from 0.45 megawatts to 0.7 megawatts. pg. 3-112.

4.9.2.1 Utilities
"In the year 1985, DOE and Los Alamos County formally agreed to pool their electrical generating and transmission resources and to share bulk power costs based on usage. The Electric Resource Pool (the Pool) currently provides bulk electricity to LANL and customers within the communities of White Rock and Los Alamos, as well as [Bandelier National Monument]. Pool resources currently provide 72 to 94 megawatts (contractually limited to 72 megawatts during winter months, when El Vado and Abiquiu hydroelectric output is negligible, and to about 94 megawatts during the spring and early summer months) from a number of hydroelectric, coal, and natural gas power generators throughout the western U.S. Excess power is sold by the Pool to other area power utilities. Power delivered to the Pool is limited by the two existing regional 115-kilovolt transmission lines owned by PNM and Plains Electric Generation and Transmission Cooperative. The 215-kilovolt electric power transmission lines come to the Bernalillo-Algodones substation near Albuquerque and the Norton substation near White Rock. Many northern New Mexico communities, including Santa Fe and Española, also receive power from these substations…. On-site electric generating capacity for the Pool is limited to the existing TA-3 steam/power plant, which has an operating capacity of 12 megawatts in the summer and 15 megawatts in the winter."

Table 4.9.2.1-2. – Electric Peak Coincidental Demand (Kilowatt) (Fiscal Years 1991 to 1995)

Fiscal Year	LANL Base	LANSCE	LANL Total	County Total*	Pool Total
1991	43,452	32,325	75,777	11,471	87,248
1992	39,637	33,707	73,344	12,426	85,770
1993	40,845	26,689	67,534	12,836	80,370
1994	38,354	27,617	65,971	11,381	77,352
1995	41,736	24,066	65,802	14,122	79,924

Source: Rea 1997
*Includes communities of Los Alamos, White Rock, and Bandelier National Monument

Table 4.9.2.1-3. – Electric Consumption (Megawatthour) (Fiscal Years 1991 to 1995)

Fiscal Year	LANL Base	LANSCE	LANL Total	County Total*	Pool Total
1991	282,994	89,219	372,213	86,873	459,086
1992	279,208	102,579	381,787	87,709	469,496
1993	277,005	89,889	366,894	89,826	456,720
1994	272,518	79,950	352,468	92,065	444,533
1995	276,292	95,853	372,145	93,546	465,691

Source: Rea 1997

*Includes communities of Los Alamos, White Rock, and Bandelier National Monument.

The existing electric transmission system has been evaluated and found to be deficient in a study conducted by technical representatives of PNM, Plains Electric, and the Pool. An operating plan for improved load monitoring, equipment upgrades and optimization of some available power sources has been discussed. The plan, if implemented, would be intended to minimize exposure to complete loss of service (Lundberg, Marshall &Associates, 1994). pgs. 4-177 to 4-179.

"Historically, off-site power system failures have disrupted operations in LANL facilities. Therefore, all facilities that require safe shutdown capability for power outages are equipped with emergency generators to assure these needs are met. This includes nuclear facilities such as TA-55 [the plutonium facility] and [the Chemistry and Metallurgy Research building], which require uninterrupted power for critical ventilation, control systems and lighting.

"The TA-3 steam/power plant currently provides the additional electric power needed to meet peak load demands when demand exceeds the allowable supply, delivered by two 115-kilovolt transmission lines. When electric power generation is required, steam generation is increased (additional gas is burned), and the extra steam is routed to three steam turbines for power generation. Typically, this occurs for only a few months out the year when LANSCE is fully operational. Loss of power from the regional electric distribution system results in system isolation where the TA-3 steam/power plant is the only source of sufficient capacity to prevent a total blackout.

"The TA-3 steam/power plant is over 40 years old, and various upgrades of the steam turbine generators, battery banks, circuit breakers, metering, and power generation controls are needed. In addition, though the steam/power plant has a design capacity of 20 megawatts, the existing cooling system (composed of low-pressure steam condensers, pumps, valves and piping) limits the generating capacity to 14 megawatts.

"The majority of LANL's 120-mile (200-kilometer) 115/13.8-kilovolt transformers, switchgear, and 13.8-kilovolt overhead electrical distribution system are past or nearing the end of their design life. Backup and replacement transformers and their ancillary equipment are needed to increase system reliability because of the increasing likelihood

of component failure and the fact that many components are no longer readily available. Most of LANL's 480/277-volt and 208/120-volt systems would fall below industry reliability standards if used to supply additional power. In addition, the TA-3 substation requires an additional thyristor switched capacitor to maintain system stability during lightning storms. Finally, about 18.6 miles (30 kilometers) of 40-year old underground cables and 13.8-kilovolt switchgear will require replacement within 10 years." pgs. 4-177 to 4-182.

5.6.1.7 Infrastructure

"LANL is a significant user of electric power in the region, but is not the dominant user in northern New Mexico. Within the electric power pool that serves LANL, direct use by LANL is about 80 percent of the total. The system serving LANL is near capacity, and future projections on electric power use from LANL under all alternatives, except Reduced Operations, indicate that demand will exceed capacity. Consideration of options to increase system capacity is complicated by the fact that the systems for other major power users in the region (the cities in northern New Mexico) are also nearing capacity, and demand from these users is also projected to exceed capacity. While the regional system capacity problem will exist regardless of the alternative selected for LANL operations, selection of an option to deal with LANL alone is strongly influenced by these regional considerations. No specific proposals have been fully developed to remedy this situation (although, as noted in chapter 1, section 1.6.3.1, some specific solutions are being evaluated), and further analysis of environmental impacts will be necessary as future options are developed sufficiently to analyze them. Previous sections of this chapter discuss these electric power issues in the context of regional problems and may therefore be referred to for details on cumulative impacts for this aspect of the analysis.

"The total increase in utility usage for the [Conveyance and Transfer] EIS proposed action would be as follows: Electric use, 31 gigawatt-hours and Peak power, 5 megawatts." pgs. 5-196 to 5-198.

"The Spallation Neutron Source (SNS) EIS proposed 1-megawatt beam would use 62 megawatts of peak power. LANL's existing electrical infrastructure in not adequate to support the additional power demand. The increase in peak power demand would exacerbate the power supply-demand problems in the Los Alamos region." pg. 5-198.

6.1.1 Existing Programs and Controls

"Electric power reliability is an issue under all alternatives due to the limited supply lines and the age of the distribution system equipment, as well as the limits of the on-site supplemental power supply (section 4.9.2.1). DOE is evaluating a proposed action that would bring a third power line (from the Norton substation) to LANL (chapter 1, section 1.6.3.1)." pg. 6-4.

6.2 Other Mitigation Measures Considered

"DOE and other regional electric power users continue to work with suppliers to remedy foreseeable power supply and reliability issues. The impact analyses in this SWEIS emphasize the severity of these issues and the consequences if they are not resolved. Solutions to power supply issues are essential to mitigate the effects of power demand under all alternatives. DOE is committed to measures that will conserve energy and avoid, or at least minimize, periods of brownouts. Some of the measures being contemplated by DOE include: (1) limiting operation of large users of electricity to periods of low demand, (2) reduced operation of low-energy demonstration accelerator (LEDA) (not implement all phases of the project), and (3) contractual mechanisms to bring additional electric power to the region." pg. 6-6.

Draft Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory
DOE/EIS-0350D, May 2003

3.3.2 Electricity
"In mid-2001, LANL broke ground for construction of the new Western TA Substation as part of a project to provide overall electrical supply reliability across the site and to provide redundant capacity for LANL and the Los Alamos town site in the event of a power outage at either of LANL's two existing substations. The Western TA Substation will be serviced by a new 115-kilovolt power transmission line originating at the existing Norton Substation. The new substation's main transformer is rated at 56-megavolt-amperes or about 45 megawatts.

"Recent changes (as of August 1, 2002) in transmission agreements with the Public Service Company of New Mexico have resulted in the removal of contractual restraints on Power Pool resources import capability. Import capacity is now limited only by the physical capability (thermal rating) of the transmission lines, which is approximately 110-120 megawatts from a number of hydroelectric, coal, and natural gas power generators throughout the western United States. Onsite electrical generating capability for the Power Pool is limited by the existing TA-3 steam and electric power plant, which is capable of producing up to 20 megawatts of electric power that is shared by the Power Pool under contractual arrangement. However, an environmental assessment has been prepared for a project that will support the installation of two new, gas-fired combustion turbine generators within the TA-3 Co-generation Complex and upgrading the existing steam turbines. Each new unit will have an electric generating capacity of 20 megawatts, with the first unit to be installed in the Fiscal Year 2003 (FY03) to FY04 timeframe. The second unit is currently not planned for installation until FY07 at the earliest. Thus, construction and installation of the first combustion turbine generator will boost LANL's onsite electrical generating capacity by 20 megawatts in the near future." pgs. 3-10 to 3-11.

4.3.2 Affects on Site Infrastructure
Current site energy capacity for LANL is 963,600 megawatt-hours per year. Current site requirement is 491,186 megawatt-hours per year. Projected energy capacity requirements for the proposed Chemistry and Metallurgy Building Replacement (CMRR) project are 898,043 megawatt-hours per year.

Peak load demand capacity will be exceeded by 18 megawatts should the CMRR become operational. Peak load demand will increase from 85.5 to 128 megawatts. pg. 4-13.

Draft Supplemental Programmatic Environmental Impact Statement on Stockpile Stewardship and Management for a Modern Pit Facility
DOE/EIS-236-S2, May 2003

4.2.2.2 Electrical Power
"Electricity is supplied to LANL via two regional 115-kilovolt transmission lines, the Norton-Los Alamos Line and the Reeves Line, by the Los Alamos Power Pool, a group of hydroelectric, coal, and natural gas power generators located throughout the western United States. A gas-fired steam/power plant located in TA-3 also can generate additional power on an as-needed basis. DOE maintains various low-voltage transformers at LANL facilities and approximately 55 km (34 Mi) of 13.8-kV distribution lines.

"Contractually, LANL receives 73 megawatts (MW) of electricity during the winter months and approximately 95 MW during spring and early summer months from the Los Alamos Power Pool. Onsite electrical power generation capacity from the TA-3 gas-fired steam/power plant is approximately 12 MW in the summer and 15 MW during winter. The steam/power plant provides the additional electricity necessary to meet peak load demands exceeding the allowable supply. The TA-3 steam/power plant and much of the electrical distribution system at LANL have past (*sic)* or are nearing the end of their design life and require replacing or upgrading. Construction and operation of a new 115-kV power line is planned and would originate at the existing Norton Substation near White Rock and terminate at the proposed DOE-administered West Technical Area Substation.

"Electricity consumption and peak demands have historically fluctuated due to the power demand of the Los Alamos Neutron Science Center. Site electrical capacity is 963,600 megawatt hour per year (MWh/yr), based on a summer peak load capacity of 110 megawatt electric (MWe). Peak load usage was 83 Mwe in fiscal year 2000." pg. 4-9.

"Existing site infrastructure would be adequate to support pit production capacities of 125 and 250 [pits per year (ppy)]. For the production of 450 ppy, peak electrical load would be exceeded and LANL would have to procure additional power." pg. 5-8.

From* Table 5.2.2.2-2. Annual Site Infrastructure Requirement for Facility Operations Under the MPF Alternative

	Energy (MWh/yr)	Peak Load (MWe)
125 ppy		
Total site requirement	571,000	103.5
Percent of site capacity	59%	97%
Change from No Action	79,800	20.5
Percent of available capacity	17%	85%
250 ppy		
Total site requirement	605,000	106.5
Percent of site capacity	63%	100%
Change from No Action	114,000	23.5
Percent of available capacity	24%	98%
400 ppy		
Total site requirement	670,000	119.5
Percent of site capacity	69%	112%
Change from No Action	176,000	36.5
Percent of available capacity	37%	152%

*Peak load is based on electrical demands of HVAC, lighting, and miscellaneous electrical systems. Peak load and annual electrical consumption estimates for the three pit production capacities are based on ratioing [Savannah River Site] FY99 Pit Manufacturing data to the multiple facility sizes. Estimates based on 24 hrs/day, 365 days/year.