-----Original Message-----
From: Owens, Kirk W.
Sent: Monday, October 16, 2006 6:23 PM
To: 'Jennifer E. Nisengard'; kirk Owens - SAIC
Cc: Withers, Elizabeth; isaacson@lanl.gov; Hoffman, Robert; Groome, Chadi D.; Folk, Kevin T.; susan
Subject: RE: SWEIS Language for Metropolis Center

Thank you Jennifer.

I interpret this to say that the analysis we have in the SWEIS regarding the resource requirements (water and electricity) for the Metropolis Center are okay, even for a petaop machine. Therefore, the only changes we need to make are with respect to the future potential level of operations (a petaop rather than 200 teraops). All of our previous conversations with LANL staff on this subject were with Nick Nagy and I see he was included on the email below, so it looks like this closes the loop.

Kirk Owens
SAIC
(301) 601-5611 (voice)
(301) 428-0145 (fax)

-----Original Message-----
From: jnisengard@lanl.gov [mailto:jnisengard@lanl.gov]
Sent: Monday, October 16, 2006 5:59 PM
To: kirk Owens - SAIC
Cc: Withers, Elizabeth; isaacson@lanl.gov
Subject: Fwd: SWEIS Language for Metropolis Center

Here is information concerning the metropolis center. The only change is the one below highlighted in pink.

Thanks,
Jen

Date: Mon, 16 Oct 2006 15:14:56 -0600
To: jnisengard@lanl.gov
From: "Phillip A. Sena" <phil_s@lanl.gov>
Subject: Fwd: Re: Fwd: SWEIS Language for Metropolis Center
Cc: rrivera@lanl.gov, hefele@lanl.gov

Jennifer,
I passed this on to our operations manager for the SCC and this is his response. I hope this helps you in your document. I'm sorry that it took so long to get back to you. Please call me if you require further information. I also have an email out to Rick Rivera, Doug's boss and electrical SME. I will copy him on this email to see if he has further comments regarding the electrical side of the SWEIS...thanks, Phil

Date: Mon, 16 Oct 2006 13:14:49 -0600
To: "Phillip A. Sena" <phil_s@lanl.gov>, rrivera@lanl.gov
From: Doug Hefele <hefele@lanl.gov>
Subject: Re: Fwd: SWEIS Language for Metropolis Center

Cc: nagy@lanl.gov, vir@lanl.gov

Phil

I have reviewed the information. It looks fine. There are a lot of variables and assumptions on water use calculations, and I'm not all together clear on the ultimate projection of 51 million gallons per year, but, we're certainly in the right ball park. The only other item that stood out was in the "Increased Level of Operation" section. I think that with new technology, we're actually looking at approaching 1,000 Teraops or a Petaop instead of the 200 Teraops called out.

Doug

At 02:19 AM 10/10/2006, Phillip A. Sena wrote:

Rick and Doug,
I received this email from the SWEIS folks to update what we want to say about the SCC in the latest version of the SWEIS.
Please review what it says about power and water usage and return it to Jennifer Nisengard for incorporation into the SWEIS documents as soon as possible. I will be sending you an additional e-mail she sent me for follow-up comments...thanks, Phil

X-Sieve: CMU Sieve 2.2
X-Sender: u176049@esh-mail.lanl.gov
X-Mailer: QUALCOMM Windows Eudora Version 6.0.3.0
Date: Wed, 04 Oct 2006 09:34:40 -0600
To: phil_s@lanl.gov
From: "Jennifer E. Nisengard" <jnisengard@lanl.gov>
Subject: SWEIS Language for Metropolis Center
X-PMX-Version: 4.7.1.128075

Phil,

Here is the wording in the Draft SWEIS, can you read it over and let me know if it sounds appropriate - there are some expected increases associated with the project listed in tables included here. Also, if you would like to review the document as a whole I have included the link here. We are trying to get all of the projects on line so we can issue the final version and get a ROD in place as soon as possible.

Thank you,
Jennifer

http://www.eh.doe.gov/nepa/docs/deis/eis0380d/

3.1.3.5 Nicholas C. Metropolis Center for Modeling and Simulation

The Nicholas C. Metropolis Center for Modeling and Simulation (Metropolis Center) is a new Key Facility and an integral part of the tri-laboratory (LANL, Lawrence Livermore National Laboratory, and Sandia National Laboratories) mission to maintain, monitor, and ensure the Nation's nuclear weapons performance through the Advanced Simulation and Computing Program. The facility is housed in a three-story, 303,000-square-foot (28,200-square-meter) structure in TA-3 and has been in operation since 2002. High-performance, complex computing operations are performed at this facility.

Computer Simulations. Computer simulations have become the only means of integrating the many complex processes that occur in the nuclear weapon lifespan. Large-scale calculations are now the primary tools for estimating nuclear yield and evaluating the safety of aging weapons in the nuclear stockpile. Continued certification of aging stockpile safety and reliability depends upon the ability to perform highly complex, three-dimensional computer simulations. Together with the Laboratory Data Communication Center, Central Computing Facility, and Advanced Computing Laboratory, the Metropolis Center forms the center for high-performance computing at LANL. The following paragraph describes the capabilities of this Key Facility, and **Table 3–7** indicates activity levels proposed under all three alternatives.

Table 3–7 Nicholas C. Metropolis Center for Modeling and Simulation Capabilities and Activity Levels

Capability	*No Action Alternative*	*Reduced Operations Alternative*	*Expanded Operations Alternative*
Computer Simulations	Perform complex three-dimensional computer simulations to estimate nuclear yield and aging effects to demonstrate nuclear stockpile safety. Apply computing capability to solve other large-scale, complex problems.	Same as No Action Alternative	Same as No Action Alternative, plus: Operate computing platform at higher computational capabilities.
Construction/Upgrades/DD&D			
Install New Processors	No activity	No activity	Install additional processors to increase functional capability. This expansion would involve addition of mechanical and electrical equipment, including chillers, cooling towers, and air-conditioning units (see Appendix J).

DD&D = decontamination, decommissioning, and demolition.

Under the No Action Alternative, the Metropolis Center computing platform would operate at up to 50 teraops.1 Computer operations are performed 24 hours a day, with personnel occupying the control room to support computer operation activities during prime business hours and other times as necessary. Operations consist of office-type activities, light laboratory work such as computer and support equipment assembly and disassembly, and computer operations and maintenance. The Metropolis Center has capabilities to enable remote-site users access to the computing platform, and its co-laboratories and theaters are equipped for distance operations to allow collaboration between weapons designers and engineers across the DOE weapons complex.

Appendix J presents the project-specific analyses for three proposed projects that would result in either new infrastructure or increased levels of operation at Los Alamos National Laboratory (LANL) within the timeframe under consideration in the *Draft Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico* (SWEIS). These three proposed projects are:

- Security-Driven Transportation Modifications;
- Nicholas C. Metropolis Center for Modeling and Simulation (Metropolis Center) Increase in Levels of Operation; and
- Increase in the Type and Quantity of Sealed Sources Managed at LANL by the Off-Site Source Recovery Project.

These projects are part of the Expanded Operations Alternative, and their implementation could entail changes in the use of resources (such as water and electric power) or new accident types (such as the introduction or movement of new materials at risk [MAR]) not fully addressed in existing National Environmental Policy Act (NEPA) documentation. The proposed timeframes associated with construction and operation of these facilities are depicted in **Figure J–1.**

Facility or Project Name / New Infrastructure or Levels of Operations	Fiscal Year					
	2007	2008	2009	2010	2011	2012 & beyond
Security-Driven Transportation Modifications	Construction	Operation				
Nicholas C. Metropolis Center Increased Levels of Operations		Gradual Increase				
Increase in the Type and Quantity of Sealed Sources Managed at LANL by the Off-Site Source Recovery Project		Ongoing Activity				

Figure J–1 Proposed Timeframes for Construction and Operation of Projects to Add New Infrastructure or Increase Levels of Operation

Increased Levels of Operation. The *Metropolis Center* is an existing facility that houses one of the world's largest and most advanced computers. It is an integrated tri-lab (LANL, Lawrence Livermore National Laboratory, and Sandia National Laboratories) effort to run supercomputers
that allows researchers to integrate past weapons test data, materials studies, and current simulation experiments, thereby acting as an alternative to underground

testing. While the computing capacity of the Metropolis Center is currently between 30 and 50 teraops (30 to 50 trillion floating point operations per second), the long-term goal was to develop a computer system capable of performing up to at least 100 teraops. With this goal in mind, the infrastructure was originally designed so that this projected computing capacity could be added without expanding the building. Since the 1998 *Environmental Assessment for the Proposed Strategic Computing Complex (SCC EA)* (DOE/EA-1250), NNSA has made the programmatic decision that in order to ensure the safety, reliability, and performance of the nation's nuclear weapons stockpile, the Metropolis Center's operations need to be upgraded to 100 teraops, with the possibility that a future operating level of approximately 200 teraops might be requested.

J.2.3.1 No Action Option

Under the No Action Option, NNSA would operate the Metropolis Center only up to the 50-teraops level analyzed in the *SCC EA*. **Table J–4** summarizes the operational requirements associated with the existing and proposed operating platforms compared with those originally forecast in the *SCC EA*, and current available site capacity. As shown in Table J–4, the *SCC EA* evaluated water usage of 63 million gallons (239 million liters) per year and electrical consumption of 7.1 megawatt per year for operating a 50 teraops platform. Due to continued computer design efficiencies, current water usage for operating the Metropolis Center is about 19 million gallons (72 million liters) per year and electricity consumption is about 5 megawatts per year (LANL 2006).

Table J–4 Metropolis Center Operating Requirements

	Platform Analyzed in SCC EA (No Action) [a]	*Existing 5-Megawatt Platform* [b]	*Expanded 15-Megawatt Platform (Proposed Project)* [b]	*LANL System Usage (2004)* [c]	*LANL System Capacity (2004)* [c]
Water (million gallons per year)	63.1	19	51	1,382	1,806
Electricity *Energy* (megawatt-hours per year)	62,196	43,800 [d]	131,400 [d]	540,821	1,314,600
Peak Load (megawatts)	7.1	6 [e]	18 [e]	86	150
Workers	300	350	350	13,261 [f]	Not applicable

[a] DOE 1998a.
[b] LANL 2006.
[c] Chapter 4, Section 4.8.2, of this SWEIS. Usage values and capacities reflect that of the utility systems that include LANL and other Los Alamos County users.
[d] Megawatt platform × estimated 8,760 hours per year.
[e] Megawatt platform × estimated 1.2 peak loading factor.
[f] LANL 2005a.
Note: To convert gallons to liters, multiply by 3.7853.

Although the *SCC EA* and associated FONSI indicated that operating the Metropolis Center at up to 50 teraops would result in no significant environmental impacts, NNSA acknowledged potential environmental concerns associated with facility water and electrical requirements. To address these concerns, the *SCC EA* indicated that: (1) cooling water for the facility would come from the Sanitary Effluent Recycling Facility, which polishes treated effluent from the Sanitary Wastewater Systems Plant; and (2) electric power constraints, common to all parts of Northern New Mexico, would need to be dealt with through mutual LANL and Los Alamos County Power Pool "shedding procedures" to balance the peak demand with load capabilities. Because the Sanitary Effluent Recycling Facility, which has been proposed to supply the Metropolis Center with its process water needs, has not been able to effectively meet the Metropolis Center's water requirements, much of this water has been, and is expected to continue to be, supplied through groundwater.

J.2.3.2 Proposed Project: Modify and Operate the Metropolis Center at an Expanded Computing Platform Water

The Los Alamos water supply system consists of 14 deep wells, 153 miles (246 kilometers) of main distribution lines, pump stations, and storage tanks. The system supplies potable water to all of Los Alamos County, LANL, and Bandelier National Monument. In September 2001, DOE completed the transfer of ownership of the water production system to Los Alamos County, along with 70 percent of its water rights (1,264 million gallons [4,785 million liters] per year). DOE has leased the remaining 30 percent of the water rights (542 million gallons [2,050 million liters] per year) to the county for 10 years, with the option to renew the lease for four additional 10-year terms (DOE 2003). In fiscal year 2004, LANL used approximately 346 million gallons (1,310 million liters) of water, of which 19 million gallons (72 million liters) were attributable to the Metropolis Center (LANL 2005a). LANL site water use and capacity compared to the Proposed Project and alternatives is presented in Table J–4. Groundwater in the Los Alamos area occurs as perched groundwater near the surface in shallow canyon bottom alluvium and at deeper levels in the main (regional) aquifer. All groundwater underlying LANL and the vicinity having a total dissolved solids concentration of 10,000 milligrams per liter or less is considered a potential source of water supply for domestic or other beneficial use. Surface water within LANL boundaries is not a source of municipal, industrial, or irrigation water. Under the Proposed Project, DOE would expand the computing capabilities of the Metropolis Center at TA-3. As shown in Table J–4, expanding to a 15-megawatt maximum operating platform is expected to potentially increase current water usage to 51 million gallons (193 million liters) per year. This higher usage would include the

additional water lost to cooling tower evaporation and blowdown. Until the Sanitary Effluent Recycling Facility becomes effective in supplying the Metropolis Center, most of this process water would be supplied through groundwater. Nonetheless, this water need would not exceed available system capacities.
During the operating timeframe evaluated in this SWEIS, continued enhancements to the Metropolis Center could theoretically be approximately 200 teraops (LANL 2006). Because each new generation of computing capability machinery continues to be designed with increased computational speed and enhanced efficiency in cooling water requirements, it is anticipated that the net cooling water requirements for the Metropolis Center would be less, should the Sanitary Effluent Recycling Facility be used as planned (LANL 2006).

Electric

Electrical service to LANL is supplied through a cooperative arrangement with Los Alamos County, known as the Los Alamos Power Pool, established in 1985. Within LANL, DOE also operates a gas-fired steam and electrical power generating plant at TA-3 (TA-3 Co-Generation Complex), and maintains various low-voltage transformers at LANL facilities and approximately 34 miles (55 kilometers) of 13.8-kilovolt distribution lines. Onsite electrical generating capability for the Power Pool is limited by the TA-3 Co-Generation Complex, which is capable of producing up to 20 megawatts of electric power that is shared by the Power Pool under contractual arrangement. A new generator producing an additional 20 megawatts of electric power is scheduled to become operational in June 2006. Generally, onsite electricity production is used to fill the difference between peak loads and the electric power import capability (LANL 2004c, 2005a, 2006). As shown in Table J–4, electric power availability from the local Pool is now estimated at 1,314,600 megawatt-hours (reflecting the lower thermal rating of 150 megawatts for 8,760 hours per year on the existing transmission system). In fiscal year 2004, LANL and other Los Alamos County users combined for a Power Pool total electric energy consumption of 540,821 megawatthours of electricity. The fiscal year 2004 peak load usage was about 69 megawatts for LANL and about 16 megawatts for the rest of the county (LANL 2004b). The estimated peak load capacity is 150 megawatts (LANL 2005a). Under the Proposed Project, DOE would expand the computing capabilities of the Metropolis Center at TA-3 to support a 100-teraops capability. This action would consist of the installation of additional mechanical and electrical equipment, including chillers, cooling towers, and airconditioning units. As shown in Table J–4, increasing to a 15-megawatt maximum operating platform is expected to potentially increase current peak electricity consumption to 18 megawatts per year. Nonetheless, this would not exceed available system capacities. During the operating timeframe evaluated in this SWEIS, continued enhancements to the Metropolis Center could theoretically be approximately 200 teraops (LANL 2006). Because each new

generation of computing capability machinery continues to be designed with increased computational speed and enhanced efficiency in electrical requirements, it is anticipated that average electrical requirements associated with such expansion would not exceed 15 megawatts. As newer computing components are installed, older, less efficient components would be retired; therefore, the number of teraops should increase significantly while the amount of required electrical power stabilizes at less than 15 megawatts (LANL 2006).

Project/Facility	*Location*	*No Action Alternative*	*Reduced Operations Alternative*	*Expanded Operations Alternative*
Technical Area Activities and Projects				
Combustion Turbine Generators	TA-3	Install two 20-megawatt combustion turbine generators.	Same as No Action Alternative	Same as No Action Alternative
Center for Weapons Physics Research	TA-3	No activity	No activity	Construct a new *Center for Weapons Physics Research*.
Replacement Office Buildings	TA-3	Construct 3 office buildings.	Same as No Action Alternative	Construct up to 9 additional *Replacement Office Buildings*.
TA-21 DD&D	TA-21	Deactivate tritium facilities followed by surveillance and maintenance.	Same as No Action Alternative	Implement *TA-21 Structure Decontamination, Decommissioning, and Demolition Project*.
Science Complex	TA-62 or TA-3 or Research Park	No activity	No activity	Construct and operate a new *Science Complex*.
Remote Warehouse and Truck Inspection Station	TA-72	No activity	No activity	Construct and operate a new *Remote Warehouse and Truck Inspection Station*.
Key Facility Activities and Projects				
Chemistry and Metallurgy Research Building	TA-3	Continue actinide research and processing activities, characterization, analysis, testing, and fabrication. Conduct nonproliferation training. Recover, process, and store LANL's highly enriched uranium inventory. Initiate construction of CMR Replacement Facility at TA-55.	Same as No Action Alternative	Same as No Action Alternative, plus: Expand and develop new actinide processing and analysis capabilities. Increase support to the Off-Site Source Recovery Program.
Sigma Complex	TA-3	Conduct research, development, and characterization on materials fabrication from metals, ceramics, salts, beryllium, enriched uranium, depleted uranium, and other uranium isotope mixtures. Analyze and fabricate tritium reservoirs. Fabricate nonnuclear components in support of research and development: 100 hydrotests and 50 joint test assemblies. Fabricate components for up to 80 pits and 50 secondary assemblies per year.	Same as No Action Alternative	Same as No Action Alternative
Machine Shops	TA-3	Machine, weld, and assemble various materials in support of major LANL programs and projects, principally related to weapons manufacturing.	Same as No Action Alternative	Same as No Action Alternative
Material Sciences Laboratory	TA-3	Develop and improve materials formulation and chemical processing technologies, mechanical testing, research, synthesis, and characterization.	Same as No Action Alternative	Same as No Action Alternative
Nicholas C. Metropolis Center for Modeling and Simulation	TA-3	Conduct high-performance, complex computing operations at up to 50 teraops, using no more than 7.2 megawatts of electricity.	Same as No Action Alternative	Same as No Action Alternative, plus: Implement *Nicholas C. Metropolis Center for Modeling and Simulation Increase in Level of Operations*, using up to 15 megawatts of electricity and 51 million gallons (19 million liters) of water per year.