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National Nuclear Security Administration

Supplement Analysis of the Lawrence Livermore National Laboratory Final Site-wide Environmental Impact Statement for the Exascale Computing Facility Modernization (ECFM) Project

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SUMMARY

This Supplement Analysis was prepared in accordance with the Council on Environmental Quality and United States Department of Energy (DOE) regulations for implementation of the National Environmental Policy Act (NEPA) of 1969. This SA considers whether the proposed Exascale Computing Facility Modernization (ECFM) project at the Lawrence Livermore National Laboratory (LLNL), Building (B) 453, would require the 2005 Final Site-Wide Environmental Impact Statement (2005 SWEIS), DOE Environment Impact Statement (EIS) 0348, DOE National Nuclear Security Administration (NNSA) 2005 to be supplemented, a new EIS to be prepared, or that no further NEPA documentation is needed.

The purpose and need for the proposed ECFM project is to continue DOE NNSA's ongoing ASC program with continued advancement of computer systems, including the more powerful Advanced Technology Systems (ATS). The ATS are a new generation of HPC that require additional power and cooling capabilities beyond those currently available in B453. The proposed ECFM project would add an electrical substation, cooling tower, heat exchangers, pumps, overhead and underground utilities, and strengthen a portion of B453 to increase the design live load to allow for future ATS computers. Potential environmental impacts of computer system delivery, installation, operations, and eventual disposal have been analyzed in the 2005 SWEIS, and are not further analyzed in this SA.

This analysis compares the potential impacts for each environmental resource area for the proposed ECFM project with the corresponding impacts in the 2005 SWEIS, considers the significance of these impacts, and determines whether they have been adequately considered in the 2005 SWEIS. This SA also reviews cumulative impacts for each environmental resource area to determine if any of the incremental impacts are considered significant. These environmental resource areas are discussed below.

Land Use: There would be no new floor space, and the new substation, cooling tower, pump house, and excavations for utility trenches and power poles would be constructed in approximately 3.5 acres of previously developed infill areas. These changes would be consistent with land use designations and infill construction projected in the 2005 SWEIS. For cumulative impacts, the proposed construction would be compatible with the City of Livermore Industrial Zone designations.

Aesthetics: The height of the new cooling tower, aboveground water piping adjacent to B453, and power poles would not be visible from offsite locations. Water vapor discharges from the new cooling tower could be seen from offsite locations during cold days, but would have the same character and extent as that from the existing tower.

Socioeconomics and Environmental Justice: There would be 25 to 155 temporary construction workers during the two-year construction period and two permanent employees would be added. Employment would remain below the 2005 SWEIS projections, as overall LLNL employment has decreased since 2005.

Community Services: There would be no changes to emergency services, school services, police protection, and security services. For municipal waste generation, the proposed project would generate 5,590 metric tons of demolition waste and 1,520 metric tons of construction waste over a two-year period. These quantities remain consistent with the projections in the 2005 SWEIS. Wastes would be disposed of in the Altamont Landfill, and the proposed project would conduct waste diversion for recycling and reuse, as these diversion strategies are a normal practice at LLNL.

Prehistoric and Historic Cultural Resources: The proposed project would not involve a historic building. Excavations would be reviewed for the presence of these resources and any mitigations would be implemented, as necessary.

Biological Resources and Wetlands: The proposed project would implement the terms, conditions, and conservation measures of the existing Livermore Site BO for infill construction and redevelopment. Surveys would be done for nesting birds prior to these activities, and, as needed, exclusion zone restrictions may be implemented during nesting season.

Utilities and Energy, Water Consumption: Domestic water consumption by the new cooling tower would average approximately 110 million gallon (gal.) /year (yr.) (0.3 million gal./day) from evaporation losses and make-up water. Although this water usage would add to the baseline water consumption at the Livermore Site, it would remain below the existing capacity of the Livermore Site domestic water system of 2.88 million gal./day. Water for the new cooling tower would come from a combination of Hetch-Hetchy Aqueduct System water and Alameda County Flood and Water Conservation District Zone 7 water. The Zone 7 Water Agency has indicated that they have sufficient capacity to provide this additional baseline increase without significant impact. The project would not require the use of Hetch-Hetchy water beyond the amounts currently permitted for use at LLNL. Under these circumstances, no significant impacts to water resources from the operation of the new cooling tower are anticipated.

Utilities and Energy, Electric Energy Use: Electrical energy use at the Livermore Site, including the proposed project, would be 432,000 Mega Watt Hour (MWH)/yr., which remains below the 2005 SWEIS projection of 442,000 MWH/yr. Although there would be an increase in B453 peak demand from 45 Mega Watt (MW) to 85 MW, but average demand, however, would be 49 MW (and varies between 29 MW and 49 MW). The average demand for the entire Livermore Site, including the proposed project, would remain below the 125 MW system capacity in the 2005 SWEIS. This demand would also remain below the capacity of the DOE WAPA transmission line substation, which has sufficient discreet load capacity of approximately 450 MW for the Livermore Site.

Utilities and Energy, Water Discharges: The new cooling tower would generate blowdown wastewater to the sewage system at approximately 16,400 gal./day. Although there are wide fluctuations of wastewater discharges year-by-year, the Livermore Site wastewater discharges would remain below the 2005 SWEIS projections of 330,000 gal./day. There would be no incremental cumulative impact to the Livermore Water Reclamation Plant.

Air Quality and Climate Change: The proposed two-year demolition and construction project would generate fugitive dust and criteria pollutants from heavy construction equipment and truck traffic, and employee commuting. The proposed project would apply appropriate dust suppression methods, and reduce idling of construction trucks. These temporary construction activities are similar to other ongoing construction and demolition projects at the Livermore Site, and there would be minimal incremental cumulative impacts on air quality.

Noise: There would be temporary construction and transportation noise, and operational noise from pumps and cooling towers. These activities are similar to ongoing construction and maintenance activities onsite, and would not result in incremental onsite or offsite noise impact.

Traffic and Transportation: The proposed project would add up to 155 temporary and two permanent personal vehicle trips per day. Additionally, there would be approximately 4,700 truck trips during the two-year construction period. As the number of employees at LLNL has decreased since 2005, and similar construction activities occur at the Livermore Site, these impacts from traffic and transportation would remain consistent with the 2005 SWEIS projections. There would be minimal incremental cumulative impacts to traffic and transportation in the Tri-Valley area.

Materials and Waste Management: Materials used at the cooling tower would be approximately 1,500 gal./yr. of corrosion inhibitors and biocides. During construction, the proposed project would generate solid demolition waste from asphalt, concrete, and soil. These would be characterized before disposal. Non-hazardous waste would be sent to the local municipal landfill. Although not expected, if characterization shows hazardous constituents, the waste would be segregated and appropriately disposed of according to LLNL's waste management procedures. The material used and waste generation amounts would remain consistent with the projections in the 2005 SWEIS.

Human Health and Safety: All workers would comply with applicable Environment, Safety, and Health and LLNL's Integrated Safety Management System requirements, including any applicable JHA before start of activities. Reducing noise levels and properly labeling and storing water treatment chemicals would mitigate any worker exposures to these hazards. For Accident Analysis, any release of water treatment chemicals would be localized to the chemical cabinet and cooling tower yard, and remediated. There would be no incremental cumulative human health and safety impacts to non-involved workers or the public.

Surface and Groundwater: The proposed site work would be done with appropriate Storm Water Pollution Prevention Plan and Energy Independence and Security Act requirements. There would be no releases of cooling tower wastewater to surface or groundwater. The proposed project would occur outside of the 2005 SWEIS floodplain designations. Therefore, there would be no incremental cumulative impacts to surface water, groundwater, or floodplains.

Geology and Soils: The proposed project would only occur in an existing building and previously disturbed infill areas.

Site Contamination and Remediation: The water treatment chemicals would be stored in appropriate chemical storage cabinets, and secondary containment would be provided for oil-

containing transformers according to LLNL's existing Spill Prevention, Control and Countermeasures plan, which would be modified to include the new transformers.

Conclusion and Determination: In conclusion, the proposed ECFM project would not result in potential environmental impacts above the impacts analyzed in the 2005 SWEIS, and would not exceed any capacities or limits in the 2005 SWEIS. The proposed project does not constitute substantial changes, or significant new circumstances or information relevant to the existing environmental analysis contained in the 2005 SWEIS. Based on that review and analysis, DOE/NNSA has concluded that its consideration of whether to proceed with the proposed project does not require supplementation to the 2005 SWEIS or preparation of a new EIS, and no further NEPA documentation is required.

NOTATION

The following is a list of acronyms, abbreviations, and units of measure used in this document.

ACRONYMS AND ABBREVIATIONS

ASC	Advanced Simulation and Computing
ATS	Advanced Technology Systems
BO	Biological Opinion
BAAQMD	Bay Area Air Quality Management District
BSL	Biosafety Level (facility)
B	Building
CARB	California Air Resources Board
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
D&D	Decontamination, decommissioning, and/or demolishing
DOE	Department of Energy
EA	Environmental Assessment
ECFM	Exascale Computing Facility Modernization
EIS	Environmental Impact Statement
EISA	Energy Independence and Security Act
ES&H	Environment, Safety, and Health
FR	Federal Register
HPC	High Performance Computing
IDA	Intentional Destructive Acts
ISMS	Integrated Safety Management System
JHA	Job Hazards Analysis
LLNL	Lawrence Livermore National Laboratory
LWRP	Livermore Water Reclamation Plant
NEPA	National Environmental Policy Act
NNSA	National Nuclear Security Administration

NPDES	National Pollutant Discharge Elimination System
ROD	Record of Decision
SA	Supplement Analysis
SFPUC	San Francisco Public Utilities Commission (Hetch-Hetchy Aqueduct System)
SPCC	Spill Prevention, Control and Countermeasures
SPEIS	Supplemental Programmatic Environmental Impact Statement
SSP	Stockpile Stewardship Program
SWEIS	2005 Site-wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement
SWPPP	Storm Water Pollution Prevention Plan
TSF	Terascale Simulation Facility
WAPA	Western Area Power Administration

UNITS OF MEASURE

dBA	A-weighted decibels
ft.	feet
gal./day	gallons per day
gal./yr.	gallons per year
kV	Kilovolt
kwh	kilowatt-hours
kwh/yr.	kilowatt-hours per year
lbs./sq. ft.	pounds per square feet
MW	megawatt
MWH	megawatt hour
MVA	mega volt-ampere
V	Volt

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1.0 INTRODUCTION

This Supplement Analysis (SA) was prepared in accordance with the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA) [Code of Federal Regulations (CFR), Title 40, Parts 1500 to 1508 [40 CFR Parts 1500 to 15080)], and U.S. Department of Energy's (DOE) NEPA Implementing Procedures (10 CFR Part 1021) (DOE 2011). This SA considers whether the proposed Exascale Computing Facility Modernization (ECFM) project at the Lawrence Livermore National Laboratory (LLNL) would require the *LLNL Final Site-Wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement* [DOE Environmental Impact Statement (EIS) 0348 and DOE-EIS-0236-S3] [DOE National Nuclear Security Administration (NNSA) 2005], hereafter referred to as the 2005 SWEIS, to be supplemented, a new (EIS) to be prepared, or that no further NEPA documentation is needed.

1.1 BACKGROUND

This NEPA SA for the proposed ECFM project is intended to comply with DOE Order 451.1B, *NEPA Compliance Program*, which requires that NEPA be incorporated early in the planning process for proposed actions. NEPA compliance documentation and the DOE NNSA determination would be completed during early design of the proposed project, and NEPA requirements would be met before irretrievable commitment of agency resources on the proposed action. The DOE NNSA reviewed previously completed environmental analyses in the 2005 SWEIS to evaluate if the potential environmental impacts of the ECFM project are adequately covered. Therefore, DOE NNSA has prepared this NEPA SA in accordance with 10 CFR 1021.314(c), *when it is unclear whether or not an EIS supplement is required, DOE shall prepare a SA.*

The 2005 SWEIS evaluated the impacts on the environment of existing and proposed operations at LLNL, including the High Performance Computing (HPC) facilities in Building (B) 453. The NEPA Record of Decision (ROD) (70 Federal Register 71491; 2005 ROD), decided to implement individual components of the proposed action alternative over the ensuing decade, subject to DOE/NNSA's continuing assessment of its mission needs. Potential environmental impacts of computer system delivery, installation, operations and eventual disposal are included within the 2005 SWEIS, and are not further analyzed in this SA. The location of the LLNL Livermore Site is presented in Figure 1.

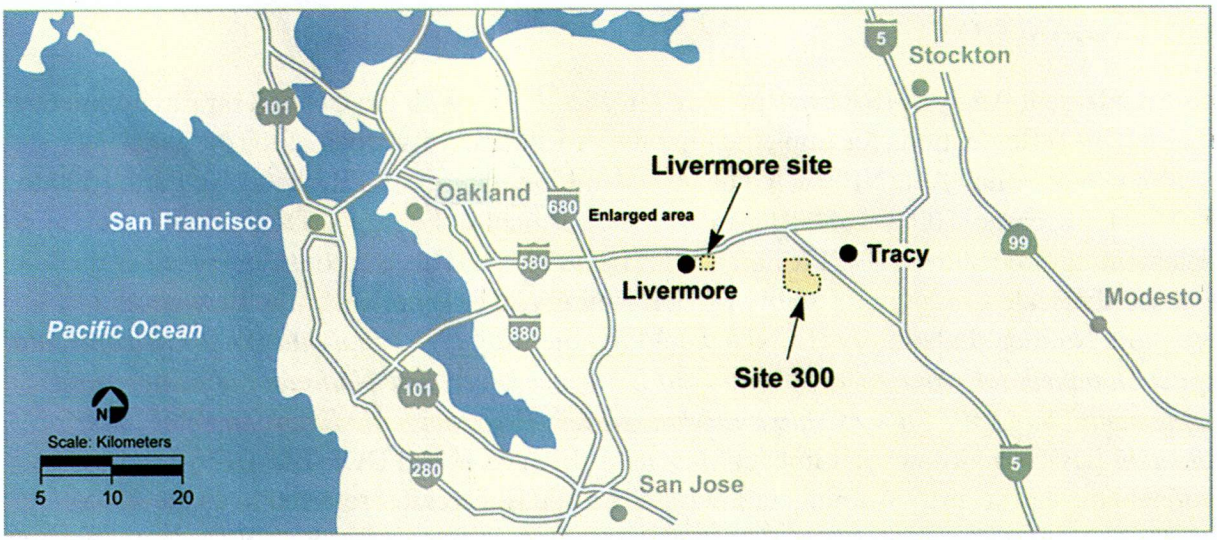

Figure 1. Location of the LLNL Livermore Site and Site 300.

1.2 PURPOSE AND NEED

NNSA moved from test-based confidence of the nuclear weapons stockpile to simulation-based confidence after the Test Ban was implemented. The Advanced Simulation and Computing initiative within the Stockpile Stewardship Program (SSP) develops, analyzes, and predicts the performance, safety, and reliability of the nuclear weapons, and certifies their functionality. Simulations of nuclear weapons are conducted in HPC facilities at NNSA's National Laboratories, and the computational needs at these facilities continue to increase with advancement of more powerful computers. NNSA's SSP has a need to install and operate a new generation of HPC, including the more powerful Advanced Technology Systems (ATS). The ATS are a new generation of HPC that upgrade computational capabilities, thereby increasing accuracy of simulation results.

Although installation of ATS computers at LLNL's B453 are ongoing as more advanced new systems replace older systems, future systems would require structural modifications and additional power and cooling capacities than currently available in B453. Therefore, there is a need to upgrade the current power and cooling requirements for ongoing and future computational needs.

1.3 PUBLIC NOTICE

As required in NEPA regulations (10 CFR 1021.314), the DOE NNSA would make the determination and related SA available to the public for informational purposes. Copies of the determination and SA will be provided for public inspection on the DOE NEPA website, https://energy.gov/nepa/nepa-documents, and the LLNL Environmental Stewardship and Occupational Health and Safety website, https://www-envirinfo.llnl.gov/. Although public

comments are not being solicited by this public notice, DOE/NNSA may respond to any questions on the project to further clarify their determination.

1.4 RELEVANT NATIONAL ENVIRONMENTAL POLICY ACT DOCUMENTS

Other NEPA documents that contain varying levels of descriptions and environmental impact analyses of LLNL's HPC facilities, and their relevance to the proposed ECFM project, include the following:

- DOE/EIS-0348 and DOE/EIS-0236-S3, *Final Site-wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement*, dated March 2005 (DOE/NNSA 2005)
- DOE/EIS-0348-SA3, *Supplement Analysis of the 2005 Final Site-wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory*, dated August 2011 (DOE/NNSA 2011)
- DOE/EIS-0236-S4, *Final Complex Transformation Supplemental Programmatic Environmental Impact Statement*, dated 2008 (DOE/NNSA 2008a)
- DOE/EA-1305, *Environmental Assessment for the Terascale Simulation Facility at Lawrence Livermore National Laboratory*, dated July 1999 (DOE/NNSA 1999)
- DOE/EA-0283, *Lawrence Livermore Direct Service 230 kV Transmission Line Project, Alameda County, California*, DOE Western Area Power Administration, dated December 1987 (DOE/WAPA 1987)

Each of these references provide information useful for NEPA analysis of the proposed ECFM project, but the focus of this SA is on the 2005 SWEIS.

2.0 DESCRIPTION OF THE PROPOSED ACTION

The proposed ECFM project would modify and upgrade the civil, structural, architectural, mechanical, and electrical systems of the existing TSF, B453, and an adjacent approximately 3.5 acres of previously developed infill area. These modifications and upgrades would allow for continued use of B453 to support more powerful high-performance computers. These modifications and upgrades would also provide enhanced power and cooling for the current and future ATS computers.

To accommodate these modifications and upgrades, additional infrastructure would be needed in the vicinity of B453 to allow additions of an electrical substation, cooling tower, heat exchangers, pumps, and overhead and/or underground utilities. The added electrical substation, cooling tower yard, and associated infrastructure would be designed to comply with the LLNL standards, matching existing similar infrastructure throughout the Livermore Site. A parking lot would be demolished to make room for the new substation. Fence lines would be adjusted to provide required clearances around the new equipment. Existing underground utilities that are in areas of the proposed yards would be removed as needed. Figure 2 shows a rendering of the new substation and cooling tower near the existing cooling tower. The new cooling tower would augment the existing cooling tower for B453 cooling needs.

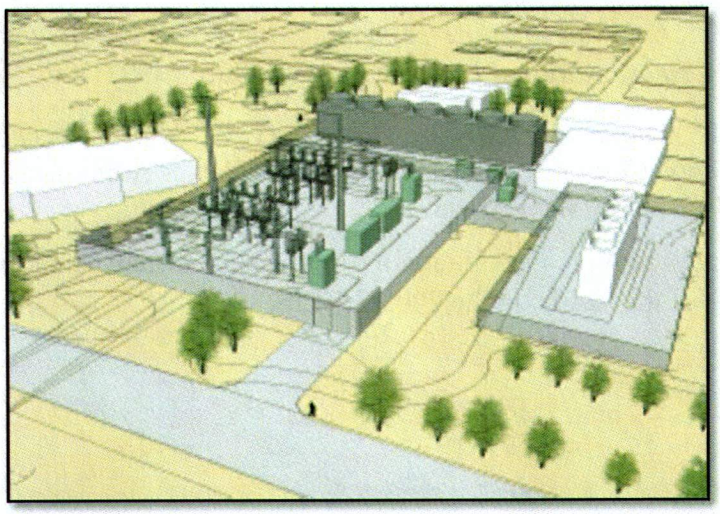

Figure 2. Rendering of new substation and cooling tower.

Connections from the new cooling tower and substation yard to B453 would be through aboveground and underground duct-banks and piping, depending on final design. The aboveground water piping would only be installed adjacent to the north side of B453. The depth of the underground lines would vary based on existing underground utility lines and minimum depth requirements. If necessary, berms may be added to provide the necessary coverage or fill. Where the new underground duct-banks or piping cross roadways, driveways, or parking areas, patches would be made in compliance with LLNL standards.

To strengthen its structure to accommodate future ATS requirements, a portion of B453 would be structurally modified to increase the design live load from 250 Pounds/Square Feet (lbs./sq. ft.) to 500 lbs./sq. ft. To accommodate this change, the foundation and structural beams would be strengthened in the area of the computer room floor requiring the new load capacity. The facility would maintain its current computer room areas for at least the next two generations of ATS computers.

For electrical infrastructure, the peak power demand for B453 would increase from 45 Mega Watt (MW) to 85 MW. The average demand for B453 would be 49 MW (varies between 29 MW and 49 MW). The additional peak power of 40 MW would be delivered to B453 through installation of a new substation. The new substation would consist of 40/50/60 MW transformers that would step the voltage of 115 Kilovolt (kV) down to 13.8kV. The C-5 Parking Lot would be demolished to make room for this substation. Additionally, step-down transformers (from 13.8 kV to 480 V) would be installed in the basement of B453. Power to the new transformers would be provided either from new overhead 115 kV lines from the Outer Loop Road, or from new overhead or underground lines from the existing OS424 substation. Either of these connection options would be within the Livermore Site. There would be no changes to the 115 kV electrical supply currently served by the DOE Western Area Power Administration (WAPA) substation near Greenville and Patterson Pass roads (DOE WAPA 1987). The new transformers would have sufficient secondary containment to be consistent with LLNL's Spill Prevention, Control and Countermeasures (SPCC) plan.

For mechanical infrastructure, a new cooling tower would be installed north of the C-5 Parking Lot at a previously developed infill area. The cooling demand would be handled primarily by the new cooling tower and supplemented by excess capacity from the existing cooling tower. A pump house consisting of heat exchangers and pumps that support the liquid cooling loop would be installed just east of the new cooling tower. The cooling loop water lines would be routed from there to B453. The project would also include grading and storm drainage improvements as necessary. The additional cooling tower would increase water consumption and discharges to the sanitary sewer system. Water usage would increase by approximately 110 million gal./yr. (0.3 million gal./day), and wastewater discharges would increase by about 16,400 gal./day.

3.0 SUPPLEMENT ANALYSIS

This SA includes a review of environmental impacts under the proposed action in the 2005 SWEIS (DOE NNSA 2005), evaluates if the potential impacts from the proposed ECFM project are included in the 2005 SWEIS, and determines if any of these potential impacts are considered significant. Cumulative impacts for each resource area on which the proposed project would have an incremental impact are also evaluated.

3.1 LAND USE

The 2005 SWEIS projected a small increase in developed space at the Livermore Site with no changes in land use designations, and that would not lead to a conflict with existing and approved future land uses adjacent to the site. It also projected that infill and modernization projects would occur at the Livermore Site (DOE NNSA 2005).

The proposed ECFM project would involve modifying an existing building without the addition of new floor space, constructing a new cooling tower, a pump house, a substation with two new main power transformers and support structures, and trenching for utilities. The construction activities would take place on approximately 3.5 acres of previously developed infill areas. These changes would remain consistent with the land use designations in the 2005 SWEIS. There would be no significant environmental impacts on land use from the proposed ECFM project.

For cumulative impacts, the proposed ECFM would have a negligible incremental impact on land use by eliminating parking spaces from an existing parking lot at the Livermore Site. There are several other parking lots within the adjacent area with sufficient capacity to handle loss of these parking spaces. For surrounding areas, there would be no loss of agricultural lands and the new construction would be compatible with the City of Livermore Industrial Park zoning designations.

3.2 AESTHETICS

The 2005 SWEIS addressed the impact of LLNL's continued operations on the scenic quality of the landscape, but was limited to the construction of buildings and infrastructure located in areas visible to the public. Activities that were proposed in the 2005 SWEIS that would change the built environment included improvements to existing buildings and infrastructure, Decontamination and Decommissioning (D&D) of existing buildings, and construction of new facilities with developments and modifications occurring within the developed portion of the site. These changes were anticipated to be consistent with the existing character of the Livermore Site (DOE NNSA 2005).

The proposed ECFM project would add a cooling tower and support structures. The new cooling tower would be approximately 55 ft. tall and located adjacent to the existing cooling tower within the interior of the Livermore Site. Assuming the use of overhead electrical lines,

additional power to the project site would require about 14 electrical power poles. These power poles would be 35 ft. to 55 ft. high, depending on line-of-site clearance, and would be installed onsite over a distance of approximately 2,900 lineal ft. Another option to bring overhead power from the existing OS424 substation would require less distance (1,100 lineal ft) and fewer power poles. The project would also install overhead cooling water loop piping adjacent to B453. Although these overhead pipes, power poles, and cooling tower would not be visible from offsite locations, a discharge of water vapor from the new cooling tower could be visible from offsite on cold days. This additional discharge would be of the same character and extent as that produced by the existing tower. Considering the new cooling tower would be located adjacent to the existing cooling towers, it would be consistent with current views of the Livermore Site as described in the 2005 SWEIS.

3.3 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

The socioeconomic environment of LLNL, including employment, population, housing, economic factors, and environmental justice, as described in the 2005 SWEIS, was based on an expectation for continued growth in the LLNL workforce. The 2005 SWEIS projected that LLNL employment would increase to 11,400 workers (DOE NNSA 2005). Since publication of the 2005 SWEIS, however, employment at the Livermore Site has declined to about 6,400 workers in 2016 (LLNL 2017).

The proposed ECFM project would add 25 to 155 temporary construction workers, depending on the stage of the project, over the nominal two-year construction period. Two permanent employees would also be added. This employment level would remain consistent with similar ongoing construction and maintenance projects at the Livermore Site. Considering LLNL employment has declined since 2005, socioeconomics and environmental justice impacts would remain well below the 2005 SWEIS projections. Additionally, there would be a negligible incremental cumulative impact on socioeconomics and environmental justice in the surrounding communities.

3.4 COMMUNITY SERVICES

The 2005 SWEIS analyzed community services, including demand for fire protection and emergency services, police protection and security services, school services, and non-hazardous solid waste disposal to the local landfill from operations of LLNL (DOE NNSA 2005).

Based on the temporary employment and two additional permanent employees, there would be no significant impacts to emergency services, police protection and security services, and school services.

3.4.1 Municipal Waste Generation

During the 2002 baseline year for the 2005 SWEIS, Livermore Site generated about 15,300 metric tons of non-hazardous solid wastes. Approximately 60% of this amount was diverted for

recycling and reuse. The 2005 SWEIS projected that LLNL would dispose of about 4900 metric tons per year from the Livermore Site, and that these amounts would have minimal impacts on community services (DOE NNSA 2005). LLNL continues to divert non-hazardous solid waste for recycling and reuse. For example, in 2016, LLNL diverted 57% of non-routine construction and demolition waste for recycling and reuse (LLNL 2017).

During the two-year construction period, the proposed ECFM project would generate approximately 5,590 metric tons of asphalt, concrete, and soil from parking demolition and trenching activities. During facility modifications, the project would also generate 1,520 metric tons of concrete washout, miscellaneous metals, debris, etc. As with ongoing waste diversion strategies, the proposed project would divert portions of these wastes for recycling and reuse, as practicable. Therefore, municipal waste generation from the proposed ECFM project would remain consistent with the projections in the 2005 SWEIS, and there would be no significant impacts on community services.

For cumulative impacts, the Altamont Landfill also employs waste diversion strategies for soil, concrete, and asphalt, and the landfill has sufficient disposal capacity through 2045 (http://altamontlandfill.wm.com/sustainability/index.jsp). Therefore, there would be negligible incremental, cumulative impacts on municipal waste generation.

3.5 Pre-Historic and Historic Cultural Resources

The proposed project does not involve buildings eligible for listing on the National Register of Historic Places. However, during trenching activities, prehistoric and historic cultural resources could be uncovered. During construction, excavations would be reviewed to assess potential adverse impacts to prehistoric and historic cultural resources and mitigations would be implemented as necessary. Given these protections, impacts in the area of prehistoric and historic resources are not anticipated.

3.6 Biological Resources and Wetlands

The 2005 SWEIS addressed the impacts of activities on biological resources, including vegetation, wildlife, protected species, and wetlands through a qualitative analysis. The impact analysis in the 2005 SWEIS determined that the effect of proposed projects on biological resources would occur primarily in areas that have been previously disturbed at the Livermore Site, by construction, maintenance, wildfire prevention, and security activities (DOE NNSA 2005).

The potential impacts on biological resources from the proposed ECFM project construction activities may result in direct impacts to California red-legged frogs and California tiger salamanders, and indirect impacts to nesting birds. Impacts on California red-legged frogs and California tiger salamanders would be minimized by implementing the Terms and Conditions and Conservation Measures outlined in the U.S. Fish and Wildlife Service's (USFWS) *Biological Opinion for Infill Construction and Redevelopment at the LLNL Livermore Site*

(USFWS 2013). Impacts to nesting birds from tree trimming and D&D would be avoided because the LLNL wildlife biologist would conduct surveys prior to these activities, and restrict conducting these activities to outside of the nesting season as practicable. Impacts on habitat would not occur because the proposed project area is within previously disturbed, developed, and low-quality habitat. Impacts on wetlands are not anticipated because the project would avoid dredge and fill of wetlands and would not substantially change existing site hydrology. Once operational, activities associated with the proposed project would be consistent with current operations at the Livermore Site and would not result in impacts to biological or wetland resources above those previously considered in the 2005 SWEIS.

3.7 UTILITIES AND ENERGY

The 2005 SWEIS analyzed utility services and energy, including water, electricity and natural gas consumption, and wastewater (sewage) discharges. The proposed ECFM project would not increase natural gas consumption at LLNL.

3.7.1 Water Consumption

The 2005 SWEIS projected that annual water consumption under the Proposed Action would be approximately 297 million gal./yr. for both Livermore Site and Site 300. Peak water use at the Livermore Site was projected to be approximately 1.37 million gal./day and the capacity of the Livermore Site domestic water system was approximately 2.88 million gal./day. The Livermore Site's primary water source continues to be the City of San Francisco Hetch-Hetchy Aqueduct System. The secondary or emergency water source continues to be the Alameda County Flood and Water Conservation District Zone 7 (DOE NNSA 2005). Average water consumption during the most recent drought (2012 - 2016) was 241 million gal./yr. (LLNL 2017).

The new cooling tower for the proposed ECFM project would consume domestic water at an average of approximately 110 million gal./yr. (0.3 million gal./day) from evaporation losses and make-up water. Although this water usage would add to the baseline water consumption for the Livermore Site, it would remain below the existing capacity of the Livermore Site domestic water system of approximately 2.88 million gal./day. Water for the new cooling tower would come from a combination of Hetch-Hetchy Aqueduct System water and Alameda County Flood and Water Conservation District Zone 7 water. The Zone 7 Water Agency has indicated that they have sufficient capacity to provide this additional baseline increase without adverse impact (Alameda 2017). The source of water for the cooling tower would be managed so that LLNL would continue to achieve the San Francisco Public Utility Commission's 10% potable water and 25% irrigation water reduction goals. Because the Livermore Site domestic water supply agencies have adequate capacity to meet this future water demand, there would be no significant impacts to water resources from the operation of the new cooling tower.

3.7.2 Electricity Use

The 2005 SWEIS projected annual electrical energy consumption of 442,000 MWH/yr. for the Livermore Site and 16,300 MWh/yr. for Site 300, for a total of 458,300 MWH/yr. for both sites. The peak power demand was projected to be 81 MW for the Livermore Site, and the system capacity was at 125 MW (DOE NNSA 2005). An existing 230 kV WAPA transmission line substation located offsite at Paterson Pass Road and Greenville Road provides power to the Livermore Site, and has sufficient discreet load capacity from four single-phase 230/115 kV transformers (three energized and one spare) with a capacity of 250 Mega Volt-Ampere (MVA) (about 250 MW), and two 230/13.8 kV transformers at 100 MVA each (about 200 MW), with a total capacity of approximately 450 MW (DOE WAPA 1987). In 2016, the electrical energy usage at LLNL was 396 million kilowatt hours (kwh) (LLNL 2017).

For electrical energy use, the proposed ECFM project, along with the rest of the Livermore Site, would consume approximately 432,000 MWH/yr. Therefore, electrical energy consumption would remain below the 2005 SWEIS projections. The proposed project would also increase electrical energy demand for B453, an increase of 40 MW from its current demand capacity of 45 MW, for a total threshold demand capacity of 85 MW. This increase would be provided from a new substation at the C-5 Parking Lot. The new substation would consist of two redundant 40/50/60 MW transformers that would step-down voltage from 115 kV to 13.8 kV. Peak power would be 64 MW and average power would be 49 MW (and varies between 29 MW and 49 MW). There would be no significant environmental impacts on electrical energy use from the proposed project.

There are no incremental cumulative impacts as the demand would remain well below the WAPA substation capacity. No additional discreet power demand would be needed at the WAPA substation.

3.7.3 Water (Sewage) Discharges

The 2005 SWEIS projected an average amount of industrial wastewater discharges to be 330,000 gal./day, with average sewer discharges of 222,000 gal./day at the Livermore Site (DOE NNSA 2005). In 2009, wastewater discharges from the Livermore Site averaged about 238,000 gal./day (DOE NNSA 2011), and in 2016, wastewater discharges averaged 320,000 gal./day (LLNL 2017). Therefore, there are wide fluctuations year-by-year for wastewater discharges.

The new cooling tower for the proposed project would generate blowdown discharges to the sewage system at approximately 16,400 gal./day (6 million gal./yr.). Blowdown water is temporarily stored in tanks, and discharged to the sewer system at a slow average rate so as not to overload LLNL's sewage pipelines. Although, there is wide fluctuation of wastewater discharges year-by-year, discharges from the proposed ECFM project along with the rest of the Livermore Site would remain consistent with the projections in the 2005 SWEIS. Therefore,

there would be no significant environmental impacts on wastewater discharges from the proposed project.

There would be no incremental cumulative impacts on the Livermore Water Reclamation Plant (LWRP) as the discharge quantities would remain consistent with the 2005 SWEIS projections. The LWRP has been notified of this potential discharge increase, which would start in 2022.

3.8 AIR QUALITY AND CLIMATE CHANGE

The 2005 SWEIS considered activities that emit air emissions from continued Laboratory operations (combustion of fuels and vehicular activities, including from employees commuting), and from construction and maintenance activities. The 2005 SWEIS concluded that under the Proposed Action, Livermore Site activities would result in no adverse impact to air resources. The 2005 SWEIS also concluded that the Livermore Site meets the Bay Area Air Quality Management District (BAAQMD) and California Air Resources Board (CARB) regulatory requirements for criteria pollutants, and remains below specific threshold levels for conformity. LLNL continues to implement standard measures to reduce air emissions from its construction and D&D activities (DOE NNSA 2005).

Activities associated with the proposed ECFM project that would produce air emissions include dust from demolition and construction, and criteria pollutants from truck traffic and heavy construction equipment. These project activities would last for approximately 240 days over a two-year construction period. The project would require approximately 4,700 truck trips for construction material delivery and construction and demolition waste disposal. These truck trips would be similar to ongoing construction and demolition projects at the Livermore Site. The proposed project would apply dust suppression and emissions reduction practices, such as reducing idling of construction trucks. LLNL continues to follow appropriate BAAQMD and CARB requirements to reduce dust and criteria pollutants from construction and heavy equipment usage. These temporary construction activities are similar to other ongoing construction and demolition projects at the Livermore Site. During operations, the proposed ECFM project would add two permanent employees, and there would be no new combustion processes. Therefore, impacts on air quality would remain consistent with the analysis in the 2005 SWEIS. There would be no significant impact on air quality from the proposed project.

For cumulative impacts, U.S. Interstate 580 (I-580) near the Livermore Site is a major truck traffic thoroughfare for the entire Bay Area. The addition of 4,700 truck trips for the proposed ECFM project would be a small incremental cumulative impact on air quality compared to the typical I-580 traffic. For greenhouse gas emissions (climate change), there would be small incremental impacts from construction activities, but well within the emissions projections in the 2005 SWEIS.

3.9 NOISE

The 2005 SWEIS projected that activities associated with the continued operation of LLNL would contribute to noise generation, through short-term construction noise from near-fence line projects as high as 82 A-weighted decibels (dBA), to long-term operational noise not noticeable beyond the fence line, and transportation vehicle noise levels of 81 - 87 dBA (DOE NNSA 2005).

The proposed ECFM project would generate temporary construction and transportation noise, and operational noise (from pumps and the cooling tower). Similar noise levels occur at LLNL during ongoing construction and maintenance, transportation, and operational activities. The construction and operational noise would not be noticeable beyond the LLNL fence line or any part of LLNL open to the public. Transportation noise would be similar to truck noise from ongoing traffic as analyzed in the 2005 SWEIS. Employee exposure to noise would be consistent with Occupational, Safety, and Health standards. Therefore, the proposed ECFM project would remain consistent with noise projections in the 2005 SWEIS. Considering the truck traffic levels from the proposed project would be similar to ongoing traffic levels, offsite noise impacts would also remain consistent, and there would be no incremental offsite cumulative noise impact.

3.10 TRAFFIC AND TRANSPORTATION

The 2005 SWEIS stated that commuting workers and deliveries of materials comprise most of LLNL-generated traffic. Traffic volume at the Livermore Site was projected to increase in the 2005 SWEIS as a result of approximately 500 additional workers by 2014, which was a small fraction of traffic levels in the heavily congested Tri-Valley area (DOE NNSA 2005). The LLNL workforce has actually decreased since 2005 and the number of deliveries and waste shipments has generally been below or consistent with the 2005 SWEIS projections.

The proposed ECFM project would add 25 to 155 temporary jobs, depending on the stage of the construction activities, and two permanent employees. During the approximately two years of construction, there would be an increase of 4,700 truck trips and a maximum of 155 daily personal vehicle trips. Similar traffic occurs on ongoing construction projects. During operations, there would be two daily personal vehicles and two delivery trucks periodically for delivering cooling tower water treatment chemicals. Additionally, during construction, the proposed project would require temporary closure of Inner Loop Road within the Livermore Site for 40 work days. Other onsite routes are available to government vehicles and employees, and there would be minimal onsite circulation impacts. As the employee population at LLNL has decreased since 2005, these impacts from traffic and transportation would remain consistent with, and below, the projections in the 2005 SWEIS. There would be no significant environmental impacts on traffic and transportation from the proposed project.

For cumulative impacts, the proposed ECFM project would have an incremental impact on traffic and transportation in the Tri-Valley area. Considering heavy traffic through I-580, and

several home construction locations on Vasco Road, the resulting traffic and transportation for the proposed ECFM project over a two-year period would have a small incremental cumulative impact.

3.11 MATERIALS AND WASTE MANAGEMENT

The 2005 SWEIS stated that implementation of the Proposed Action would not cause any major changes in the types of materials used on site. Materials usage at LLNL would increase consistent with an increase in Laboratory operations, but the increases would not exceed existing material management requirements (DOE NNSA 2005). Similarly for waste management, the 2005 SWEIS stated that waste generation projections were not expected to exceed existing waste management capacities and no additional waste storage, treatment, handling capacity, regulatory requirements, or security requirements were projected to be needed (DOE NNSA 2005).

During construction, the proposed ECFM project would generate approximately 7,110 metric tons of non-hazardous solid waste, including asphalt, concrete, and soil. The solid waste would be characterized according to established LLNL procedures before disposal to the local landfill. During operations, the proposed project would use approximately 1,500 gal./yr. of corrosion inhibitor and biocide chemicals. These quantities would be similar to the ones used by the existing cooling tower. The proposed project would also generate potentially hazardous wastes, such as empty water treatment chemical containers. These empty containers would be recycled by the vendor, or disposed of according to existing LLNL waste management practices. The materials quantities and waste generation amounts from the proposed project would remain consistent with the projections in the 2005 SWEIS. There would be no significant impacts on materials and waste management from the proposed ECFM project.

3.12 WATER

3.12.1 Surface Water

The 2005 SWEIS projected that the area of impervious surfaces at the Livermore Site would increase, primarily due to construction of new roads and buildings. An increase in surface runoff was also projected to occur because of the increased impervious surface area. However, because Livermore Site soils are relatively permeable, and abundant uncovered acreage remains within landscaped and buffer areas for groundwater recharge, the impact of the reduction in recharge area was expected to be minimal (DOE NNSA 2005).

The proposed ECFM project involves modification of an existing building and infill construction in previously developed and paved areas. There would be no loss of undisturbed open areas at the Livermore Site. A Storm Water Pollution Prevention Plan (SWPPP) would be prepared by a Qualified SWPPP Developer and implemented for the construction activities. The proposed project would also follow the requirements of the Energy Independence and Security Act (EISA), which maintains the pre-development hydrological characteristics of the site (Environmental Protection Act 2009). During operations, the proposed project would involve

the use of oil-containing equipment, which would be operated in compliance with SPCC regulations; full secondary containment would be provided for the two new transformers, each containing from 7,000 to 9,000 gal. of dielectric coolant. The proposed project would have no significant impact to surface water.

3.12.2 Groundwater

The 2005 SWEIS identified that groundwater could be further degraded by contaminants released during construction activities. Spills were expected to be cleaned up before they reached the water table because LLNL follows prevention and mitigation steps, and the depth to groundwater at the Livermore Site is approximately 50 ft.; therefore, impacts were not anticipated. Impacts to groundwater quality from surface water recharge were also projected to be minimal because LLNL continues to comply with National Pollutant Discharge Elimination System requirements (DOE NNSA 2005).

The proposed project would not discharge to groundwater and LLNL would continue to implement established procedures and best management practices for cleaning up spills. The proposed project would have no significant impact to groundwater.

3.12.3 Floodplains

Because no activities identified in the 2005 SWEIS were expected to occur within the 100-year floodplains, other than the Arroyo Las Positas Maintenance Project, no impacts to floodplains were expected. The proposed ECFM project would not be located within the 100- or 500-year floodplains as described in the 2005 SWEIS (DOE NNSA 2005).

3.13 HUMAN HEALTH AND SAFETY

The 2005 SWEIS stated that all employees follow LLNL's Integrated Safety Management System (ISMS), which systematically integrates safety into management and work practices at all levels so that missions are accomplished while protecting the public, the worker, and the environment. ISMS is a systematic approach for defining scope of work, identifying, planning, and performing work that provides for early identification of hazards and associated control measures for hazardous mitigation or elimination. The ISMS process also forms the basis for work authorization and provides assessment through a continuous feedback and improvement loop for identifying both shortcomings and successes for incorporation into subsequent activities. Continued application of site Environment, Safety, and Health (ES&H) programs and ISMS principles would result in minimizing impacts to workers and the public (DOE NNSA 2005).

The proposed ECFM project would comply with applicable ES&H and ISMS requirements, and completion of any required Job Hazards Analysis before start of each construction and demolition activity. In addition, the contractors performing work would adhere to LLNL's safety plans. Small commercial quantities of cooling tower water corrosion inhibitors and biocides would be used during operations. The chemicals would be stored within secondary containment,

and containers and storage sheds would be appropriately labeled for worker safety. LLNL would continue application of site ES&H programs and ISMS principles to minimize impacts to workers and the public during construction and operations as described in the 2005 SWEIS. There are no significant environmental impacts to human health and safety from the proposed ECFM project.

3.14 ACCIDENT ANALYSIS

The 2005 SWEIS evaluated bounding accidents at LLNL's Radioactive and Hazardous Waste Management facilities, Superblock facilities, the National Ignition Facility, and the Biosafety Level (BSL) 3 facility. These bounding accident scenarios involve radiological, chemical, biological, and high-explosives incidents (DOE NNSA 2005)(DOE NNSA 2008b).

Possible worst-case accidents for the proposed ECFM project would involve the potential release of commercial quantities of cooling tower water treatment corrosion inhibitor (1,100 gal.) and non-oxidizing biocides (450 gal.). Release of such materials would be localized to the cooling tower yard and immediately cleaned up; there would be no impacts to non-involved workers or the public. Therefore, the proposed project would not affect the bounding scenarios considered in the 2005 SWEIS. There would be no significant environmental impacts on accident analyses from the proposed ECFM project.

3.15 GEOLOGY AND SOILS

The geology and soils analysis in the 2005 SWEIS examined the effects of the construction and the operation of facilities and other activities on land occupied by, and immediately adjacent to, the Livermore Site. Potential impacts considered included erosion and effects to potential geologic economic resources, such as mineral and construction material resources and fossil locations. In general, impacts to soils were defined as taking place in areas that support agriculture, but are out of production (DOE NNSA 2005).

Construction activities for the proposed ECFM project would occur in existing buildings and previously developed infill areas; they would not take place in agricultural or undeveloped areas. The proposed project would remain consistent with the projections in the 2005 SWEIS, and there would be no significant environmental impacts to geology and soils.

3.16 INTENTIONAL DESTRUCTIVE ACTS

The 2005 SWEIS did not discuss the potential environmental impacts of Intentional Destructive Acts (IDA) on facilities at LLNL as this was not a requirement at that time. However, since 2005, two analyses have been conducted for the operations at LLNL, which considered IDAs. They are the analysis from the *Revised Environmental Assessment for the Bio Safety Level 3 (BSL-3) Facility* (DOE NNSA 2008b) and the analysis from the *Complex Transformation Supplemental Programmatic EIS* (DOE NNSA 2008a). These analyses involved biological agents and nuclear materials.

Since the proposed ECFM project would not involve biological agents or nuclear materials, and the proposed use of small commercial quantities of approximately 1,500 gal./yr. of water treatment chemicals and biocides would not exceed any onsite limits or hazards, the previous analyses on IDAs remain bounding and there are no significant environmental impacts on IDAs from the proposed project.

3.17 SITE CONTAMINATION AND REMEDIATION

The 2005 SWEIS projected a general increase in mission activity levels across LLNL. Consequently, an increase in hazardous material management and waste management activities was expected and an associated risk that a spill or release could occur. If a spill or release occurs, the impact analysis also considered that LLNL conducts immediate cleanup actions and performs periodic site surveys to ensure environmental impacts are minimized. This proactive approach results in minimal deposition of contaminants to soil from LLNL's continued operations (DOE NNSA 2005).

Commercial quantities of water treatment chemicals and waste would be stored in chemical storage cabinets, and secondary containment would be provided for oil-containing equipment in accordance with LLNL's SPCC Plan. The proposed ECFM project would continue LLNL's proactive approach in cleaning spills or releases. Therefore, the proposed ECFM project would remain consistent with the 2005 SWEIS, and there would be no significant environmental impacts on site contamination and remediation.

4.0 CONCLUSION AND DETERMINATION

DOE NNSA prepared this SA in furtherance of its responsibilities under 10 CFR 1021.314(c), and the CEQ regulations cited therein. The purpose of this SA is to determine whether the described ECFM constitutes substantial changes to the previously determined actions analyzed in, or significant new circumstances or information relevant to the existing environmental analysis contained in the *LLNL Final Site-wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement* (2005 SWEIS).

DOE NNSA considered potential incremental and/or cumulative impacts of the ECFM on each of the resource areas listed and discussed above. Based on that review and analysis, DOE NNSA has concluded that its consideration of whether to proceed with the proposed project does not require supplementation to the 2005 SWEIS or preparation of a new EIS, and no further NEPA documentation is required.

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