PROJECT/ACTIVITY TITLE: Steam Plant Acquisition Project	**Accession No:** 22389 **PRID No:** N/A	**Date:** March 6, 2018

PURPOSE: The National Nuclear Security Administration (NNSA) depends on the Los Alamos National Laboratory (LANL) to have utility infrastructure that adequately supports all key mission assignments including those activities essential to maintaining the nation's nuclear deterrent. Currently, LANL import electrical power capacity and TA-3 Steam Plant capacities are insufficient to support future programs and operations. Additionally, the TA-3 Steam Plant co-generation steam system for heating TA-3 buildings is over 60 years old, inefficient, and expensive to maintain and operate.

Therefore, NNSA has proposed the LANL Steam Plant Acquisition (SPA) Project to replace the TA-3 Steam Plant's capabilities, replace the associated co-generation steam distribution system and construct a short natural gas high-pressure pipeline. The SPA Project would be designed, constructed, and operated to increase on-site electrical power generation and provide for a more reliable, efficient, and sustainable TA-3 building heating capability. At completion, the SPA Project would supplement the electrical supply through on-site power generation and provide cost effective reliable heat to TA-3 facilities that would buttress building safety and security and afford protection against significant property loss (e.g. prevent freezing of fire protection systems).

The SPA Project would support compliance with ***Executive Order 13693, Plamiingfor Federal Sustainability in the Next Decade*** (EO 13693) and Department of Energy (DOE) Order 436.1, ***Departme11tal Sustainability*** that direct the consideration of sustainable. efficient and reliable energy for the future and the reduction of greenhouse gas emissions. EO 13693 encourages the installation of combined power and heat processes on-site at Federal Facilities and the reduction of potable water consumption "intensity" relative to a baseline of water consumption in fiscal year 2007.

Once operational the SPA Project would support LANL's power procurement strategy to diversify its electrical power generation resources in order to reduce greenhouse gas emissions.

Location: TA-03 off Diamond Drive at the existing Steam Plant Location	**Project Contact:** Steve Fong, NA-APM General Engineer, 665-5534

NEPA COVERAGE: Department of Energy National Environmental Policy Act Implementing Procedures 10 Code of Federal Regulations Part 1021, Appendix B to Subpart D of Part 1021-Categorical Exclusions Applicable to Specific Agency Actions

BS. Categorical Exclusions Applicable to Conservation, Fossil, and Renewable Energy Activities

B5.4 Repair or replacement of pipelines
Repair. replacement, upgrading, rebuilding, or minor relocation of pipelines within existing rights-of-way, provided that the actions are in accordance with applicable requirements (such as Army Corps of Engineers permits under section 404 of the Clean Water Act). Pipelines may convey materials including, but not limited to, air, brine, carbon dioxide, geothermal system fluids, hydrogen gas, natural gas, nitrogen gas, oil, produced water, steam, and water.

B5.5 Short pipeline segments
Construction and subsequent operation of short (generally less than 20 miles in length) pipeline segments conveying materials (such as air, brine, carbon dioxide, geothermal system fluids, hydrogen gas, natural

gas, nitrogen gas, oil, produced water, steam, and water) between existing source facilities and existing receiving facilities (such as facilities for use, reuse, transportation, storage, and refining), provided that the pipeline segments are within previously disturbed or developed rights-of-way.

B5.14 Combined heat and power or cogeneration systems
Conversion to, replacement of, or modification of combined heat and power or cogeneration systems (the sequential or simultaneous production of multiple forms of energy, such as thermal and electrical energy, in a single integrated system) at existing facilities, provided that the conversion, replacement, or modification would not have the potential to cause a significant increase in the quantity or rate of air emissions and would not have the potential to cause significant impacts to water resources.

BACKGROUND:

Technical Area-3: TA-3 is LANL's main administrative area, housing approximately half of LANL's employees and total floor space. TA-3 houses a mixture of laboratory activities including experimental sciences, biological work, work with special nuclear material, materials synthesis, metallic and ceramic processing and fabrication, theoretical and computational research, and physical support operations. TA-3 contains major facilities such as the Chemistry and Metallurgy Research Building; the Sigma Complex; the Machine Shops; the Materials Science Laboratory; the Nicholas C. Metropolis Center for Modeling and Simulation; the Biosafety Facility; and the existing Steam Plant.

Power Pool and Steam Heat: The Los Alamos Power Pool supplies electricity to LANL through an agreement between DOE and Los Alamos County whereby each entity's electricity resources are consolidated or pooled. Import capacity is limited by the physical capability (thermal rating) of the transmission lines. On-site electrical generation capability for the Los Alamos Power Pool is limited by the capacity of the existing the TA-3 Steam Plant. The electrical transmission import capacity to LANL is insufficient for future demand.

LANL continues to operate the TA-3 steam system which was originally built in the 1950's. The TA-3 Steam Plant is the driver for the centralized heating system where steam is supplied throughout the TA-3 campus. The steam boilers are dual fuel (natural gas and fuel oil) capable and provide heat to approximately 38 TA-3 buildings. Previously, electrical cogeneration was possible from steam pressure available using installed turbines; however, they are no longer available.

The existing steam system is aged, inefficient, expensive to maintain and operate, and has many components which are no longer feasible to upgrade or maintain due to age and would be impractical to repair in-situ. For example, the steam condensate piping system is leaky and inefficient with less than a 50% return of the condensate, thus wasting both energy and water. The refurbishment of the existing steam will return around 90% of the condensate. Overall, the refurbishment of the steam system will significantly reduce maintenance and operation costs.

Co-generation Power Plants: In terms of fossil fuel management, gas-powered combined cycle plants are the most efficient technology for generating electricity from fossil fuels with the lowest levels of carbon dioxide emissions, which makes them one of the best solutions for reducing greenhouse gases. Combined cycles are more efficient than other traditional thermal technologies like coal and fuel oil as they produce energy in two phases. During the first phase, they generate electricity through the direct combustion of natural gas. During the second

phase. they use the residual gases to make steam that can move a steam turbine and produce electricity. The combination of two systems increases the efficiency of the process by up to 55%-60%, compared to 30%-40% for other thermal technologies. The SPA Project will allow for using natural gas to generate steam and electricity on-site as opposed to using electricity generated from less environmentally friendly sources such as coal. Natural gas has much lower emissions of sulfur dioxide and nitrogen oxides as compared to coal. CO2 emissions are approximately 50% lower from natural gas when compared to coal when burned to generate electricity.

DESCRIPTION OF PROPOSED ACTION:

Key components of the SPA Project in addition to the new combined heat and power (CHP) plant facility include the use of a Heat Recovery Steam Generator (HRSG) to capture the waste heat from the base load Combustion Gas Turbine Generator (CGTG); producing both steam and additional electrical power. In the advent of an unplanned outage or during periods of required maintenance. a series of auxiliary steam boilers, located in the steam plant area, will provide back-up heat. The HRSG is planned to provide a variable amount of recovered energy to either the steam heating system or the electrical generator. Natural gas will be the only fuel used for the existing combustion turbine and HRSG duct burners. Natural gas will be the primary fuel for the auxiliary boilers, with No. 2 fuel oil as a backup fuel. The Los Alamos County Department of Public Utilities would provide the water necessary for cooling tower makeup, service water users and other project related water requirements. Additionally, recycled water from the LANL Sanitary Effluent Reclamation Facility may be used when available. The remaining key components are the replacement of the TA-3 steam condensate lines used for comfort heating and installation of a high-pressure natural gas pipeline.

This project will be constructed in a three phased approach within the footprint of the existing TA-3 Steam Plant and the steam condensate pipeline corridors. The CHP plant facility would be designed for an operating life of not less than 30 years and construction phase of the SPA Project is projected for completion in 2021. Overall, the SPA Project will require approximately 20% less source energy to operate than comparable alternatives and require about 16% less potable water compared to FY 2007 usage.

Phase 1 Boilers and High Pressure Gas Line: Boiler construction and decommissioning modifications involve the construction and installation of two new auxiliary boilers [TA-3-22-4 and TA-3-22-5] and the permanent shut down of existing boilers located at the Steam Plant with the designations TA-3-22-1, and TA-3-22-2. The primary purposes of the new auxiliary boilers are to serve as backup when the CHP plant is off-line for maintenance or repair. During new boilers construction the existing boilers will operate as currently permitted. Once the new auxiliary boilers are fully operational. boilers TA-3-22-1 and TA-3-22-2 will be permanently shut down. Boiler TA-3-22-3 will be kept temporarily as a hot standby in case as backup for the new auxiliary boilers. It is planned to be abandoned when the CHP plant is operational.

A new high-pressure gas line will be required and installed to provide natural gas to the existing CGTG. The new gas line will tap directly into the New Mexico Gas Company (NMGC) pipeline, adjacent to Diamond Drive just southwest of Omega Bridge on LANL property and terminate at the new CGTG gas compressor (Figure 1). The NMGC pipeline operates at an average pressure of 425 psig while the TA-3 distribution piping operates at only 80 psig. The new gas compressor is required to boost the pressure from 425 psig to 459 psig required by the CGTG. Operation of the new high pressure gas line will significantly reduce the energy required to boost the

natural gas pressure from 80 psig to 459 psig and result in an electrical savings and increased CHP net cycle efficiency and production output compared to the current TA-3 distribution gas line pressure of 80 psig.

Phase 2 Steam Condensate Lines: Currently, heating via the existing central stem system, is supplied to approximately 38 TA-3 buildings. Steam condensate lines from the steam plant will be upgraded/replaced and routed from the steam plant throughout TA-3 in order to provide comfort heating. Some facilities may be converted from steam to hot water via a dedicated building boiler, therefore, not require steam and condensate lines. A project option is to maintain centralized steam service to most buildings while a few building could be served by local capabilities (e.g., building boilers). The south loop and north branch of the system could be abandoned because they largely serve buildings scheduled for decommissioning. However, a decision for abandonment has not been made. Figure 2 is representative of a potential abandonment option.

Phase 3 Electrical Power Generation: A Steam Turbine Generator Building is required to enclose the steam turbine and support functions of the power generating facilities. Support functions and equipment could include: a control room and separate electrical equipment rooms; elevated grating platforms to provide access to equipment; a crane capable of handling the heaviest piece of disassembly for a steam turbine/generator; and miscellaneous hoists and trolleys.

Additionally, a water treatment building may be constructed as an engineered or pre-engineered metal building adjacent to the Steam Turbine Generator Building. The building would be constructed of custom engineered structural framing, with metal panel siding and either standing seam metal roof or a membrane roofing system.

The TA-3 Steam Plant includes an existing CGTG with approximately 24MW of capacity in simple cycle operation that was commissioned in 2008. The existing generator on the CGTG will be replaced and control room upgrades installed prior to increasing the use of the CGTG to up to 5,000 hours per year. The CGTG is currently run for approximately 1 day per week or 400 hours per year.

One HRSG would be installed immediately downstream of the CGTG. The steam output from the HRSG with additional supporting equipment would power a new steam turbine generator to produce approximately IOMW-22.SMW of additional electricity during peak demands. Augmenting the CGTG and HRSG would be a steam turbine generator (STG) with associated equipment installed in a combined cycle configuration to the existing CGTG. Steam sent to the STG will create additional electricity or the steam can be used in case of additional steam demand within LANL. The combined cycle/combined heat and power (CHP) installation will include wet cooling for the heat rejection cycle by way of an existing mechanical draft cooling tower and new wet surface condenser. The CHP installation will generate power and steam for the TA-3 facilities. With the installation of the HRSG, the existing CGTG would be converted from a simple cycle operation to a combined cycle operation capable of generating both electricity and steam. Integration of the existing Combustion Gas Turbine Generator would provide nominal electrical generation capability in the range of 46MW. The electricity generated from the combined cycle will be used to support the Los Alamos Power Pool. No electricity will be sold off-site.

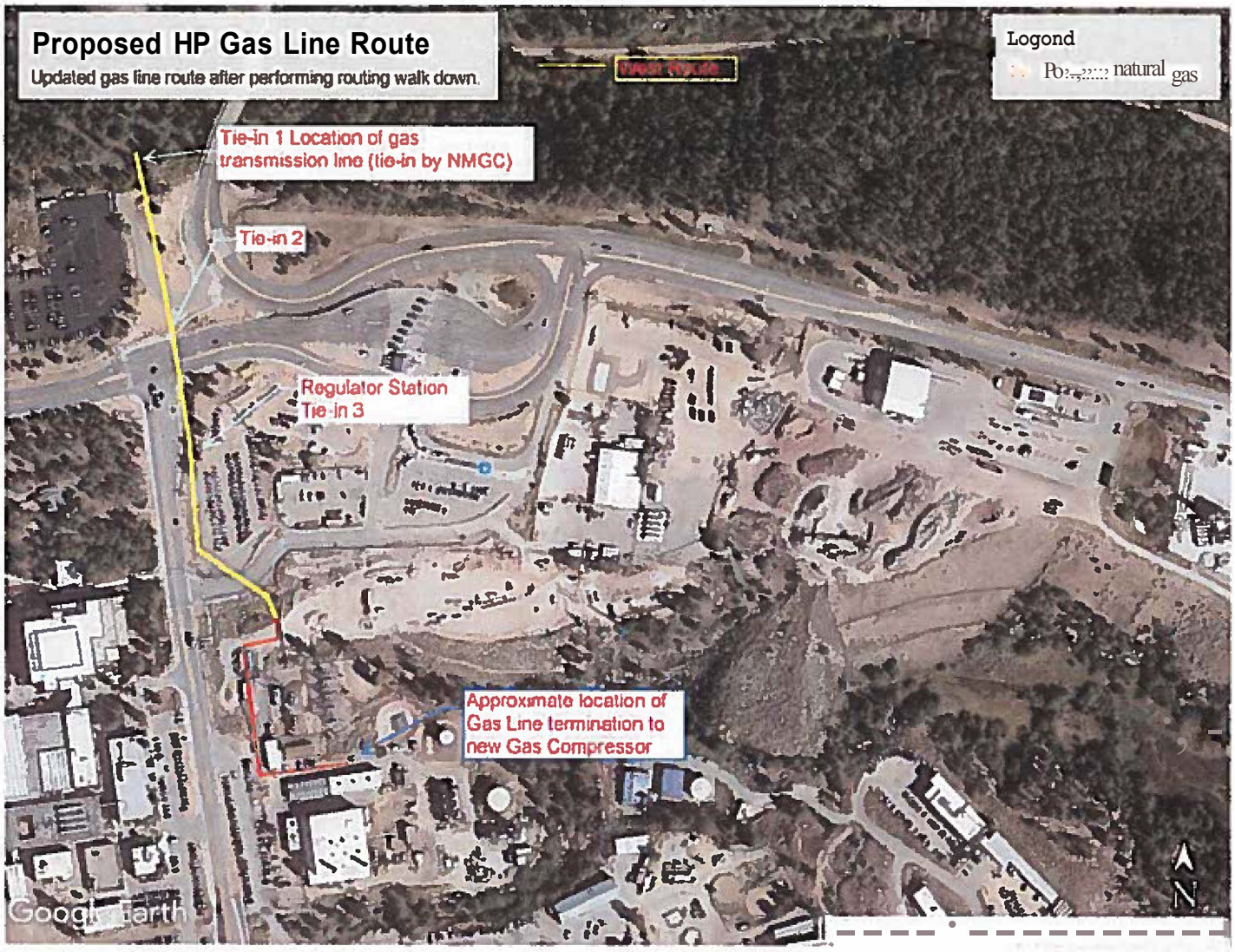


Figure 1: Location of the New High Pressure Gas Line and Gas Compressor

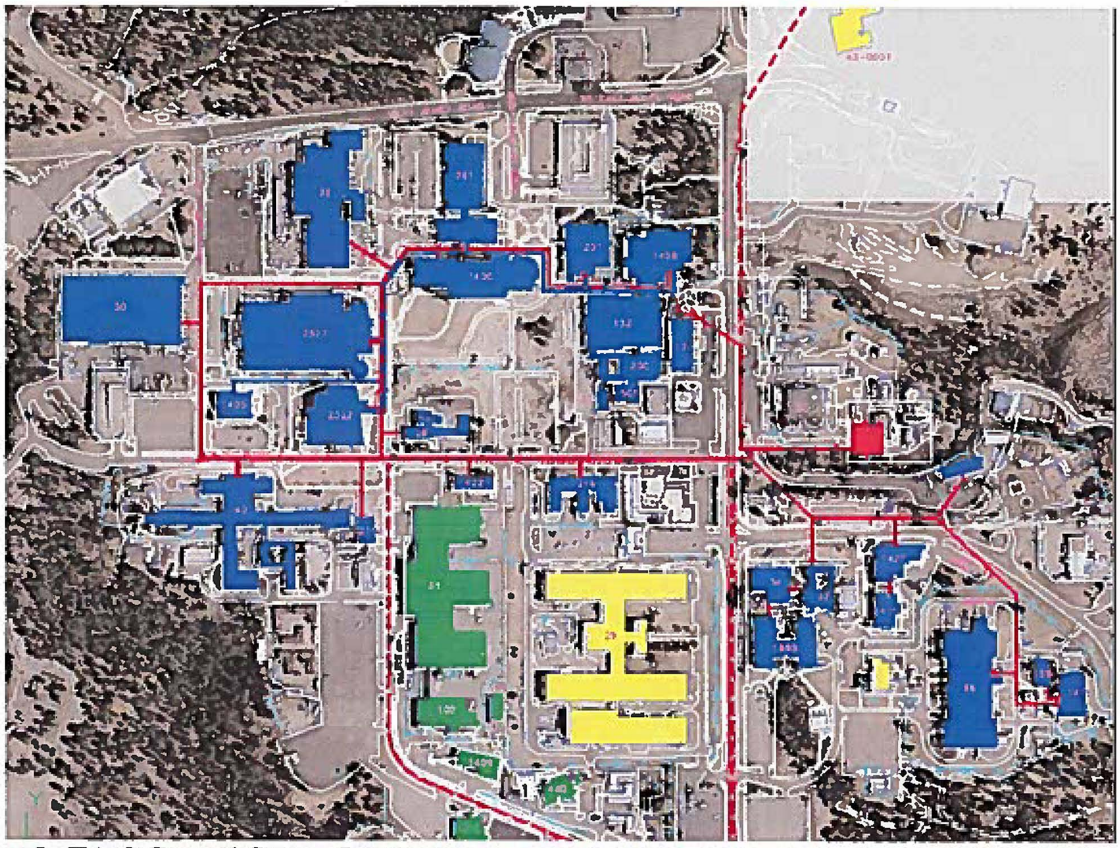


Figure 2: TA-3 Central Steam System

.. - .. One alternative for the Potential Abandonment of a portion of the Central Steam System
Blue: Central Steam System Buildings
Red: Central Steam System
Green: Proposed Permanent Local Boilers
Yellow: Potential Use of Temporary Boilers for Buildings Scheduled for Decommissioning

IMPACT ASSESSMENT:

By design the Proposed Action is designed to utilize the existing Power Plant footprint while maximizing electrical and heat generation and minimizing primary energy use, water consumption and air emissions. See Table I below for an assessment of potential impacts.

Table 1. Environmental Factors Checklist

Environmental Factor	Analysis
Land Use	No change to current conditions. The SPA Project would utilize the existing Steam Plant footprint and be within the existing steam condensate and/or utility corridors.
Visual	Compatible with current visual landscape.
Geology and Soils (geologic hazards, soil productivity, capability, erodibility, and mass failure)	No special considerations. Best Management Practices would be implemented during construction to minimize erosion.
Water (surface and ground ater quality and quantity, groundwater recharge, streamflow regimes)	Los Alamos County Department of Public Utilities would provide the water necessary for boiler feed makeup, service water users and other project related water requirements. Refurbishment of the condensate return line would substantially reduce water leakage and the amount of make-up water required compared to current use. A National Pollutant Discharge Elimination System Construction General Permit for Storm Water Discharge and an associated Storm Water Pollution Prevention (SWPP) Plan will be required. The Project will use the LANL SWPP. Best Management Practices will be implemented during project construction to minimize erosion and runoff. All areas disturbed by grading and not covered with surfacing will be seeded with seed mix specified by LANL. Sloped areas particularly subject to erosion will be protected by seeding or other methods of slope protection common to the area. To the maximum extent possible, existing vegetation will remain undisturbed. Topsoil will be stockpiled during grading operation and will be replaced prior to seeding.
Non - radiological Air Quality	A comprehensive dispersion modeling analysis was conducted which considered LANL project sources as well as surrounding source emissions and ambient background concentrations. Modeling was conducted for all criteria pollutants including PM2.5. Model results demonstrate that all National and New Mexico Ambient Air Quality Standards would be met during full operation of all sources for each hour of the year.
Radiological Air Quality	N/A

Environmental Factor	Analysis
Noise	There are no sensitive receptors in the area. Heavy equipment would be used for construction. Construction noise impacts would be temporary. All operationally equipment will be specified to comply with near-field noise requirements of 85 dBA measured 3 feet horizontally from the base of the equipment and 5 feet above floor or platform level. In instances where equipment does not meet the near-field noise requirements, signs will be posted indicating hearing protection is required. Outdoor equipment will be located to minimize noise and sound vibration transmission to the occupied spaces of the building structure it serves as well as adjacent buildings. If equipment must be located in close proximity to a building, effort will be made to place next to an unoccupied space such as a storage room or mechanical room
Ecological (floodplains, wetlands, threatened or endangered species and habitat, migratory birds, exotic organisms)	The project is almost entirely in a fully developed (urbanized area) and does not cross any open channel watercourse, floodplains or wetlands areas. Any trees the need to be removed will be evaluated for bird nesting prior tree removal to prevent any take of migratory or other birds. Ancillary components such as bollards will be capped to prevent birds or other small animals from being entrapped inside the empty pipe cylinder.
Human Health - Radiological Impacts on the Public	N/A
Human Health - Chemical Impacts on the Public	N/A
Human Health - Worker Health	A comprehensive health and safety policy and procedures protective of workers, worker safety and health requirements that is consistent with the Code of Federal Regulations Title 10 Part *851-Worker Safety and Health Program.*
Cultural Resources (archeological and historical)	No effect. The proposed LANL site does not contain identified archeological areas. If any buried archaeological resource, remains, or items of cultural significance are encountered during construction, site activities would cease until the significance of the items could be determined by a trained archaeologist, and appropriate actions taken. No historic resources will be affected by the Project work.
Socioeconomics	Economic benefits through increase efficiencies and reduced consumption of resources will result in lower maintenance and operational costs.
Infrastructure (roads, utility corridors, communications systems, energy & fuels, distribution systems, and water)	There will be a decrease in primary energy consumed, increase in the effective use of primary energy, decrease greenhouse gas emissions by over 20% and operational support for the expected growth in electricity demand. Water waste will be reduced. Operation of the new high pressure gas line will significantly reduce the energy required to boost the natural gas pressure from 80 psig to 459 psig and result in an electrical savings and increased CHP net cycle efficiency and production.

Environmental Factor	Analysis
Waste Management	Spill containment will be provided for outdoor oil filled transformers, or other oil reservoirs, containing more than SO gallons capacity. Discharge from the containment will be controlled by a normally-closed valve discharge pipe to the Steam Plant oil waste system. Secondary containment will be designed for 110% capacity of the largest single container and to contain the precipitation from a 25-year, 24-hour storm event, plus 3 inches of freeboard.
Transportation	Minimal disruption, if any, during work on the Steam Plant and steam distribution system.
Environmental Justice	N/A
Facility Accidents	Among the most common hazards to power plant workers are electrical shocks and burns, boiler fires and explosions, and contact with hazardous chemicals. Accident avoidance will be accomplished with comprehensive training, detailed pre-job planning, and proper and well-maintained safety equipment. A robust safety and health project specific plan that meets Federal standards will be developed and followed throughout the project.

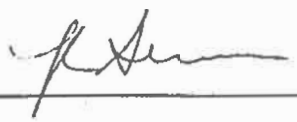
CONCLUSION

The SPA Project docs not have the potential to cause significant impacts as the proposal is primarily a modification to an existing Steam Plant, upgrading a steam condensate distribution system and construction of a new short segment high pressure natural gas pipeline. The SPA Project would not entail a significant change to facility and pipeline footprints and docs not involve major new construction. Additionally, operational efficiency (e.g., cogeneration and pipeline improvements} are designed to decrease potential impacts when compared to taking no action.

Based on this NEPA determination analysis, there arc no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects or threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders. Consequently, no further NEPA analysis is necessary or required. The proposal has not been segmented to meet the definition of a categorical exclusion. Consequently, no further NEPA analysis is necessary or required.

NEPA DETERMINATION

Based on my review of the Proposed Action, as NEPA Compliance Ollicer (as authorized under DOE Order **451_.18),** I have determined that the Proposed Action as described herein, falls within the DOE NEPA Implementing Procedures listed in 10 CFR Part 1021, Subpart D, Appendix B 10 CFR Part 1021, Appendix B to Subpart D of Part 1021-Categorical Exclusions Applicable to Specific Agency Actions: **B5.4** RepClir or ***replacement of fpipelines;*** **B5.5** ***Shor/ pipeline segments;*** and **B5.14** ***Combined heat and power or cogenera/ion systems.*** There arc no extraordinary circumstances related to the proposed action that may atlect the significance of the environmental effects or threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or executive orders. If changes are made to the scope of the action so that it is no longer bounded by the enclosed description, or the project is changed to encompass other actions, NEPA requirements for the action will need to be reassessed at that time and further analysis may be required.

NNSA NEPA Compliance Officer: Jane Summerson **Signature:** 	Date: 5/2/18