Power Sources Technology Group (PSTG)

Essential to every system in the U.S. Nuclear Deterrent

All nuclear weapons in the U.S. Nuclear Deterrent (ND) stockpile require safe, reliable power source components. The Power Sources Technology Group (PSTG) at Sandia National Laboratories (Sandia) ensures safe and reliable power source capabilities, safeguarding national security and stockpile sustainment and providing the heartbeat of all National Nuclear Security Administration (NNSA)-directed weapon systems.

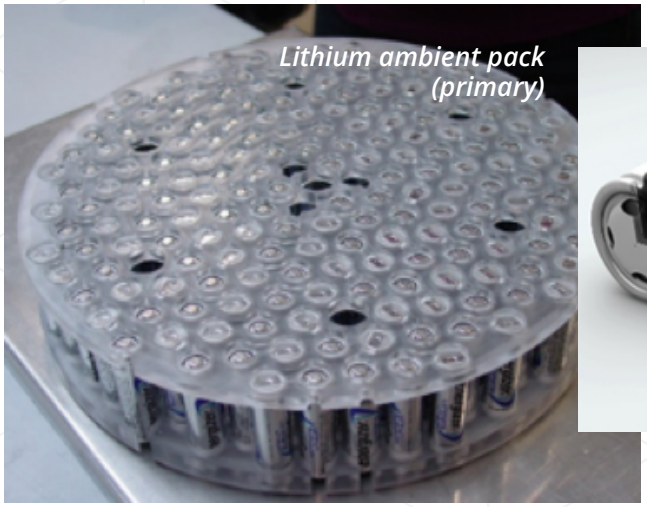
The PSTG provides research, engineering design/development, and production of thermal batteries, thermoelectrics, lithium primary and secondary batteries, novel battery chemistries, component and materials surveillance, and battery-abuse testing research.

In a capabilities context, the PSTG provides production support, non-destructive, destructive, and abuse testing capabilities, grid energy storage, and surveillance. Such capabilities are focused on lithium-ion cell and thermal battery prototyping; header assembly, battery assembly, and inspection; battery abuse testing, which includes mechanical (penetration, crush, impact, and immersion), thermal (over-temperature, flammability, thermal propagation, and calorimetry); and in-house production of thermal, silver zinc, and lithium primary batteries.

The synergies from ND-related capabilities also enable the PSTG to utilize the latest scientific and engineering technologies to advance power source technologies to meet both current and future national energy needs. This focus includes research, design, development, and production of power sources, including grid technology programs used for the NNSA, Department of Energy, Department of Defense, National Aeronautics and Space Administration, and a variety of other stakeholders, including local governments, the energy industry, and consumers. Power source technology is a growth area both within Sandia's ND program and the Energy and Geosciences program.

Sandia's PSTG organizations –

- provide product support and internal manufacturing capabilities for development and production of thermal battery and lithium primary packs;



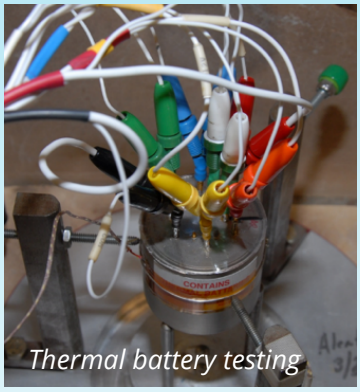
Lithium ambient pack (primary)

Lithium-ion (secondary

- oversee development, qualification, operation, and maintenance of custom-built and commercial off-the-shelf product testers for thermal and lithium batteries built in the PSTG and at external vendors;
- design and develop primary and secondary lithium battery packs and radioisotopic thermoelectric generators and x-ray, welding, and small-lot lithium cell prototyping;
- support nuclear deterrence, national security, transportation, and grid energy storage needs and characterize aging and material degradation phenomena in power source technologies to ensure battery safety;
- design, develop, and prototype electrochemical power sources, including thermal batteries and associated battery assemblies; develop advanced manufacturing techniques and automation for thermal battery production, advanced thermal battery design, and thin film technology and offer engineering support for legacy thermal battery products and component surveillance;
- control the internal and external production of power source components, which include thermal batteries, lithium primary packs, and silver zinc batteries; provide materials, planning, procurement management, and supply chain monitoring; and
- support critical engineering projects and provide surveillance to legacy power sources.

PSTG Capabilities

Thermal battery



Thermal battery testing

X-ray imaging

Energy storage research and development

Thermoelectric power source

Abuse testing

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Sandia National Laboratories

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U.S. DEPARTMENT OF ENERGY

NNSA National Nuclear Security Administration