



Standby power

> Case History
Lucas Heights Nuclear Replacement Reactor,
Australia



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Where:

Lucas Heights Nuclear Replacement Reactor,
Sydney, Australia

What:

A 2.5 MW standby power system featuring three PowerCommand® 833DFHC generator sets, tested and modified to withstand a major earthquake

Purpose:

To provide emergency standby power to a 20 MW nuclear research reactor in the event that a major earthquake would disrupt nuclear power generation

Primary choice factors:

Cummins Power Generation was chosen based on the ruggedness of its equipment, the quality of its commissioning process and its ability to pass rigorous seismic testing procedures

Australian nuclear reactor is toughest test yet for Cummins Power Generation gensets

SYDNEY, AUSTRALIA — Construction of a standby power plant for a new nuclear research reactor at Lucas Heights in Sydney, Australia, resulted in one of the most exhaustive seismic analyses ever for generator sets from Cummins Power Generation. The 2.5 MW standby power system was installed as a backup for the normal power supply that will run the research reactor at the Lucas Heights Science and Technology Centre.

The new reactor — known as the Replacement Research Reactor (RRR) — is scheduled to be commissioned this year. It will replace the High-Flux Australian Reactor (HIFAR), which has been Australia's national research reactor for more than 45 years. The RRR, which is less than 1/100th the size of a typical nuclear power reactor, will be fueled by low-enriched uranium and be capable of generating 20 MW of thermal power.

The new facility will be an international center for scientists using high-energy neutrons to perform world-class research in areas such as nuclear medicine and subatomic physics.

The RRR itself has been designed to withstand severe seismic loads. In fact, its strength is said to be well beyond



Cummins Power Generation was chosen to design, construct, install, test and commission a standby power system to meet the most exacting power generation specifications.

the predicted magnitude of a once-in-10,000-years earthquake — a very unlikely event. Although a geological fault has been discovered at the Lucas Heights site of the RRR, analysis of the fault showed conclusively that it hasn't produced any movement for at least 5 million years. The ancient fault is similar to other geologic faults identified under many major buildings throughout the Sydney Basin. The analysis of the standby power system centers around its ability to withstand a significant seismic event.

Standby system designed for reliability

The Lucas Heights facility's standby power system consists of three PowerCommand 833DFHC generator sets from Cummins Power Generation, powered by the 30-liter, Cummins QST30 V12 engine. Each generator set has a standby rating of 833 kW. The PowerCommand Digital Master Control provides system status data to the Reactor Control and Monitoring System using Cummins Power Generation networking technology.

"The Cummins gensets in their standard form came through the entire seismic analysis process with flying colors."

Cummins Power Generation was chosen to design, construct, install, test and commission the standby power system — and to run sophisticated tests to ensure reliability during a major seismic event. The seismic analysis was very thorough in order to ensure structural integrity of the generator sets, enclosures, fuel tanks, control systems and associated piping if an earthquake strikes.

Extensive testing and analysis

David Van Brussel, contracts manager for the Cummins Power Generation team at Wetheril Park in Sydney, has been involved in numerous major power generation projects. However, none has come close to requiring the analysis and documentation of the RRR application.

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The Cummins Power Generation gensets and enclosures were subjected to exhaustive analysis to ensure their structural integrity.

"The Cummins gensets in their standard form came through the entire seismic analysis process with flying colors," says Van Brussel. "Only a few minor modifications were needed to meet the stringent standards."

For example, all connection points between the generator components and skid frame were analyzed for integrity, while muffler bellows, fuel lines and electrical connections were also subjected to seismic scrutiny. The generator sets' acoustic enclosures and dual-walled fiberglass fuel tanks were also tested and verified under seismic loading.

Testing of the gensets and their control systems at the Cummins Power Generation manufacturing facility in Singapore was witnessed by representatives from INVAP, the Argentinian construction firm in charge of the project, and its partner, the Australian Nuclear Science and Technology Organisation (ANSTO).

"This was a worthwhile exercise having INVAP and ANSTO in attendance," says Van Brussel. It reinforced their confidence in Cummins Power Generation quality procedures and it also showed exactly what our generator sets can do. Witnessing a generator being put through its paces — seeing the turbos glowing red-hot under load while the test team goes calmly about its work — is invaluable in expanding a client's knowledge of the product. INVAP and ANSTO have placed a high level of importance on quality procedures for design, manufacture and testing to ensure that the products they are purchasing not only meet the specific requirements of the project but also the manufacturer's own claims and standards.

"Cummins Power Generation was chosen over several other competitors for the RRR project, and we've delivered a product that meets the most exacting specifications we've ever encountered in a power generation project in Australia," concludes Van Brussel.

For more information about integrated standby power systems, contact your local Cummins Power Generation distributor or visit www.cumminspower.com.

