

Test Capabilities Revitalization (TCR) Phase 1

The Test Capabilities Revitalization (TCR) Phase I project, a \$47 million project funded by Congress to revitalize, enhance, and integrate nuclear weapon environmental test facilities at Sandia National Laboratories (SNL), modernized aging nonnuclear field testing and experimental infrastructure to provide state-of-the-art weapon systems testing and validation, allowing a shift from test-based certification of weapon reliability to an increasing use of judgment enabled by validated analysis. The test infrastructure simulates extreme thermal and mechanical environments used to test, model, and improve the safety, security, and confidence of the nation's nuclear stockpile. TCR Phase 1 revitalized the SNL Aerial Cable Facility (ACF), which performs pull-down and gravity-drop tests, plus simulated flights along a cable. TCR Phase 1 also constructed the Thermal Test Complex (TTC), a unique and challenging facility built to produce and study

the effects of 20-megawatt (MW) fires in a highly controlled and repeatable environment. Along with 5.2MW radiant heat labs, this facility delivers capabilities matched nowhere else in the world.

The highly matrixed project team successfully completed the project on time and under budget. Full funding for construction was received after Critical Decision 3 (CD-3) approval in fiscal year 2004. This funding allowed for simultaneous awards of both subprojects. No limits or obligations were placed on the contractors, which allowed for immediate procurement of long-lead equipment and materials. The contractors were able to schedule all work from the beginning to maximize efficiencies of construction and minimize rework that would have been required had they been forced to plan around funding delays.

F M O C



Thermal Test Complex as built by the Hensel Phelps Construction Company.

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**Fire Laboratory for Accreditation of Models by Experimentation/
Radiant Heat (FLAME/RH) in fire mode.**

Because of the scope of the upgrades required, TCR was divided into two phases, each a completely separate project. Phase 1 included constructing a new world-class TTC and rebuilding the ACF to address repeatability, reliability, security, and safety issues. The project received praise from all sectors:

The ACF presented unique challenges, working in a mountainous region requiring four-wheel-drive and helicopter access. Multiple land-use authorities were involved, each with conflicting priorities. Work was constantly under scrutiny from these authorities, because the land was owned by the Bureau of Land Management for the United States Forest Service.

The ACF is used to conduct pull-down tests, gravity-drop tests, and simulated flights along a cable to support bomb-qualification tests and weapons-

development activities. The pull-down test capability allows controlled accident simulations. Gravity-drop tests are performed from a cable suspended between two peaks, giving a 600-foot vertical distance for acceleration. To provide higher impact velocities when gravity tests are not adequate, a rocket-assisted (320-foot sled track) pull-down technique is used. The project constructed a 5,000-square-foot support facility, enlarged and modified an existing building, and renovated or demolished numerous smaller buildings. To save resources the main-haul cable was recycled from a nearby existing private tram concession, saving the project \$175,000.

No other facility in the world is comparable to the TTC, which centralizes SNL thermal test capabilities, incorporates multiple unique design features, and provides new, advanced capabilities for thermal testing that are currently available nowhere else. The test facilities at the TTC include the 5,000-square-foot Crossflow Test Fire Facility (XTF); an indoor "fire wind tunnel"; the 3,000-square-foot Fire Laboratory for Accreditation of Modeling by Experiment (FLAME) Radiant Heat Test Cell; a seven-story cylindrical "water-walled" test chamber for conducting fuel fire tests and radiant heat lamp tests; and the Radiant Heat Test Cell for performing high-heat flux experiments. Additionally, smaller test labs and assembly areas were built within the 13,000-square-foot Thermal Test Facility (TTF), which includes various support structures.

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For more information about the TCR Phase I project, please call or send an email message to one of the following project representatives:

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Crossflow Test Fire (XTF) Facility.

