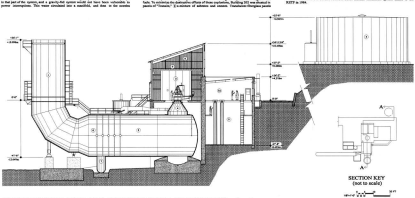
This delineation is a section view of Rocket Engine Test Facility (RETF) Building 202. The viewer is looking north along an imaginary axis through the center of the building's scrubber/silencer ①. This view shows the construction of the horizontal, transitional, and vertical sections of the scrubber. The horizontal section ② was a cylinder measuring 100' long and 25' in diameter. During testing, researchers positioned the rocket engine on Stand A inside the test cell ③ using variously sized mounts. The exhaust was directed downward into the scrubber. Stand A was instrumented with load cells that sent engine thrust data to the observation room terminals and on to the control room in Building 100. Sensors also measured temperature and pressures at critical points on the engine.

Rocket engines mounted on Stand A discharged exhaust at velocities of up to 12,000 feet per second (fps) and at temperatures of 6,000°F. A counter-flowing water spray ④ inside the scrubber intercepted the engine exhaust. To feed this spray, water flowed from a 500,000-gallon reservoir ⑤ located on a hill approximately 100' east of Building 202. RETF personnel have not confirmed that the water was gravity-fed, but there are no pumps in that part of the system, and a gravity-fed system would not have been vulnerable to power interruptions. This water circulated into a manifold, and then to the nozzles mounted on a series of pipes inside the scrubber ⑥. The nozzles produced a heavy mist or aerosol of water that cooled the exhaust and removed soluble gases from the gas stream. The water also purged combustion particles, approximately 10 to 10,000 angstroms in size, which were dispersed in the exhaust stream. The condensation of water vapor during combustion also reduced the velocity of the exhaust stream. Rapid condensation and the large diameter of the scrubber tank in comparison to that of the rocket nozzle further decreased the exhaust velocity to 25 fps. Additional water sprays condensed steam, and the combined flow of condensed steam and water from the spray drained ⑦ into a detention tank. Non-condensable gas emerged from the exhaust stack at temperatures below 160°F and at velocities of 20 fps or less.

The stand inside the test cell ③ secured and supported the rocket engine during testing. The test cell could be closed and heated to provide a dry, sheltered area that protected the engine, associated sensors, and other instruments. Before firing the engine, engineers opened the cell's blast doors and shutters, effectively providing open-air conditions for the test. Explosions frequently resulted from the testing of experimental engines and fuels. To minimize the destructive effects of these explosions, Building 202 was sheated in panels of "Transite," ⑧ a mixture of asbestos and cement. Translucent fiberglass panels later replaced the original transite. In the event of an explosion, the panels blew away and quickly relieved pressure. The panels were easily replaced afterwards to re-sheath and enclose the test cell. The portion of the test cell's inner perimeter near the roofline contained a fire suppression system ⑨. In case of fire, some of this piping and the associated nozzles sprayed water from the 500,000 - gallon reservoir into the test cell, while others flooded the cell with carbon dioxide.

A section through the fuel pit is delineated at ⑩. The fuel pit housed two tanks ⑪ that contained petroleum-based fuels, chiefly gasoline, from 1957 to 1959. These tanks were equipped with load cells that gathered data on the weight of the tanks. By analyzing this data, engineers could monitor fuel consumption rates and determine the quantity of fuel left in the tanks.

To cool the rocket nozzles after testing, the 500,000 - gallon water tank ⑤ east of Building 202 fed pumps that had a capacity of either 650 or 1,400 gallons per minute. Water from this reservoir also cooled a rocket altitude simulation system added to the RETF in 1984.



BUILDING 202 TRANSVERSE SECTION A-A

DELINEATED BY: Hardlines Design Company, 2003

NASA ROCKET ENGINE TEST FACILITY RECORDING PROJECT

ROCKET ENGINE TEST FACILITY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, LEWIS RESEARCH CENTER

CUYAHOGA COUNTY

CLEVELAND | OHIO

SHEET 7 - 12

HISTORIC AMERICAN ENGINEERING RECORD OH-124-D

SECTIONAL VIEW OF HIGH-ENERGY ROCKET TEST FACILITY