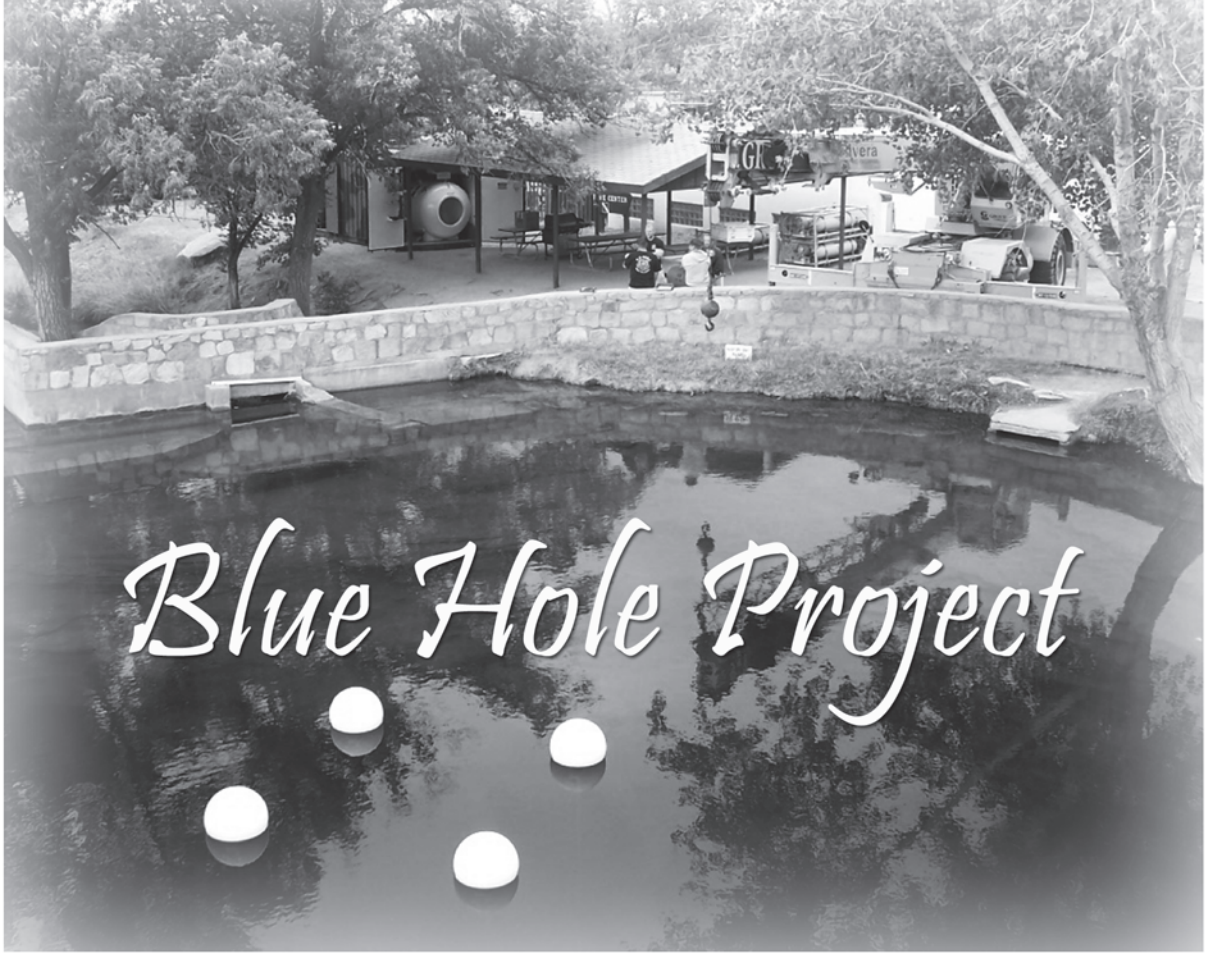


Blue Hole Project

By First Lieutenant Trent D. Geisler

The Blue Hole is one of Santa Rosa, New Mexico's, greatest natural resources and a geological wonder. It has a water depth of approximately 81 feet, and the water temperature stays at a constant 61 degrees Fahrenheit. An artesian spring from an underground source supplies water at a rate of more than 3,000 gallons per minute, and this rate of water flow creates a large amount of natural erosion as rock and soil are loosened and fall to the bottom. Along with the natural erosion, a former Santa Rosa city administrator ordered rock and debris dropped in the Blue Hole to close off the opening to the cavern system located at the bottom. This decision was partly to discourage divers from attempting to navigate the caverns, because many would run out of air or become lost and disoriented and were unable to find their way back.

Divers prepare to perform in-water checks before leaving the surface.

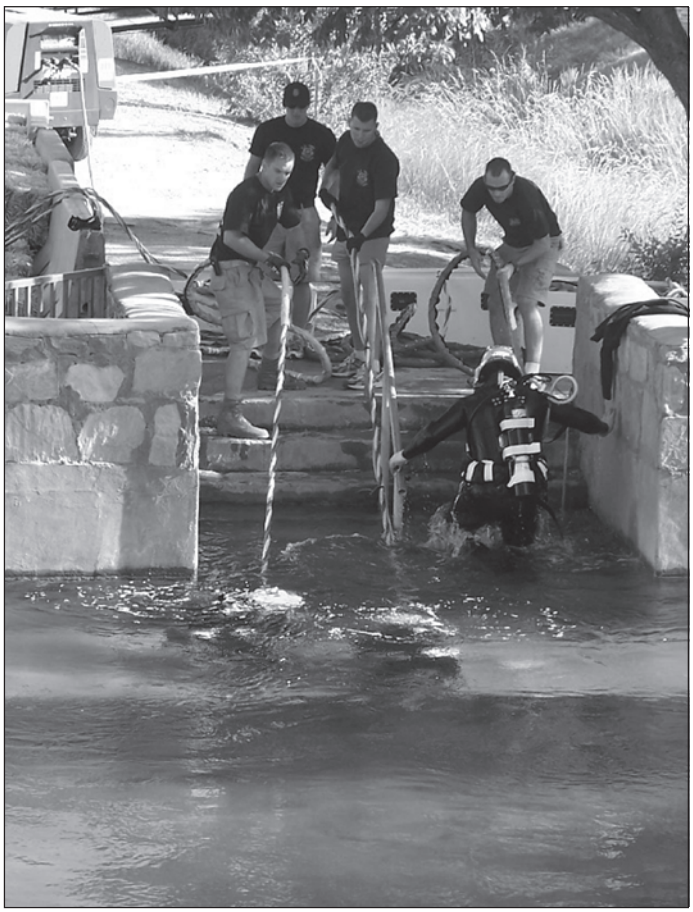
The massive amounts of debris, both natural and man-placed, cut off the artesian water flow into the Blue Hole. But the debris could not stop the flow for long—the water found new ways of pouring into the hole. The water soon forced its way in from the sidewalls, causing an even greater amount of erosion. This new erosion from the sidewalls deteriorated the hole's stability, and it was placed in an emergency state of repair.

Twenty years after the initial decision to fill in the hole, the United States Army Corps of Engineers® Albuquerque District called on Army divers to remove the rock and silt that clogged this natural wonder. In late Spring 2006, 23 members of the 74th, 86th, 511th Engineer Light Diving Teams and the 569th Engineer Dive Team from Fort Eustis, Virginia, deployed to Santa Rosa to conduct dredging operations.

The plan to remove the debris called for three techniques: manual labor, a hydraulic submersible pump system, and an

A crane lifts a basket of rock and debris from the bottom of the Blue Hole.

airlift system. The manual labor technique involved the strongest divers picking up the larger rocks and placing them into a basket. The second technique consisted of a hydraulic submersible pump suspended approximately 40 feet in the water column with intake hoses extending all the way to the silt bottom. Divers would call for "switch on," and the pump would suck a silt and water mixture at a rate of 800 gallons per minute. The third technique was a basic airlift consisting of an 8-inch hose that pumped out small gravel and rock. Air was supplied to the hose at a pressure of 110 pounds per square inch, resulting in a flow of more than 1,000 gallons per minute.



Tenders, who provide surface support, pull the divers from the water.

Each method was very productive because the divers worked all three techniques at the same time. The dive plan called for three divers to dive to a depth of approximately 81 feet for 90 to 100 minutes. At an altitude of more than 4,600 feet, the equivalent diving depth is 100 to 110 feet, and the decompression schedules were modified accordingly. Using surface decompression, the divers spent anywhere from 38 to 51 minutes in the hyperbaric recompression chamber, breathing 100 percent oxygen to reduce the amount of time needed to off-gas the residual nitrogen left in the body.

Due to the dive plan using surface decompression schedules, the divers were able to complete more than eight hours of underwater work each day, which resulted in more than 100 cubic yards of rock and more than 120 cubic yards of silt being removed after 21 diving days. The mayor of Santa Rosa and the Corps of Engineers were extremely pleased with the Army divers' efforts—they worked longer, harder, and more efficiently than any commercial dive company hired in years past. The divers' hard work and dedication to the mission assured future training opportunities at the Blue Hole in the years to come.

First Lieutenant Geisler is the team leader of the 74th Engineer Dive Team (Light) at Fort Eustis, Virginia. He is a graduate of the United States Military Academy.