GEORGIA TECH RESEARCH

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GEORGIA TECH HELPS SOLVE
MISSILE BASING PROBLEMS

FOR IMMEDIATE RELEASE

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ATLANTA, GA. -- Suppose the enemy has launched a missile attack against the United States. How do we protect our missiles from destruction before they can be launched in our defense? For some time, a controversy has been swirling in the public arena over "racetrack basing" of missiles versus "dense pack," and just how "hardened" or resistant to enemy attack it is feasible for a missile silo to be.

That's a problem for the near term. The Air Force also is working on long-term solutions—for the 1990's and beyond. One idea is to deploy missiles, their support equipment and crews in tunnels thousands of feet below the surface of the earth. Such a facility likely would be required to operate in the pre-attack mode, with normal access to surface facilities, for at least ten years. Prior to an enemy attack, the base would be "buttoned up," or sealed off from the outside world. It could then be capable of operating for up to one year independent of external support. The complex would include tunneling machines that could dig out of the deep base in preparation for missile launch. It also would contain launch control and life support systems for the missile crew.

A practical, reliable and economical way to house missiles in "deep bases" is under active study. One of the major technological challenges with this concept is how to get rid of the tremendous amount of waste heat that would be generated

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by the necessary power plant, equipment and people. Even the surrounding rocks at these depths can have ambient temperatures ranging from 70° to 100°F.

Enter the Georgia Institute of Technology. Mechanical Engineering Professor Gene Colwell and Walter Hendrix, a research engineer in Tech's Engineering Experiment Station, are investigating the feasibility of using heat pipes to dissipate the waste heat from the missile base to the surrounding rock. The study is one of several projects dealing with waste heat disposal that are funded by the U.S. Air force Ballistic Missile Office.

Heat pipes are passive devices designed to conduct waste heat from the source to a "heat sink," where the heat is dumped. They are sealed, fluid-filled tubes with wicks. Waste heat applied at the lower end of the tube causes the liquid in the pipe to evaporate. The vapor rises to the other end of the pipe, where it condenses. Then the heat is dissipated to the cooler rock surrounding the pipe. The condensate (fluid) travels back down the wick, and the process begins again.

The Georgia Tech study began last September with a preliminary analysis of the thermal characteristics of the rock environment. Phase 2, nearing completion, is culminating in "conceptual design of heat pipe heat dissipation systems for practical Deep Base applications," said Colwell, a recognized authority with 20 years of experience with heat pipes. "We also are recommending laboratory and prototype system test programs to address technological questions that are still unresolved. The results of these tests should lead to design information for the manufacture, installation, operation and maintenance of full-scale systems," he added.

Hendrix points out that the findings of the Tech study may have applications beyond missile survivability and endurance. "Heat pipes can be used in deep-based bomb shelters to protect our nation's leaders or in command and control centers," he said. "A practical commercial application that comes to mind is heat removal from deep mines."

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