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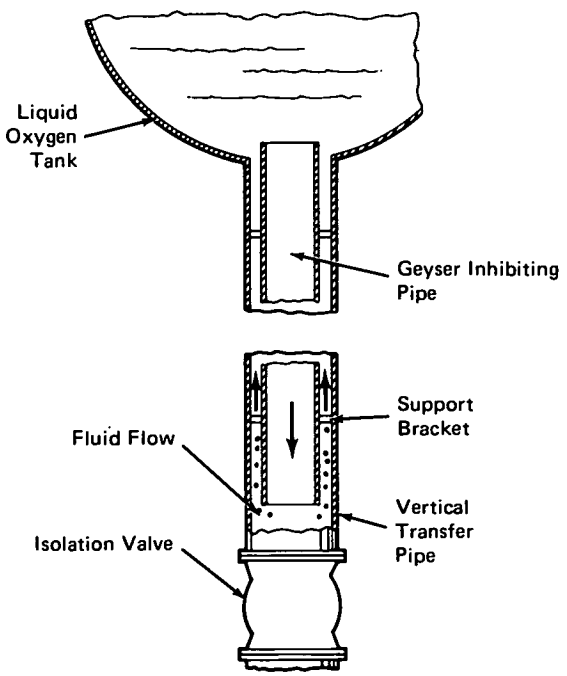
NASA TECH BRIEF

John F. Kennedy Space Center

Geysering Inhibitor Pipe

A pipe system has been designed to reduce geysering in verticle, cryogenic fluid pipes used to transfer cryogenics to a rocket engine. This same system may be useful in wells or other verticle pipe systems in which unwanted thermal geysering is a problem.

In space flight vehicles heat absorbed by pipes carrying liquid oxygen during vehicle fueling causes the liquid to boil at the pipe surface. The bubbles concentrate at the center of the pipe where the flow-resistance is least and coalesce to form a large bubble. Spontaneous bubbling occurs at the bottom of this bubble because of reduced static pressure. The result is a large bubble which, gaining speed and size, spews out of the pipe hurling hundreds of pounds of liquid oxygen with it. The liquid oxygen then falls and impacts the bottom of the vertical pipe.



Geyser Inhibitor
For Vertical Cryogenic Transfer Pipe

The pipe system as shown in the illustration comprises a smaller concentric pipe welded to the main pipe. The inner pipe begins above the bottom of an isolation valve and terminates in the storage tank at the top.

As liquid next to the walls warms, it begins to rise along the outer edge of the pipe system. This causes cooler fluid from the storage tank to flow to the bottom of the pipe, replacing the rising warmer fluid. There is a continuous circulation of fluid within the pipe that tends to maintain a fluid temperature below the boiling temperature of the liquid oxygen. Should some boiling occur, the bubbles cannot concentrate in the center, and the geyser effect is reduced Furthermore, the system is self-regulating in that the more heat that is absorbed the faster the convective circulation.

Note:

Requests for further information may be directed to:

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Reference: TSP73-10110

Patent status:

This invention has been patented by NASA (U.S. Patent No. 3,697,021). Inquiries concerning nonexclusive or exclusive license for its development should be addressed to:

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