Spinoff 1977

Heat Pipes for Alyeska

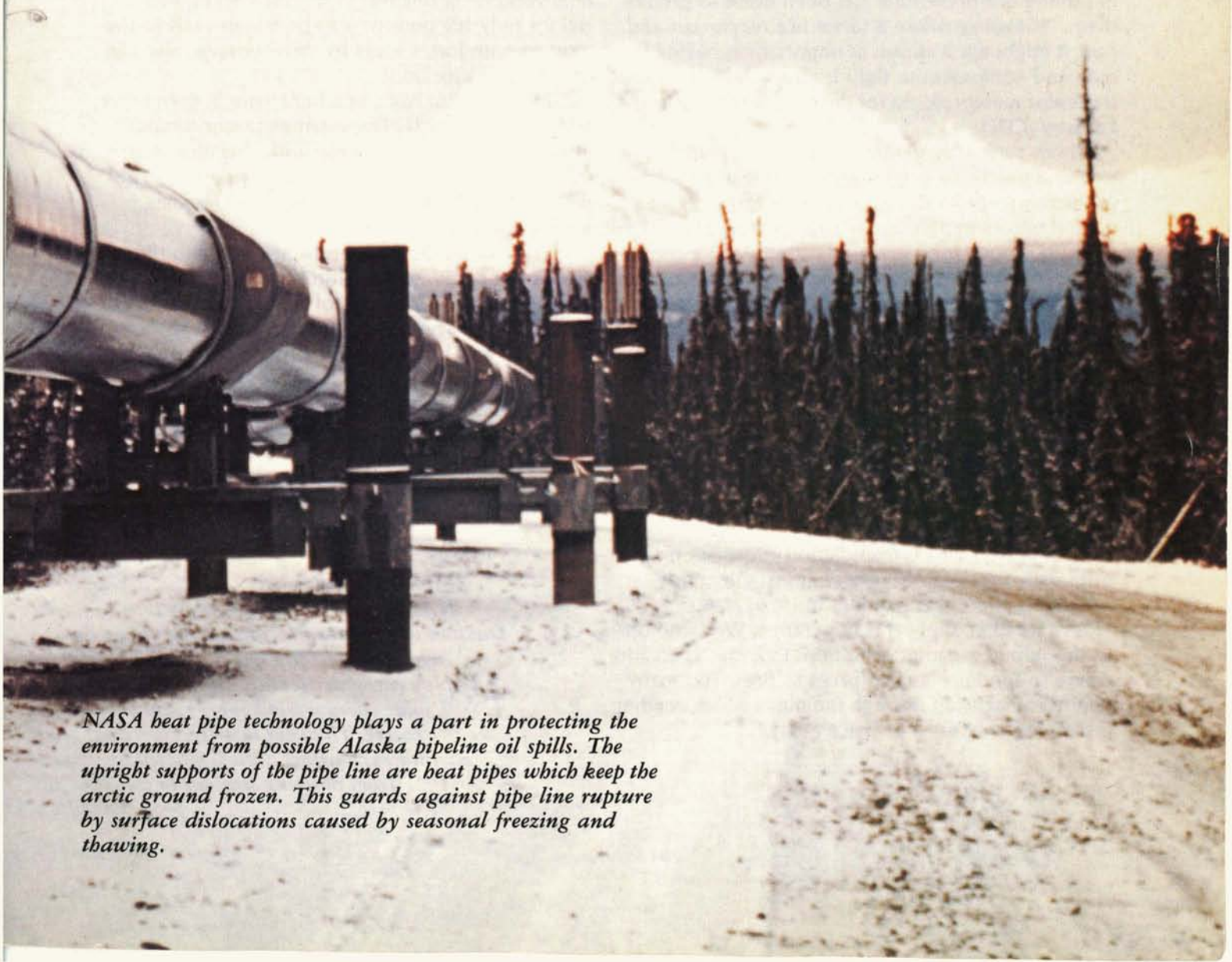
Alaskan oil flowing through the 800-mile pipeline to the ice-free port of Valdez on the Gulf of Alaska is partly an accomplishment of space technology.

Astounding as that claim may be, the fact is that the pipeline may never have been approved by Congress without the unique heat pipe, deliberately spun off from spacecraft where it was used routinely for cooling electronic equipment. In the Alaskan pipeline, heat pipes protect the tundra from possible pipe ruptures that could spill large amounts of oil over the land.

The heat pipe's job is to keep the arctic ground frozen. The permafrost soil alternately freezes and thaws with seasonal temperature changes, causing surface dislocations and problems for the builders. In winter, a phenomenon called frost-heaving uplifts the soil. It is something like the creation of highway potholes by the freezing of rainwater below the roadbed—but frost-heaving exerts far greater force. Conversely, thawing of the frost in summer causes the soil to settle unevenly. It is therefore necessary to keep the soil in a continually frozen state, negating the powerful forces which could weaken supporting structures and rupture the pipeline.

To do so, McDonnell Douglas Corp. applied heat pipe principles in the design of the vertical supports that hold up the four-foot diameter oil pipeline. Alyeska Pipeline Service Co., the consortium responsible for building and operating the trans-Alaska system, utilized some 76,000 McDonnell Douglas heat pipes varying in size—according to terrain requirements—from two to three inches in diameter and from 31 to 66 feet long.

94



NASA heat pipe technology plays a part in protecting the environment from possible Alaska pipeline oil spills. The upright supports of the pipe line are heat pipes which keep the arctic ground frozen. This guards against pipe line rupture by surface dislocations caused by seasonal freezing and thawing.