female cigarette smokers also occurred during that period. Evidence also indicates that resistance to heart disease deaths occurs 5 to 10 years after a person has stopped smoking. Thus, smoking fewer cigarettes during the 1950s, 1960s and early 1970s might have provided protection against heart disease deaths in the late 1960s and early 1970s.

Stern also contends that a decrease in high blood pressure — another heart disease risk factor — might have contributed to lowered heart disease deaths between 1968 and 1976; there has been a steady improvement during the 1960s and 1970s in high blood pressure control in the United States (SN: 12/11/76, p. 377). However, two surveys indicated that the vast majority of hypertensive persons (84 percent) still did not have their high blood pressure controlled in the early 1970s. So precisely how much high blood pressure control contributed to reduced heart disease deaths between 1968 and 1976 remains to be seen. Stern likewise contends that physical fitness might have contributed to lowered heart disease deaths between 1968 and 1976. Various studies have suggested that physical fitness can prevent heart disease deaths (SN: 9/29/79, p. 214), and anecdotal evidence suggests that an explosive growth in leisure-time physical activity has occurred in recent years.

As for treatment contributions to the lower heart disease deaths between 1968 and 1976, Stern gives some of the credit to coronary care units. Three studies showed that hospital heart attack fatalities in the precoronary care unit era were 30 to 40 percent, and that such rates are only 15 to 20 percent in coronary care units. However, Stern believes that neither emergency medical services nor coronary-artery bypass surgery contributed to the downward trend in heart disease deaths since few persons had access to such treatments during those years. He concedes, however, that such treatments may eventually reduce heart disease deaths (SN: 5/13/78, p. 314).

On the basis of his analyses of existing scientific data, Stern concludes: "It is not possible at present to quantify definitively the relative extent to which the decline in ...heart disease mortality has been due to life-style changes with resulting improvements in cardiovascular risk factors, and the extent to which it has been due to improvements in medical care. It is likely, however, that both have played a role." □

NASA studying Viking extension

Faced with delays in proposed planetary missions such as the Galileo orbiter and probe of Jupiter and a Venus-orbiting imaging radar, the National Aeronautics and Space Administration is now studying the possibility of extending the operations of the three Viking spacecraft still working on and around Mars. The two landing craft and one orbiter have been gathering data ever since they reached the planet in the summer of 1976 (a second orbiter ran out of gas months ago), but present plans call for them to be shut down in January. The new proposal, now being evaluated by Viking project officials at Jet Propulsion Laboratory in Pasadena for presentation to NASA headquarters next month, could result in keeping the craft active late into 1980.

The limiting factor is the amount of attitude-control gas left in the orbiter. When it runs out, there will be no way to control the vehicle's orientation in space, keeping its antenna pointed at earth and its instruments at Mars. This will also end the use of lander 2, located about 42° from the Martian north pole, since it long ago lost its ability to transmit directly to earth and must depend on the orbiter to relay its data. (Lander 1, closer to the equator, still has its "direct-link" capability, but it can only send 1,000 bits of data per second that way, compared to 16,000 bits when it uses the orbiter as an intermediary.)

Continuous operations could use up the orbiter's gas by January, but the supply could be husbanded by turning the craft off periodically. A key part of the mission-extension idea is that scientists could then wait for especially desirable data-gathering opportunities, such as when the satellite's orbit has shifted enough for it to pass low over portions of the planet that were missed by previous high-resolution photography. Eligible opportunities will not begin to occur until about next July, because the orbit's low points are now over Mars's night side.

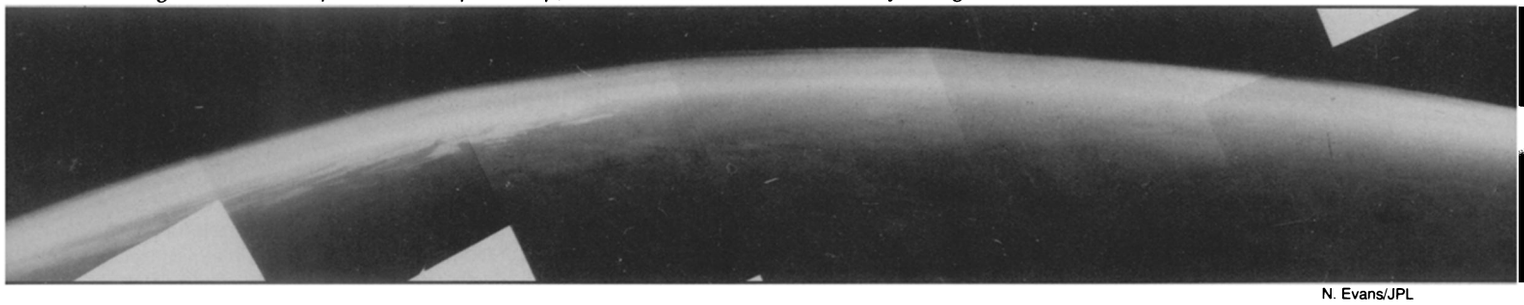
The trade-off, however, is that the extension would cost money, to sustain at least a minimal mission-control team at JPL (the team is now down to about an eighth of its original 800-person size, and part of the study is to see how much further it could be reduced if necessary), as well as to reduce the new data from its digital form.

The project's scientists have a number of reasons besides the continued high-resolution mapping for extending the observation period, says Nancy Evans of JPL. In January and February, for example, the cloudy haze of carbon dioxide and water covering the north polar cap will dissipate, letting in the sun's warmth and causing the rapid shrinkage of the cap itself — a process that the scientists would like very much to record in detail. In as little as 45 days, Evans says, the edge of the cap will retreat from its maximum extent — uncertain due to the overlying clouds but possibly as far south as lander 2, whose cameras have revealed widespread frost on the surface — to its residual minimum at about 80°N.

Another goal is to seek signs of a similar cloud cover forming over the south pole, difficult to identify in past photography (some scientists argue that it doesn't happen at all in the south) because of seasonal dust storms that interfere with the visibility. This year, however, there have been signs that the dust was less intense — which raises yet another scientific question: Recent photos of the south-polar region show the size and position of the southern cap to be similar to what they were a Martian year ago, when the dust was presumably thicker. Yet it had been thought that it was the dust keeping out the sunlight, so that this year's cap should have been smaller. Now the researchers are puzzling over the possibility that there may in fact have been some dust this year, which simply went undetected.

Another activity for the orbiter, says Evans, could be to make sequence-photo "movies" of cloud motions, showing such details as wave patterns that have been observed in clouds as they pass over craters on their way down from the north. There could also be stereo photos of surface features from orbit, made possible by re-photographing areas already covered. The landers, too, could have an expanded role, collecting and transmitting meteorological and photographic data on atmospheric, dust and frost effects more often than they now do. □

Viking view of Mars's present south polar cap, similar in size to that a Martian year ago — but it was expected to be smaller.



N. Evans/JPL