technology

A cold pipeline for Alaskan oil?

A Stanford University engineer has developed a system for transporting Alaskan oil that, he says, could minimize the ecological threat to the Alaskan environment, do the job more economically than presently proposed systems and would require no new legislation, unlike other systems.

Reporting in LOGISTICS AND TRANSPORTATION REVIEW, an international transportation journal, Sullivan S. Marsden of Stanford's School of Earth Sciences proposes suspending the oil of Alaska's great North Slope fields in a frigid brine that could flow in buried pipes without melting the surrounding permafrost. One of the main concerns expressed by environmentalists about presently conceived plans for the Alaska pipeline has been the necessity of keeping the oil hot enough to flow readily. This heating requires installation above ground and considerable auxiliary equipment, all of which could threaten the fragile arctic ecology. Rather than thawing the permafrost, Marsden's "cold dispersion pipeline system" would tend to keep it frozen and stabilized.

Aside from ecological considerations, Marsden says the cold pipeline would be more economical than the hot, involving only refrigeration units to chill the brine-oil mixture while passing through permafrost terrain. Natural gas could also be transported in the same pipe, he says, unlike the hot-oil system, which requires a separate line for gas. Further, he claims, the system should be more impervious to possible earthquake damage and could be built within the 25-foot right-of-way limits presently prescribed by law.

The brine-suspension technique may have a variety of worldwide applications, Marsden says, and Japan is already reported to be showing considerable interest in the idea.

Major advance in desalination

A scientist at Technion, Israel's Institute of Technology, has developed a new desalination process that, he says, may provide the long awaited breakthrough in wresting fresh water from the sea.

Long before Coleridge's Ancient Mariner wailed, "Water water everywhere, nor any drop to drink!" people have sought inexpensive ways of desalinating vast quantities of sea water. Recent attempts have been limited primarily by the great quantities of energy, expensive alloy tubing and sheets required and the over-all complexity of many-staged pumping and transport systems.

Not surprisingly, the secret of the "Kogan-Rose" process—named for Abraham Kogan of Technion and his collaborator, David Rose of New York—lies in its simplicity. A thin-walled plastic heat exchanger uses energy of condensing fresh water to heat incoming sea water, saving considerable energy. A multistage evaporator-condenser eliminates large quantities of tubing by bringing vapor into direct contact with a stream of fresh water.

Kogan expects the system to lower desalination costs by a third from the cheapest process now in use. Institute President Alexander Goldberg describes the technique as "one of the most important developments to come out of Technion."

Sweeter water

City dwellers who complain their water tastes of vintage swimming pools may soon find relief from an invention of Glen Stoner, a materials scientist at the University of Virginia. By applying slowly alternating electric current to submerged screens, he kills bacteria, viruses and flukes without adding any chemicals. The system, he says, is ready for large-scale, urban installation.

physical sciences

Cosmic rays from neutron stars?

There seems to be a general belief, though no definite proof, that cosmic rays are produced and accelerated in supernova explosions, supernova remnants or things of that sort. Now in the May 18 SCIENCE three scientists from the Goddard Space Flight Center, Reuven Ramaty, V. K. Balasubrahmanyan and J. F. Ormes, suggest that the iron nuclei in the cosmic rays may have an origin different from that of the other nuclei present.

Their evidence comes from balloon-borne spectrometers that show that the energy spectrum of the iron has a markedly steeper slope than that of the other nuclei. They propose that the iron comes from the surfaces of neutron stars, which are believed to be rich in that element, while the other nuclei come from supernovas or some other source. They make a number of predictions of what further observations should show if their model corresponds to the reality.

Infrared and Weber pulses

For more than four years now Joseph Weber of the University of Maryland has been recording pulses of what he believes are gravitational waves that appear to come from the center of our galaxy. Among the activities stimulated by Weber's findings has been a search for bursts of energy in other forms coming from the same source. The gravitational waves seem to give evidence of something cataclysmic going on at the center, and the reasoning has been that this might put out energy in other forms, electromagnetic radiation or neutrinos.

People have looked for radio, X-ray and neutrino pulses coincident with Weber's and found none. Now comes infrared. The observation was done by R. E. Slusher and J. A. Tyson of Bell Laboratories at the Cerro Tololo Interamerican Observatory in Chile. It is reported in the May 4 NATURE.

No infrared pulses coincident with Weber's were seen. The finding does not necessarily throw doubt on Weber's results, however. There are many ways to explain why the infrared might not show up.

Cosmic-ray muons and scaling

Physicists still turn occasionally to the cosmic rays to find out how particles behave at extremely high energies. A group at the University of California at San Diego (T. H. Burnett et al) used the ratio of positively to negatively charged muons from cosmic rays to determine whether scaling holds at energies many times higher than those available in the laboratory today.

Scaling is the name given to a simplification of the relations among energy, momentum and interaction cross sections (probabilities). Its existence seems to indicate that the proton is made up of a number of point-like subparticles called partons (see p. 328).

The muons are the end result of a chain of interactions initiated when cosmic-ray protons strike the upper atmosphere. According to theory, the ratio of positive to negative muons will remain constant over any range of energies where scaling holds. The group reports in the May 7 PHYSICAL REVIEW LETTERS that the data are consistent with a constant charge ratio over muon energies between 50 billion and 1.5 trillion electron-volts. This corresponds to primary proton energies of 500 billion to 15 trillion electron-volts, and the conclusion is that scaling appears to operate over this range.