ing of drinking water could reduce the one million cardiovascular deaths annually in the United States by as much as 15 percent.

- Nineteen organic chemicals known or suspected to cause cancer are detectable in drinking water. But most of these compounds have only been examined at high doses in laboratory animals. "There is no hard evidence that low-level oral exposure to any of these chemicals causes cancer," the report states, but it cautions that most of the compounds have not been studied sufficiently and that their interactions may ultimately be most important.

The quest for pure water, the report points out, began in prehistoric times. Water treatment procedures are described in Sanskrit medical lore and Egyptian inscriptions dating to 1500 B.C. Yet in 1975, more than 10,000 cases of water-borne intestinal diseases were still reported. The significance of water standards to modern public health, the report emphasizes, warrants continued investigation for further refinements. □

Optical phone lines in use in Chicago

The wave (literally) of the future for the transmission of telephone calls and other kinds of messages appears to be light. The development of miniature lasers that are good enough to generate the message-carrying light waves and of translucent fibers to transmit them efficiently over a practical distance (SN: 7/19/75, p. 44) has proceeded so far that Bell Telephone Laboratories has an experimental system undergoing field tests by a telephone operating company, Illinois Bell, in Chicago. Light waves also appear to be a practical future option for communication between spacecraft and between spacecraft and the ground, and prototype systems for these applications are also under test. Meanwhile, basic research and development work continues to find better lasers, and one that seems virtually optimum for the job has now been found. All these things were reported last week at the Conference on Laser Engineering and Applications in Washington.

Ira Jacobs of the Bell Labs branch at Holmdel, N.J., reports that the prototype system being tested by Illinois Bell went into operation May 11. It runs from the Brunswick Building, an office building in downtown Chicago, to Illinois Bell's Franklin central office, and from there about a mile to the Wabash central office. The test is designed, he says, to evaluate a complete system under "operating company conditions" carrying real messages. It follows outdoor tests of the components at Bell Labs' Chester, N.J., field station and trials "in the real world" that took place in Atlanta. The Chicago test has been successful so far, Jacobs says.

The lasers that generate the light in the system under test in Chicago are made of gallium arsenide. While efficient enough for practical use, these lasers do not produce the theoretical optimum wavelength, 1.3 microns, says Ivars Melngailis of the MIT Lincoln Laboratory. Melngailis reported the development of one that does, made of indium gallium arsenide phosphate. The wavelength is ideal because it suffers minimum attenuation in the fiber material and zero dispersion. This allows the highest possible modulation frequency and thus the transmission of more messages at less energy cost. At the moment, the new laser is still a laboratory item, but that, says Melngailis, is simply because its manufacture has not yet been commercialized. He sees no technical difficulties in the way of commercialization and believes that the laser has a long enough lifetime and sufficient performance reliability to make its use practical.

Optical transmission of messages to spacecraft will take place through space and, in part, through the atmosphere without the connection of solid fibers. This is possible because lasers produce light beams that spread out very little as they travel, enabling a given transmitter to acquire a given receiver at great distances provided there is an open straight line between them. (The telephone company's fibers will carry its messages around corners when necessary).

John D. Wolf of McDonnell-Douglas Corp. in St. Louis reported on ground tests of a system for space application with a message transmission capacity of 1,000 megabits. Its beam can be pointed with an accuracy of a millionth of a radian, or .000057 degrees. This is the equivalent of hitting a quarter dollar 14 miles away. The system can find the proper target within 6 seconds if it starts from half a degree away or nearer. A space test of the system is planned for 1980 or 1981 between a satellite in orbit and a ground station in Cloudcroft, N.M. □

DSDP sets record, heads for Pacific

After three years in the Atlantic Ocean, during which time it bored 130 holes in the seabed, the Deep Sea Drilling Project's research ship Glomar Challenger has moved to the Pacific. During its last Atlantic leg, however, almost as a parting gift, it set a new drilling record and threw new light on a question that has long plagued the geologic study of the ocean bottom.

The final Atlantic foray was DSDP Leg 53, the ninth leg to be conducted under the project's International Phase of Ocean Drilling, or IPOD. During Leg 52, the drilling crew had bored a hole in the Bermuda Rise at the bottom of 5,519 meters of water. Using an implanted, cone-shaped device to guide and center the drill bit, the team reentered the same hole three more times to pierce—and sample—a total of 137.5 meters of sediment and 246.5 meters of underlying eruptive basalt. On Leg 53, the ship returned to the same hole for six further reentries, penetrating an additional 297.4 meters to accumulate "the deepest penetration into old crust ever made by DSDP."

The drilling took place in a vast lava pile representing multiple episodes of eruption and covering perhaps a half-million-year span in the Cretaceous period at least 110 million years ago. When such volcanic outpourings harden, they preserve a "fossilized" record of the local geomagnetic field at the time—both strength and polarity—and it was to such a question that Leg 53 made a major contribution.

The DSDP scientists used to think that the one characteristic of the field whose traces would not vary within a given core sample was the "dip angle," the angle at which the field lines penetrated the planet at the sampling site. The researchers soon found, however, that different levels in some cores showed dip angles that varied over a range of more than 2 to 1. One theory, says Leg 53 co-chief scientist Matthew Salisbury of the Scripps Institution of Oceanography (which also manages the DSDP), was that such lava might have been deposited while the field was undergoing one of its periodic polarity reversals. During such periods, Salisbury says, the field is unstable, wobbling and pulsating in a way that could conceivably produce varied dip angles in strata that are close in time.

The Leg 53 core, however, strongly suggests a different answer. The long core spans at least five complete field reversals (though it will take more study to date each one accurately), and the varied dip angles cover a span of time that is far longer than the few thousand years of any one reversal episode. Thus, says Salisbury, it is reasonable to assume that the preserved dip angles were shifted as a result of the physical movement of the rocks preserving them, such as by the pushing of new lava from below. This is consistent with signs that similar shiftings, or "rotations," produced alterations in the localized record of polarity changes.

Another important find was that the Leg 53 core was the first DSDP sample to include part of a "dike swarm"—sections of about half a dozen lava "dikes" contained in a 10-to-15-meter section of the core. Volcanologists have felt certain that dikes—a lava eruption's final outpourings, which remain in the conduit from the source since there is no more lava to push them out—underly the oft-sampled seafloor flows, but it remained for the Glomar Challenger's parting Atlantic effort to find a cluster of them. □