GEOCHEMISTRY

Fuel Lead Found In Ocean

Tons of poisonous lead, exhausted into the atmosphere from cars using tetraethyl gasoline and then rained into the seas, may be helpful for tracing patterns of ocean currents.

➤ POISONOUS LEAD, exhausted into the atmosphere with every revolution of each auto engine burning antiknock gasoline, may give oceanographers a way to trace the circulation patterns of the ocean currents.

Researchers at the California Institute of Technology show that each year 500,000 tons of lead, raining into the oceans of the Northern Hemisphere at 50 times the natural rate before antiknock fuel was invented, go into the sea, possibly disturbing the fishes and other marine life and upsetting the geochemical cycle. Only 10,000 tons a year were added to the sea naturally centuries ago.

Little alarm is felt over the danger from added amounts of lead in the ocean, but in cities the exhaust fumes containing the lead and other substances cause the lead concentrations in the atmosphere to be very high and may constitute a serious health hazard, the research showed. When tetraethyl lead was first added to gasoline 30 years ago to prevent knocking, there was a controversy over the danger to human health.

Rain washes an estimated 275,000 tons of small particles of lead oxide out of the atmosphere into the oceans, and 200,000 tons are from rivers, which includes some lead that came from auto exhausts and also lead from industrial plants and rock weathering.

The investigators are Drs. Tsaihwa J. Chow, now at the University of California's Scripps Institution of Oceanography, M. Tatsumoto of the U.S. Geological Survey, Denver, and C. C. Patterson of the Caltech division of geological sciences.

Widely distributed over the earth as the decay end-product of radioactive minerals, lead normally is one of the rarest elements in the ocean water, occurring only in extremely minute concentrations. It forms chemical compounds that precipitate from ocean water onto the ocean floors.

In their studies of how fast lead is being introduced into the oceans, Dr. Patterson and his colleagues determined the average rate at which it is accumulating at the bottom of the oceans. They sampled waters of the Pacific and Atlantic Oceans and the Mediterranean Sea at various depths from the surface down to more than 15,000 feet.

They showed that the heaviest concentrations of lead were at the water's surface and that the concentrations decreased rapidly with depth until about 1,000 feet was reached. Thereafter, the smaller concentrations remained rather constant for the remaining thousands of feet of ocean depths.

The geochemists found 10,000 times more lead in snow samples from California's Lassen Volcanic National Park than would be expected from ordinary soil dust. Dr. Patterson plans to sample "fossil" snow in Greenland. He plans to tunnel into Greenland's upper few hundred feet of snow layers and compare the lead concentrations in the recent snows with those all the way back to 1900.

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OCEANOGRAPHY

Whale of a Heart Reverberates Underseas

➤ THAT DEEP, intense, subsonic throbbing underneath the ocean may come from the beating of a heart—a whale's heart.

Oceanographers have long been puzzled in tracking down sources of pulsating sounds that travel through the water with such low frequencies that humans cannot hear them. The sounds are so energetic that they often rise 30 or 40 decibels (a measure of the intensity of the sound) above the level of the background noise.

These sounds may come from the heart of a whale, stated Dr. Richard A. Walker of the Bell Telephone Laboratories Inc. at Whippany, N. J.

By using hydrophones (underwater microphones), Dr. Walker and his colleagues tried to track down sources of the strange unidentified noises in waters on the continental shelf south of New England.

The sources of the sounds move about at random, at speeds varying between two and eight miles per hour, Dr. Walker reported in the Journal of the Acoustical Society of America, 35:1816, 1963.

At a frequency of about 20 cycles per second, the sounds occur in pairs at a rate of about three per minute. These pulses may last for many minutes, halt, then start again. This pattern seems to correspond to the traveling and feeding habits of whales, he said.

The sounds may occur only when the whale's mouth is open to scoop up tiny marine animals on which it lives. When its mouth is closed, tons of flesh might muffle the powerful heartbeat.

The blue whale has a heart which weighs half a ton, pumps eight tons of blood, and develops a useful output of about ten horsepower for circulating the blood. Such a heart could produce a powerful acoustical pulse, Dr. Walker said.

Efforts to identify directly the source of the sound have not been successful. Scientists hovered more than 200 station hours in an airship over the area monitored by the hydrophones, with no success. They also recorded sounds made by large marine animals, such as sharks, porpoises, moray eels and small whales, in aquarium tanks at St. Augustine, Fla.

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Swedish International Press Bureau

NOBEL WINNER—Nobel festivities took place with traditional splendor in Stockholm (Dec. 10). King Gustaf Adolph of Sweden is escorting Dr. Maria Goeppert Mayer, University of California, San Diego, who shared half the Physics prize with Dr. J. Hans D. Jensen, Heidelberg University, Germany; the other half was awarded to Dr. Eugene P. Wigner, Princeton University.

BIOTECHNOLOGY

Machine Decodes Signals Of Body's Animal Heat

➤ DISTRESS SIGNALS flashed out by the human body are being picked up and decoded by scientific specialists who hope to be able to diagnose diseases as soon as the body begins to feel them.

The body signal being picked up for medical use is simply animal heat. Normal tissues emit infrared heat, and diseased or injured tissues, are hotter than healthy tissues.

The thermograph, a special kind of camera, is used to decode the body's messages. The thermograph films a fine record of the body temperature. Troubled tissues or "hot spots" show up white, while healthy, "cool" areas of the body register black.

Thermography is much like taking your temperature with a thermometer, said R. Bowling Barnes, thermograph inventor of the Barnes Engineering Company, Stamford, Conn. The difference is that the thermograph takes thousands of temperatures all over the body with a device that never comes in contact with the body.

Dr. Barnes told fellow specialists about the physical principles and diagnostic potentials of the thermograph at a conference in New York sponsored by the New York Academy of Sciences.

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