

Prospecting with a sense of oil

Oil-stained rocks, iridescent puddles and similar, visible surface features have often pointed to the presence of petroleum in the ground below. In fact, during the oil industry's early years, more oil fields were discovered by detecting where oil and gas had seeped to the surface than by any other prospecting method. Lately, one company has started searching for oil using a new, sophisticated version of this age-old technique. The method involves tracking down and analyzing invisible, minute traces of hydrocarbon gases that may have migrated up to the surface from deeply buried oil and gas deposits.

As a first step in exploring a given area for potential oil and gas production, Hydrocarbon Gas Surveys, Inc., of Dallas offers a sensor system, flown beneath a helicopter, that detects hydrocarbon gases. When the instrument irradiates the ground with microwaves of a given frequency, hydrocarbon gas molecules fluoresce by emitting microwave signals at a lower frequency. By detecting and displaying these emissions, the instrument shows how much hydrocarbon gas is present. So far, every time a strong signal has been detected, substantial oil and gas reservoirs have been discovered when wells were drilled deep enough, says Robert L. Owen, company vice president. Of these discoveries, about 75 percent showed commercial potential.

While the sensor doesn't distinguish between oil and gas reservoirs, other methods are available to determine the nature of the underlying deposit. At the Gulf Research and Development Co. in Pittsburgh, Victor T. Jones and R. J. Drozd have shown that the chemical composition of hydrocarbon gases trapped in the soil near the surface depends on the type of deposit below. By using gas chromatography to measure the ratios of methane, ethane, propane and butane present, it is possible to predict whether oil or gas is more likely to be found (SN: 4/25/81, p. 267).

Fusion: Hanging by a silken thread

Even the high-tech world of nuclear fusion research sometimes has to rely on the special qualities of natural materials. At the University of Rochester's Laboratory for Laser Energetics, a tiny spider is at work spinning the silk used to support targets for laser fusion. This silk makes an ideal support because it's sticky, extremely strong (SN: 6/23/84, p. 391), and consists of threads with very fine diameters.

During laser fusion experiments, laser light is focused on a tiny glass balloon, smaller than a pinhead and filled with a hydrogen isotope. This causes the hanging sphere to vaporize and implode, setting off a nuclear fusion reaction. Spider silk turns out to be about 1,000 times lighter than other traditionally used support materials such as plastic foams (SN: 2/25/84, p. 125). As a result, the silk thread interferes much less with the implosion reaction.

Soiling a new radiation detector

For the first time, soil samples can be checked for low levels of radioactive contamination in one step. The operation, using a new detector recently developed at the Lawrence Berkeley Laboratory in California and the Argonne National Laboratory in Illinois, can be done within minutes or, at most, a few hours. In contrast, current detection techniques, which rely on complex, costly chemical separations, often take weeks.

The new instrument measures X-ray emissions characteristic of radioactive elements like plutonium. By using an array of six silicon detectors to measure the emissions over a prescribed period of time, the amount of a particular radioactive material can be determined. Special shielding reduces the effect of background gamma rays, making the new detector four times more sensitive than previous detection systems. Researchers now plan to build a modified version of the detector for use in monitoring the lungs of workers exposed to plutonium.

AUGUST 4, 1984

The risks of teen drug use

Efforts to prevent serious drug problems may be best directed at discouraging cigarette, alcohol and marijuana consumption during adolescence, according to a long-term study in New York State. Teenagers who use cigarettes and alcohol are far more likely to take up marijuana smoking than those who stay drug-free, and those who use marijuana are far more likely to try other illicit drugs, report Denise B. Kandel and colleagues at Columbia University in New York City.

Drug use is also related to an individual's personality and lifestyle (SN: 2/18/84, p. 107), but an early involvement with legal and illegal drugs strongly predicts a more extensive use of drugs later on, says Kandel in the July *AMERICAN JOURNAL OF PUBLIC HEALTH*. Her assertion is based on interviews with 1,325 young adults aged 24 and 25 who took a 1971 drug use questionnaire in high school. She finds that males tend to first use alcohol, then marijuana, then other illicit drugs; among women, either alcohol or cigarette use precedes marijuana smoking, and cigarette and marijuana use are strongly linked to the eventual use of other illegal drugs. Not all youths follow these patterns, adds Kandel. A "developmental sequence" of drug involvement is apparent, but the data do not necessarily show that marijuana use, for example, causes teenagers to try other illicit drugs. Certain classes of drugs are, however, associated with different ages of initiation.

In the same publication, scientists at the University of Michigan Institute for Social Research in Ann Arbor report that a general decline in marijuana use among young adults aged 18 to 24 began in 1979. Social psychologist Patrick M. O'Malley and co-workers sent drug use questionnaires to a national sample of 2,400 individuals from senior classes between 1976 and 1982. Beginning in 1977, each preceding senior class sample was recontacted.

Marijuana, it appears, began to wane in popularity at about the same time for everyone, regardless of age or the duration of prior drug use. Although cigarette smoking is becoming less prevalent, those seniors who do take up the practice are still not likely to cut down or quit. In contrast, most youths try alcohol and about half develop heavy drinking after graduating from high school. Reported alcohol consumption begins to decline at about age 23, suggesting that many young adults "mature out" of heavy alcohol use by their mid-twenties. It is still too early to tell if there is a similar pattern for cocaine use, say the researchers, because its recent popularity has attracted many new users to the psychoactive drug.

Runners, anorectics are miles apart

Compulsive runners, who feel guilty if they do not exercise and become tense, irritable and depressed if they miss a scheduled workout, have been given a bad rap, say psychologist James A. Blumenthal and co-workers at Duke University Medical Center in Durham, N.C. A recent report suggested that the extreme commitment of these runners is self-destructive and pathological, a primarily male version of what in women shows up as anorexia nervosa, or self-imposed starvation (SN: 2/12/83, p. 102). The Duke researchers identified 43 compulsive runners and compared their psychological profiles on the Minnesota Multiphasic Personality Inventory to those of 24 anorectic patients. The anorectics exhibited significantly greater abnormality on eight of the test's 10 clinical scales whereas no runner deviated on more than two. The majority of anorectics had abnormal scores for depression, hostility and anxiety, while nine runners had scores that suggested mild levels of emotional disturbance. Running is usually an adaptive behavior that improves health, self-confidence and self-esteem, conclude the investigators in the July 27 *JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION*; anorexia, on the other hand, is a life-threatening emotional disorder.

73