Love Canal: A Federal Emergency

With the unexpectedness of the Mt. St. Helens eruption, Love Canal has again exploded into national prominence. Though suspicious tremors have rumbled through the Niagara Falls community on and off for nearly a decade — at times exploding briefly — the most recent upheaval results from the airing of two controversial and admittedly preliminary health-effects studies. Together they direct new suspicions at the latent dangers of the more than 80 toxic wastes buried there and last week served as justification for President Jimmy Carter's declaration of the region as a federal emergency.

This emergency status makes it possible for the government to offer aid for the temporary relocation of 710 families remaining in the affected area. Following a similar emergency-disaster declaration by President Carter last August, the State of New York began purchasing 239 abandoned homes from residents nearest the Love Canal dump site at an eventual cost of $10 million. Many of the families fled in the wake of studies showing abnormally high rates of cancer and other disorders among residents and a recommendation by the state health commissioner that pregnant women and children under two years of age evacuate the region.

Relief offered the 710 families last week — in the form of relocation assistance and funds — is being managed under the direction of the Federal Emergency Management Agency. Funding for the moves — which could last up to a year — will be shared by the state and federal governments. But according to Barbara Blum, deputy administrator for the Environmental Protection Agency, the final tab for relocation expenses and evidence-gathering health-effects studies will be added to restitution claims against Hooker Chemical Co., in four separate suits filed by the Justice Department at EPA's behest last Dec. 20 (SN: 1/5/80, p. 6).

Two controversial human health-effects studies upon which Blum said the government's relocation assistance had been based include one finding chromosome damage in the blood from 11 of 36 Love Canal residents (SN: 5/24/80, p. 325) and another finding the suggestion of a slowing in the speed at which electrical impulses travel along peripheral nerves in 35 Love Canal residents.

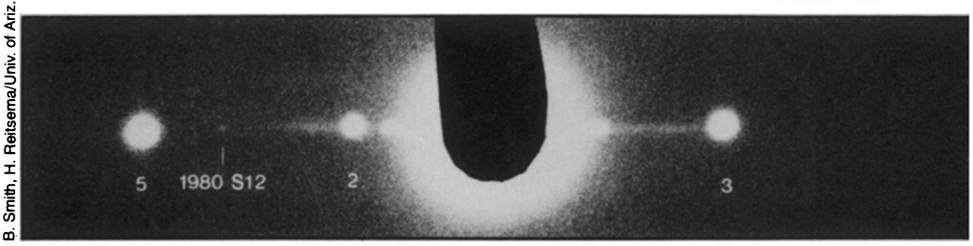
Though the scientific community has not had much chance to review the methodology and findings of either study, both have come under rapid fire. The chromosome study took its heaviest salvos from critics complaining about the lack of a control group of individuals matched to Love Canal participants in every way possible except for their exposure to toxic chemicals percolating up through the soil from their landfill burial site. Additional criticism focused on participant selection: Accepted volunteers included persons known to suffer identifiable problems — such as a history of miscarriages — which need not have been related to Love Canal exposures. The nerve-damage study by Beverly Paigen of Roswell Park Memorial Institute in Buffalo and Stephen Barron at the Veterans Administration Hospital in Buffalo did contain 20 control subjects but lacked the statistical strength to "demonstrate" a serious health problem, according to reports of testimony by Barron before a House committee last week.

What such dubious findings demonstrate is the political nature of the federal move to relocate Love Canal families. Those families — some of whom at one point held two EPA officials "hostage" for six hours last week — have demanded national recognition of the dangers to which they believe they were exposed and government relief in the form of some action.

Both came last week together with a commitment from EPA for more definitive research on potential health hazards experienced as a result of chemical exposures at Love Canal. Blum said a registry of former Love Canal residents will begin and families tracked from now on. Selected groups of these individuals will get complete physical examinations. Other analyses will hunt for chromosome abnormalities, damage to liver enzymes, the presence of unusual chemicals in the urine, lowered sperm counts or signs of dead sperm and evidence of nerve damage. Additional epidemiological studies will look for unusual rates of cancer, liver damage or other problems.

"Ordinarily we would not subject ... families to the disruption of temporary relocation unless conclusions on adverse health effects had been fully documented and confirmed," Blum said. "But this is not an ordinary situation .... Studies completed to date are sufficiently suggestive of a threat to public health that prudence dictates the residents be relocated" until longer-range studies are complete. When asked whether families should be compensated for health problems, Blum answered, "Yes, we feel they should be compensated for the risks. Hooker Chemical will be held liable and I think [the affected] will collect." □

Moons share orbits around Saturn



B. Smith, H. Reitsema/Univ. of Ariz.

"1980 S12" here identifies an object orbiting Saturn in the same path as Dione (not shown). Also shown are satellites Rhea (5), Enceladus (2) and Tethys (3).

Saturn's confusing family of moons, believed from recent observations to number at least 13 and possibly as many as 18 (SN: 3/15/80, p. 167), has now become more complex still with the discovery that two of the "established" satellites may each be sharing their respective orbits with two or three additional objects.

One and perhaps a second of the newly identified objects are in the orbit of Dione, about 377,000 kilometers from the planet. The brighter of the two was about 74.3° ahead of Dione as of March 1, says the University of Arizona's Bradford Smith, and has been increasing its lead by about 0.026° per day. According to Smith (who has been working with colleague Harold Reitsema), the object, temporarily known as Dione B, is probably oscillating around the L-4 libration point of the Saturn-Dione system — a gravitationally stable point 60° ahead of Dione's orbital position. This would tend to keep Dione B centered at that point, although it could gain and lose relative to Dione by many tens of degrees. An object has also been spotted at what may be the L-5 or trailing libration point, although it is much fainter and thus more difficult to confirm. Unsuccessful searches have been conducted in the past for objects at the earth-moon libration points, but dozens of asteroids are known to populate the comparable positions in Jupiter's orbit, where the sun's gravity completes the balance.

Smith and Reitsema have also found a companion (and again, perhaps a second) for a smaller, closer-in Saturn satellite loosely known as the "Fountain-Larson object" for the astronomers who identified it several years ago. Here, however, the companion is tied not to libration points

(it is on the opposite side of Saturn from Fountain-Larson), but to the gravitational influence of the satellite Enceladus, two moons farther out. Enceladus circles Saturn exactly half as fast as Fountain-Larson, creating a strong gravitational "resonance" that could preserve the relationship. □

Radio signals show length of Saturn day

The length of a day on a hardrock world such as Mars can be measured by simply timing successive appearances of a convenient surface feature as the planet rotates. Jupiter, without a solid surface, shows brilliant features in its cloud tops, but they rotate at widely varying rates. It was not until scientists found that Jupiter was emitting powerful radio signals that they could, by timing peaks in the signals, measure that planet's true rotational period — in effect the period of its magnetic field. Saturn, too, lacks a solid surface, and its haze-topped clouds offer far fewer visible details to follow. Furthermore, its radio signals are far weaker than Jupiter's, and a tentative detection of them from an earth-orbiting spacecraft has been considered unreliable.

The Saturn-bound Voyager 1 and 2 spacecraft, however, have done the trick. Michael L. Kaiser of the NASA Goddard Space Flight Center and colleagues have been able to identify Saturn's signals in their data since January ("the first conclusive evidence" for nonthermal emissions from that planet, the researchers report), and peaks in the data indicate a true ("internal") period for Saturn of 16 hours 39.9 minutes ± 0.3 minutes.

In Jupiter's case (or earth's), the modulations are caused by the tilt of the magnetic field's axis relative to the planet's own axis of rotation. Saturn's magnetic and rotational axes, however, are almost aligned, suggesting that the radio peaks are caused by magnetic-field regions of different strengths. □

Ariane 2 in the drink

The second of the European Space Agency's Ariane rockets ever to be launched—and the first to carry a payload of scientific satellites — ended up on the floor of the South Atlantic May 23 when all four of its first-stage engines stopped firing prematurely. Lost with the rocket were a Max Planck Institute satellite called Firewheel, designed to study earth's magnetic field with high-altitude injections of barium and lithium, and an amateur radio satellite known as OSCAR 9. The previous launching, carrying only an instrumented test capsule, was successfully carried out last Dec. 24. The cause of last week's mishap is being investigated. □

Deep walk in a one-atmosphere suit

In the future everyone should have ready, easy, comfortable, safe access to the sea, says Sylvia Earle, a botanist who has spent more than 4,000 hours underwater. She says this goal requires learning how to go deeper, stay longer and do more exploring of the oceans — links to our destiny.

An armored suit that looks like an astronaut's gear recently allowed Earle to lumber along the Pacific Ocean floor off the coast of Hawaii, more than 1,250 feet below the surface. It was the first dive in such a suit without a line to the surface and the deepest solo exploratory dive in the open sea.

Exploring the Deep Frontier, National Geographic Society

Sylvia Earle walks in a "Jim" suit at 1,250 feet tethered to another submersible.

The suit has a self-contained supply of air, from which carbon dioxide is continuously removed. The metal shell protects the diver from the water pressure—at that depth 600 pounds of water press on each square inch. A diver breathing compressed gas, as with an aqua-lung, would have to spend at least a week in a decompression chamber before returning to the surface from such a depth. "Sylvia went down to 1,260 feet, stayed two and a half hours, got out and had lunch," recounts Al Giddings, colleague and underwater photographer.

More flexibility should be the key to future "Jim" suits, named after the diver early in the century who wore an 800-pound predecessor called the Iron Man. Earle says that already a newer model, named Sam, has more articulated rings to allow the diver enough flexibility to swim. Other "personal immersibles" being developed depend on motors and propellers for propulsion. But Earle says she abides by the engineering principle KISS — "keep it simple, stupid" — and has the greatest confidence in an immersible with no machine except a human being propelling it. Engineers, for example, envision for the future glass or titanium suits that might allow a person to step into the ocean and dive freely to any depth.

In addition to armored, or 1-atmosphere (pressure) diving suits, Earle predicts more use of unmanned vehicles that are controlled from the surface for ocean exploration, she told reporters last week at the National Geographic Society in Washington. Another exciting development, she says, is the mixture of gases that Peter Bennett at Duke University has found that allows divers to simulate a dive to depths of more than 2,000 feet (SN: 4/12/80, p. 232).

Earle feels a sense of urgency about attempts to explore the sea. She cites a strong sense of curiosity toward the many unknown creatures the oceans contain. "It's the age of exploration all over again," she says. But she also sees ocean exploration as a requirement for continuing human survival on this planet. "We have to become more aware of our dependence on the sea as a life support system," she says. "We have to know the sea so we can take care of ourselves." □

New bedfellows: Freedom & infertility

The 1970s may have brought progress toward equality of the sexes and perhaps even a greater "sensitivity" to the needs of a person's spouse. But the decade also brought an apparent increase in infertility among married couples in the United States. Currently, about one in six couples of childbearing age experiences difficulty in conceiving or carrying a pregnancy to term, estimates Harvard University psychiatrist Miriam Mazor. She and others discussed the trend recently in San Francisco at the annual meeting of the American Psychiatric Association.

Factors contributing to the fertility decrease, Mazor says, include postponement of childbearing into the person's thirties and forties (statistically, both men and women are maximally fertile in their mid-twenties); increased prevalence of venereal disease and consequent scarring of the reproductive tract; the use of certain contraceptive methods that may lead to scarring or infections (IUD's) or problems in ovulation after use (birth control pills); and environmental factors—drugs, chemicals, radiation, etc. — that may have a delayed effect on fertility.

Although at least one study has reported that physical causes are responsible for about nine of 10 infertility cases, the problem of infertility remains fraught with psychological consequences for both men and women. (It is estimated that about 50 percent of all infertility problems are related to women and 30 percent are related