

fibrosis of the lung — an excess of connective tissue such as collagen — occurs in advanced stages of ozone toxicity. Finally, the number of fibroblasts — cells that make collagen — was three times higher in lung tissue of rats that had been exposed to both pollutants than in those exposed to just ozone.

According to David McKee of Research Triangle Park, N.C., project officer for the Environmental Protection Agency's ozone air-quality review, this synergism and the type of lung effects reported by the Davis group "are of sufficient importance to raise a flag of concern. It really is worth paying attention to." — J. Raloff

Five-fold increase in Superfund money

House and Senate conferees agreed last week to spend \$9 billion to continue cleaning up hazardous-waste sites during the next five years. This new Superfund program is designed to be stronger than the original \$1.6 billion program — which technically expired last fall — by requiring that:

- the U.S. Environmental Protection Agency (EPA) begin at least 375 new cleanup projects through 1991
- cleanups meet state and federal environmental and health standards
- the statute of limitations be extended to allow people harmed by exposure to toxic wastes to sue many years after exposure, if they do not become aware of their injuries right away
- \$500 million be targeted for repairing leaking underground tanks containing motor fuel
- federal agencies releasing toxic chemicals (mainly the defense and energy departments) now fall under the Superfund program

• large chemical manufacturers report annually the substances they routinely release into the environment and store in underground tanks, and help their neighbors respond to any emergency leakage. Exempt from this provision are power companies, hazardous-waste facilities and, during the first year, chemical companies releasing less than 75,000 pounds of hazardous wastes. In the second year, chemical companies that release less than 50,000 pounds are exempt, and in the third, those that release less than 25,000 pounds are exempt.

Still unanswered is the question of where the \$9 billion comes from. House conferees suggested raising more than \$7 billion through taxes on chemical manufacturers, but senators have not yet responded.

The lack of a firm funding provision is a major flaw in the compromise, according to the environmental groups that have banded together to lobby for a tougher law. As long as there is a chance that a major share of the costs may have to be met by the taxpayers, there is a danger that Congress may not fully fund the program each of the five years, according to Rick Hind, an environmental lobbyist for the U.S. Public Interest Research Group (U.S. PIRG) in Washington, D.C. "This is a classic area where environmental laws break down," Hind says. "You succeed in getting legislation but no money to implement it."

The funding mechanism must be worked out before the House and Senate vote on the compromise bill. That vote is expected in the next two months.

Although environmentalists are pleased that the new program is to be

Return to the *Titanic*: Gash is dashed

Scientists who recently returned to the wreckage of the *Titanic* (SN:7/19/86,p.37) found no evidence in the luxury liner's hull of an immense gash long thought to have been the result of a fatal collision with an iceberg. Instead, it appears that the hull's steel plates buckled, popped their rivets and separated from adjoining plates in the region where the gash was supposed to be; this allowed water to seep in and sink the ship.



Photos: ©1986 Woods Hole Ocean. Inst.

Alvin, with Jason Jr. on its bow, is lowered into the ocean (left). Bollards, used to secure mooring lines, and a railing on *Titanic*'s bow (right).

"We saw absolutely no evidence of a large gash in the starboard side [of the bow]," said expedition leader Robert D. Ballard at a press conference at the National Geographic Society in Washington, D.C., last week. Plate separation on the hull, he added, fits into survivors' accounts that at first they were unaware an accident had occurred. "Rivets could pop without much notice," explained Ballard.

The scientists also took a closer look at the ship's stern, which lay 2,000 feet away from the bow section. This area, where many passengers assembled as the vessel sank, "was a carnage of debris," said Ballard. It was twisted so that it faced the same direction as the bow and much of the inside ribbing of the hull was exposed, perhaps peeled away by increasing water pressure as the *Titanic* headed for its grave. The remains of the stern were too damaged to permit safe exploration inside.

The two halves of the liner separated soon after the iceberg collision, according to Ballard, but it is not possible to tell if the ship broke while still on the surface.

The hull and other steel objects were heavily rusted and in some places covered by what Ballard calls "rusticles." Extensive wooden areas of the ship and

other organic material were almost completely disintegrated, but copper, brass, glass and ceramic artifacts were beautifully preserved.

Salvage operations appear to be out of the question, said Ballard. Both the stern and the bow hit the ocean floor with a great impact that created sizable craters, and the two sections are now embedded in sediment. In addition, according to the researchers, artifacts strewn throughout the field of debris

are mostly from the third-class section and not of great value.

"I don't see the economics of a salvage operation," said Ballard. "The *Titanic* is protecting itself."

The chief purpose of returning to the *Titanic* was to test a new, remote-controlled video camera called Jason Jr., which was tethered to the three-man submersible vehicle known as *Alvin*. With its 12 cameras and other imaging devices, *Alvin* spent a total of 33 hours exploring the ship on 11 dives. The lawnmower-size Jason Jr. was released four times from its nest on *Alvin*'s bow, and on three dives it took photographs inside the *Titanic*. Though the robot suffered a number of mechanical problems at the 12,500-foot depth of the sunken vessel, the scientific team, which operated out of the Woods Hole (Mass.) Oceanographic Institution, returned with hours of videotape and 57,000 still photographs.

The scientists hope to assemble about 100 photographs into a mosaic of the 882-foot-long *Titanic*. In the darkness of the ocean floor, the whole wreck cannot be viewed at once. Said Ballard, "It's like you're in a forest at night with a flashlight, and you look up at a sequoia tree and say, 'Great bark.'"

— B. Bower