

total annual slaughter, well in excess of 100,000 animals. Because the young lose their prized, downy white fur within the third week after birth, the hunt focused on nursing animals. But a ban on the importation of white-coat pelts by the European Economic Community (EEC) last year (SN: 3/5/83, p. 150) dried up the commercial market for trade involving these newborns. As a result, last year's slaughter fell 143,000 animals short of the federally imposed ceiling for the kill of 186,000.

Only this week, Mark Small, president of the Canadian Sealers Association, told SCIENCE NEWS, "We [the association] have called for a moratorium on white coats." Reached in Wild Cove, Newfoundland, he said, "The pups are out there now and the season is open for taking pups, but there's nobody out there. There are no sealers taking any pups." He added emphatically, "I know for sure that there won't be any pups taken." Asked for clarification, he said he could speak for the 5,000 "landsmen" — land-based sealers from Newfoundland, Labrador and the Magdalen Islands — that there would be no slaughter of animals under one year of age during this year's hunt.

But on Tuesday, Jim Winter of the Canadian Department of Fisheries and Oceans in Ottawa contradicted that, saying the hunt had officially begun Sunday and that the first day's kill totaled 43 animals — "mostly young ones," on the ice. He emphasizes that these were not white coats, but "just after the white-coat stage."

That's impossible, counters Vivia Boe, international projects coordinator for Greenpeace. Reached in Canada, where she and colleagues are now monitoring the hunt, she notes that when escorted into the main herd of harp seals on Feb. 28 by fisheries officials, the only pups she saw were a day old. Clearly, whelping didn't begin until Feb. 27, she says, "which means that today [March 12] the oldest animals are two weeks old." That also means, she says, that the young being killed are white coats.

Kirk Smith, executive director of the Canadian Sealers Association, said he could not confirm that the clubbing of white coats had occurred. However, he did say that in the Magdalen Islands — where the hunt is now being conducted — landsmen occasionally take white coats for their own family's meat consumption. Moreover, he said, in striking contradiction to what his group's president had said, "Our position is very clear: There's no difference in the taking of seals at any age."

"There's a *de facto* moratorium at the moment" on the commercial sale of white-coat pelts, Smith says, so pups would only be killed for individual consumption. Suggesting that earlier media accounts may have distorted his organization's stance, he explained: "We said to the Canadian government that if you need a fallback position, if you need to change policy, then this [white-coat ban] is what we would do. However, we are very pleased to see that the government has not seen fit to change its policy." Hence, there has been no need to curb the killing of the youngest seals.

Both the International Fund for Animal Welfare (IFAW) and Greenpeace are outraged, but not only because of the killing of pups. On March 9, a Canadian airport refused to refuel an IFAW helicopter that had been observing the herd. And while the craft was still grounded, a mob stormed the airport on Sunday and destroyed the vehicle. IFAW's Donna Hart says this just confirms her group's intention to campaign for a U.S. boycott of Canadian fish. Initially, IFAW will focus on "encouraging" the McDonald's, Burger King, Gorton, Mrs. Paul's and Taste o'Sea companies to boycott Canadian fish until the seal hunts end.

"We did a dress rehearsal of this boycott in the United Kingdom starting about six months ago," Hart says, "and feel it's a success. We got two of the major supermarket chains in England to take a moral stand against the seal hunt: Their 600 stores no longer stock Canadian fish products."

— J. Raloff

## EPA to limit only smallest particles

A major revision of the national clean-air standards affecting particulate matter — pollution consisting largely of dust, soot, dirt and smoke — was proposed by the Environmental Protection Agency (EPA) last week. More than 100 million tons of particulates enter the atmosphere annually. Rather than trying to regulate all of these suspended particles, EPA is now proposing to focus only on those most likely to cause lung damage, those 10 micrometers or smaller in diameter.

EPA's current ceiling on particulates, designed to protect human health, is 260 micrograms ( $\mu\text{g}$ ) per cubic meter ( $\text{m}^3$ ) of air, averaged over 24 hours, or an annual geometric mean (AGM) concentration of 75  $\mu\text{g}/\text{m}^3$ . The new proposal suggests re-

placing these standards with a 24-hour limit of somewhere between 150 and 250  $\mu\text{g}/\text{m}^3$  and an AGM concentration of between 50 and 60  $\mu\text{g}/\text{m}^3$ . Precise limits within the ranges announced probably won't be proposed for a year.

Condemning this proposal, David Doniger of the National Clean Air Coalition (a consortium of nine environmental groups) cited several studies that he said indicated health could be jeopardized at even the lower end of the proposed ranges. The coalition also worries whether particulates might go unregulated altogether for the three or more years it will take to get data and technology to enforce limits on the respirable (10 micron and under) fraction.

— J. Raloff

## Chipping away at silicon processing

An integrated-circuit chip is built up in layers to create a microscopic, silicon sandwich. It consists of a sequence of metallic films and insulating layers, etched with intricate patterns and doped with traces of elements that alter a layer's properties. The production of such electronic chips requires a complicated, expensive manufacturing process that limits the number of companies and laboratories that can make them. However, current research on the use of lasers and a technique called "chemical vapor deposition" may within a few years bring chip manufacture to, for instance, a university laboratory.

A recent, surprise discovery at the Sandia National Laboratories in Albuquerque, N.M., illustrates the potential value of laser processing. The Sandia researchers use a newly developed technique, called "plasma-initiated laser deposition," for depositing thin layers of silicon on surfaces. The method depends on the interaction between light from an ultraviolet laser and a gas that has passed through a high-voltage, electrical discharge to create a "chemical soup" or plasma of charged, excited molecular fragments. The gas, in this case silane ( $\text{SiH}_4$ ), enters the reaction chamber at a low pressure and passes through a 10,000-volt discharge. Ultraviolet light from a krypton-fluoride laser shines through a window onto the surface of a quartz-glass or silicon wafer. Only when both the plasma is present and the laser is shining does silicon deposit on the area outlined by the laser beam on the wafer's surface. In other words, the discharge activates the gas, and the laser defines where deposition should occur.

The researchers found that at low laser energies, silicon films made up of many randomly oriented crystals form on the surface of a single-crystal silicon wafer. However, when the laser energy reaching a given area is increased beyond a threshold value, the deposited silicon atoms line up in a very orderly arrangement so that the surface-film crystals take on a single orientation.

The results for deposition on quartz plates were even more surprising and puzzling. In this case, Philip J. Hargis Jr. and his colleagues discovered that while low-energy, 10-millijoule laser pulses cause silicon deposition, higher-energy, 30-millijoule pulses cause etching to occur. Simply altering the laser energy changes deposition to etching or etching to deposition. When the experiment was tried on a single-crystal silicon wafer coated with a thin film of silicon dioxide (quartz), the high-energy laser pulses etched the coating until they reached the silicon base. At that point, silicon began to deposit within the etched groove.

Sandia's A. Wayne Johnson, head of the