

## NASA Had Warning of Potential Shuttle Accident

A White House investigation into the cause of the space shuttle disaster has focused on the possibility that a seal in the right solid-fueled booster failed, allowing hot flames to escape out the side onto the surface of an adjacent liquid-fuel tank. The shuttle orbiter may have been destroyed on 28 January by the booster rocket tearing away and rupturing the fuel tank.

According to public statements by officials of the National Aeronautics and Space Administration (NASA), as well as internal documents recently leaked to the press, the seals on the solid-fueled boosters had partially eroded on 32 joints during previous shuttle flights. Warnings had been made about a potential catastrophe, and NASA studied the problem but apparently took no further action.

The seals, installed between the four cylindrical segments of each booster, consist of a strip of zinc chromide putty and two rings of vulcanized rubber, which serve as consecutive barriers to a burn-through of searing flame and gases once the booster has ignited. Testifying on 6 February before a panel of experts appointed by the White House to conduct an official inquiry, an official of NASA's Marshall Space Flight Center said that soot had been found between the first and second rings after several flights, indicating that both the putty and the first ring had failed. "That was thoroughly worked, and that's completely documented on all the investigative work we did on that," the official, Judson Lovingood, said.

Internal agency documents also indicate that the secondary ring had been unseated on previous occasions by the severe dynamic pressures that are present during a shuttle launch.

During a teleconference with executives of Morton Thiokol, the booster manufacturer, on the evening before the launch, particular concerns were expressed about the "integrity" of the rubber rings because of unusually low temperatures on the launchpad, Lovingood told the commission. But "Thiokol recommended to proceed in the launch," and NASA accepted this advice.

All internal NASA documents relating to the seals have been examined by the commission, which is chaired by former Secretary of State William Rogers and includes several physicists and aeronautical engineers. Its members are David Acheson, a former executive at Comsat; Neil Armstrong, the former commander of Apollo 11; Eugene Covert of MIT; Richard Feynman of Cal-



**William Rogers**

*Chairman of investigating panel.*

tech; Robert Hotz, a former editor of *Aviation Week and Space Technology*; Donald Kutyna, a director of space systems for the Air Force; Sally Ride, a former shuttle astronaut; Robert Rummel, a former vice president of TWA; Joseph Sutter, an executive vice president of the Boeing Corporation; Arthur Walker, Jr., of Stanford; Albert Wheelon of Hughes Aircraft; and Charles Yeager, a former aircraft test pilot. ■

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## Foods as Salty as Ever, Center Says

The food industry as a whole is not doing a very good job on its own to reduce sodium in products, according to a recent survey by the consumer group, the Center for Science in the Public Interest in Washington, DC.

Two years ago, the Food and Drug Administration declined to impose mandatory limits on sodium content in processed foods and instead urged the industry to lower levels voluntarily. As many as 60 million Americans suffer from hypertension, which can be prevented or treated by reducing sodium intake. The National Academy of Sciences recommends that daily sodium intake for the average individual should be 1100 to 3300 milligrams.

Now, "most products are as salty as they were 2 years ago, and of the ones that have changed, almost as many have gone up as have gone down in sodium content," says Bonnie Liebman, nutrition director of the consumer organization.

Since 1984, the organization has monitored 185 lines of popular food brands,

including Ragu spaghetti sauces, Stouffers frozen dinners, and Chef Boy-Ar-Dee products. Taking sodium information supplied by food manufacturers, the center found that among the product lines, which include more than 2000 individual items, 83 percent did not change in sodium content, 9 percent dropped, and 8 percent increased. Compared to a 1983 survey of 116 product lines, the center found that 29 percent are now lower in sodium, while 26 percent had higher levels.

Among the foods that jumped the most in sodium content were three kinds of Stouffers frozen soups, which increased 41 percent to 980 mg on average. The same number of Chef Boy-Ar-Dee lasagna and pizza products increased an average of 30 percent to 1471 mg.

In other products, Stouffers reduced the sodium content by the biggest margin, the survey showed. Stouffers pizzas dropped 27 percent to 1018 mg on average and its Side Dishes line was lowered by a similar percentage to 487 mg among 12 items. Ragu spaghetti sauces are less salty now; they dropped 20 percent to 584 mg. A tally of 25 fast-food items at McDonald's showed a cut of 14 percent in sodium to 512 mg.

Among the items that remained about the same were Stouffers Entree line, which averaged 1028 mg among 38 selections; Armour frozen dinners, which contain 1311 mg; and Progresso soups, which have 1076 mg on average.

The survey did not take into account new foods that companies are marketing as low-sodium items. Although their availability is clearly increasing, low-sodium foods are still a small percentage of total food consumption, according to James Heimbach of FDA. Liebman remarked, "Our object was to look at standard products to see what was happening," and to look at a company's willingness to change a popular product.

A spokeswoman for Stouffers Corporation said that consumer demand influences the contents of its products. Stouffers does not have a concerted effort to reduce sodium in its food, according to Marguerite Danne-miller. As consumers ask for more low-sodium foods, the company will consider changing products, she said. The Salt Institute notes that salt sales to food processors and consumers have leveled off after declining for several years.

An official at FDA, Marilyn Stephenson, said that "we think the voluntary effort is working, but you don't get [big changes] overnight." FDA's approach is to educate consumers through sodium labeling. The agency says that 40 percent of processed foods, measured by sales volume, are labeled with sodium content. ■ MARJORIE SUN