whose control procedures often require the most attention inside the cockpit, thus making it most difficult to maintain an adequate visual scan for other aircraft," the report says.

The report's unsettling implication—that the skies are safer when air space is less controlled by air traffic controllers—would appear to undercut the FAA case for greater control of air space. The FAA announced its plan late last year, after a commercial 727 airliner collided with a training plane within sight of the control tower of the San Diego Airport. Opponents of the FAA plan dispute that the new FAA rules would have prevented the crash, had they been in force.

Bond has proposed to triple the number of TCA-type airports, from 21 to 65, and to increase the number of airports using the voluntary TRSA controls by 80. (There are now 105.) Finally, planes flying between 10,000 and 18,000 feet would be obligated to follow instructions from the ground. The plan has been one of the most controversial in the history of the Department of Transportation: a notice of proposed rule-making concerning it drew a record number of 38,000 comments. The FAA can implement the plan, which also calls for new equipment on board aircraft, after taking into account the comments of interested parties. Foes of the plan hope to get Congress to stop it.

Whether the skies would be safer with more controls depends on whose data are correct.

But whether the skies would be safer with more controls depends on whose data are correct. Bond stood up for his agency's data showing the lesser risk of NMAC's. His staff investigate reports of near collisions to find out exactly what happened. "The quality of it is very good but it suffers by not being comprehensive," he said. Many of the situations investigated by the FAA are followed up by punishment of the pilots involved for causing a dangerous situation. The NASA data are of poor quality, Bond says, because names are kept confidential and so individual incidents cannot be investigated, with the result that "In some cases there may be six or seven reports—from pilots, crew, and ground controllers—of one incident."

According to the NASA study, 11 percent of the NMAC's reported might be multiple reports of a single incident. This error is partly offset by single reports that describe several near collisions, which it estimated at 5 percent. But these error margins still do not explain the wide discrepancy between the NASA and FAA estimates.

Many people believe that FAA receives relatively few reports of dangerous air situations because those reporting fear prosecution for negligence. For this reason the Aviation Safety Reporting System was created at the NASA Ames Research Center in California. Under the system, anyone—pilots, crew, or ground controllers—can file a form reporting a dangerous occurrence and in so doing relieve themselves of liability. The researchers at NASA think this is the reason it receives so many more reports that the FAA. For instance, the NASA file shows 1852 reports of NMAC's from July 1976 through November 1978, whereas FAA data show only 484 NMAC's for the year 1978.

The NASA Aviation Safety Reporting System, whose $1 million annual budget comes mostly from FAA, has produced other unsettling findings. A previous report on the problems caused by new descent rules led the FAA to cancel plans to require the rules at a number of U.S. airports.

The FAA has decided, effective 30 April, to drop the immunity feature of the Aviation Safety Reporting System. Henceforth, any pilot filing an NMAC report with the system might be liable for prosecution by federal officials, after all. The NASA researchers fear this change will skew their data and lessen the program's usefulness, but Bond argues that the data may be skewed now by the fact that pilots and crew are under pressure from their unions to file large numbers of the reports.

Bond clearly believes that more regulation will make the skies safer. He notes that as ground control has grown, collisions involving commercial planes have all but disappeared. (The San Diego crash was the first since 1972.) On the other hand, private planes, which are less regulated, experience 30 to 40 collisions per year. In the ongoing battle of regulator and regulated, this new NASA study, and the government's investigation of its unorthodox conclusions, will clearly play a role.—DEBORAH SHAPLEY

Scientists Probe Secrets of Sauce Bearnaise

Some European scientists may have had a good chuckle a while ago, when *Nature* published their finding that acetic acid (vinegar) and stirring uncurdled Sauce Bearnaise, the famous egg, butter, and tarragon brew that is notorious for its propensity to coagulate on the stove.

But they have been outdone. An American lipid biochemist and a restaurant chef report in the 5 April *New England Journal of Medicine* that there are other methods for uncurdling Sauce Bearnaise. Their finding may be important for the theory—if anyone cares to learn it—of the chemistry of Sauce Bearnaise. Two Danes and a German, C. M. Perram and J. W. Perram and C. Nicolau,* had reported that the sauce maintains its homogeneity because of the balance of electric charge: the particles are suspended in the solution so long as the ionized acetic acid keeps them in repulsion. The sauce curdles when, due to other changes, this interplay of charges breaks down.

The scientists "proved" their theory by alternately adding onion, egg yolks, butter, parsley, tarragon, herbes de Provence, mustard, and alpine water to various test batches of curdled Bearnaise—all to no avail. But when acetic acid (presumably as vinegar) was vigorously stirred in, "the heterogeneous phase soon assumed the expected homogeneous consistency." Tiens!

But D. M. Small, of Boston University Medical Center, and M. Bernstein, the chef, now report that curdled Bearnaise can be reconstituted by many methods, the best being by "slowly stirring a few drops at a time into a new pan containing a small amount of water" between 40° and 50°C. Thus, acetic acid and ionization are not the sole secret of the smooth sauce. "Interparticle forces" alone are not responsible for "the tasty, complex colloidal system of Sauce Bearnaise. . . . We are evidently dealing with a sauce, like medicine itself, blended of science and art."

*C. M. Perram, C. Nicolau, J. W. Perram, "Interparticle forces in multiphase colloid systems: the resurrection of coagulated Sauce Bearnaise," *Nature (London)* **270**, 572 (1977).

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Don't Swallow the Whistle—Blow It!

Federal laws are moving into the area of protecting the rights of whistleblowers, employees who speak out about real or potential problems, often at the cost of their jobs, according to a report by the Committee on Scientific Freedom and Responsibility of the American Association for the Advancement of Science, coauthored by Rosemary Chalk and Frank von Hippel.

Little-known clauses in eight recent pieces of federal legislation could be used to protect whistleblowers, among them clauses in the Safe Drinking Water Act, the Toxic Substances Control Act, the Occupational Safety and Health Act, and the Clean Air Act amendments. The employee can file under these clauses whether he works for a private or a public organization, as long as the organization's activities are affected by one of these laws.

Thus, Glenn Greenwald, a North Miami, Florida, public utility chemist was fired after warning residents and flushing some possibly hazardous drinking water from the system. But his actions fulfilled the Safe Drinking Water Act, a federal administrative law judge ruled in 1978. "To punish or discriminate against a chemist for recommending a procedure which, at worst, would be a precautionary step would be to demand that all subordinates at all levels remain silent if so instructed until harm has occurred or is imminent," the judge said. Greenwald had applied to the Secretary of Labor after the city appeal process had upheld his firing.

But the report explains that these federal clauses have their problems. The Department of Labor, which enforces these laws, has been strict about a requirement they frequently have that the employee file with the Secretary within 30 days of the alleged discriminatory act. So the Greenwald case—even though the judge agreed with Greenwald—was dismissed because he had filed too late.

Protection of whistleblowers has been left to whatever procedures their employers might set up, which are often management-controlled and discretionary. A few professional societies have been active, but generally they have been "strikingly reluctant" to get involved, the report says. Thus, the clauses in the federal laws could be a big help if they were better known and better used.

The report notes sympathetically the pressures which often cause employees to "swallow the whistle" rather than blow it. One is the fear of being proved wrong, due to lack of certainty or of data which would confirm that the suspected hazard is real. "It should not necessarily be required, however, that concerns raised by the dissenter be proved correct for his or her job to be protected. . . . Whether the dissenter's worst nightmares were ultimately borne out or not, he or she might be performing an important service by drawing greater attention to a significant, but previously neglected area of uncertainty or incomplete information."

Another problem is that when an employee starts to step out of line, higher-ups in the organization retaliate with ad hominem statements that try to discredit him. "The side which has the weaker case on the issues will tend to push the ad hominem argument harder," the report says. Professional societies should offer a placement service which would relocate conscientious dissenters whose immediate work environment becomes too poisoned by these attacks. The AAAS is circulating a list of the relevant protective laws.

IEEE Dissenter Faces Unknown Charges

Irwin Feerst, newsletterist, gadfly, and a perennial presidential candidate of the Institute for Electrical and Electronic Engineers (IEEE), has become the object of ethics charges by an unknown IEEE member. The complaint was filed with the IEEE Member Conduct Committee in January. Its chairman, James Fairman, says he cannot divulge the identity of Feerst's accuser or the charge itself until after the committee finishes an investigation into whether the charge has enough basis to warrant a formal hearing by the IEEE.

So IEEE headquarters, where Feerst is a familiar and controversial figure, and several chapters around the country, are buzzing with rumors and wondering about what, exactly, is up. So, apparently, is Feerst.

The lack of information about the charges, which is fanning suspicion, is designed, of course, to protect the person who is accused. Fairman says that in several complaints that the committee has investigated it has found the charges groundless and so dismissed the case, and no one was harmed because the charge was never publicized. In Feerst's case, the committee must decide by late April or early May whether to drop the matter or forward it to the president and executive committee of IEEE so that a formal hearing can be held from 3 to 6 months thereafter.

Ironically, Feerst claims that this secrecy is damaging his reputation and has demanded an immediate open hearing. He clearly fears the complaint is in retaliation for his many assaults on IEEE practices and policies over the years. He wrote to the Board of Directors after learning of the charge: "For the past seven years the Board of Directors has tried to stonewall me, has held me up to public ridicule, and is now trying to exile me. You may have damaged my professional reputation with your statements and innuendos."

Feerst has mainly sought to have the jobs of electrical engineers protected. He has come out against measures, such as more federal money to engineering schools, which could increase enrollment and the supply of engineering graduates, and against the importation of foreign engineers who, he alleges, take jobs away from American engineers. His chief gripe against IEEE has been that its leaders are drawn from the management level of big electronics and aerospace firms and so do not make policies sympathetic enough to the working engineer. Thus he has run as a members' candidate for president, and one year received as much as 43 percent of the vote. Among those rumored to be charging him now are the Tokyo chapter of IEEE, which he has challenged, and some IEEE members from Aerospace Corporation, whose president, Ivan Getting, a past president of the IEEE, is a past Feerst sparring mate.

Deborah Shapley