FOG CLEARANCE

No Clear Skies Yet

Fog is expensive. It costs time, money and lives. In just one nose to tail pile up in Britain last month, nine people died and fifty were injured. One day's fog at Christmas when planes are full could cost BEA alone £40,000, although money saved from cancelled flights would bring this figure down. Yet comparatively little research is done in Britain into fog dispersal.

Fog dispersal, whether of warm or cold fogs, is beset with a number of problems. Any dispersal process must operate continuously as mixing and drift within the fog rapidly fills in cleared spaces. Dispersal methods must not in themselves create equally serious hazards, and any method for frequent dispersal must be economically viable.

Supercool fogs are the easiest to disperse. Once the fog is below $-4°$ C silver iodide crystals, liquid propane or CO_2 can be dropped into it from aircraft, cooling the droplets so that they fall as snow. Alternatively, material can be forced into the fog by generators at ground level. Dispersal by these methods is used in Norway and North America and they are established techniques, the economics of which are viable if fogs are frequent.

Warm fogs, however, pose greater problems. During the war a system known as FIDO was used in Britain to improve visibility for returning bombers. This involved the burning of tons of oil along the runways. After the war it was abandoned in Britain on the grounds of cost and no commercial fog dispersal has since been attempted. FIDO was still used at Los Angeles airport until 1953, however, when cost and pollution put a stop to its use. It has been reconsidered in various forms from time to time—the latest suggestion being that North Sea gas should be used at Heathrow—but it is an extremely expensive system, causing severe turbulence around the runways, and flying through the ring of flame has been compared to going through hell. At Orly airport, near Paris, an Atar 101F jet engine has been installed on one runway, the heat of which evaporates fog. The system is considered semi-operational and to date no turbulence problems have been encountered, although only light aircraft have used the runways.

Successful dispersal has been achieved in America by flying a helicopter over the fog using the downdraft to blow the dry air above the fog down into it, thus drying the fog out. This method is also expensive, however, and only the Americans have helicopters capable of producing a large enough downdraft.

The approach that the Americans most favour, however, is seeding. Hygroscopic material is dropped into the fog to effectively dry it out. Common salt can be used, but the problems of corrosion that result from dropping tons of salt on runways may prove prohibitive. A number of American companies have taken out patents on chemical and detergent mixtures which, they claim, increase the cohesion of the droplets but the scientific basis for this has not been proved and in Britain it is doubted if these offer a real solution. The cost and effectiveness of both these approaches are questionable. Dr B. A. Silverman, of the USAF, estimated recently that to clear a fog over one runway, for one hour, to allow aircraft sufficient visibility to land would require the use of several large aircraft to seed-drop up to 100 tons of material at a cost of between $30,000 and $250,000 an hour. Dr Silverman predicted that in three to five years these systems will be in operation, but British researchers consider that a rather optimistic estimate.

Research in Britain concentrates on the fundamental microphysics of fog as it is felt that fog dispersal systems cannot be effectively assessed until fog is fully understood. In the United States research is concentrated on actual dispersal methods and considerable success is claimed for some of them. Earlier this month Northwest Environmental Technology was granted $159,000 by the Federal Aviation Administration to measure and evaluate seeding techniques, and Dow Chemical Company is part way through a $99,000 research programme.

For the immediate future, however, airlines prefer to put their money into blind landing systems as in reality economic warm fog dispersal is not just around the corner. The clearing of fog on motorways is completely out of the question for years to come, partly on the grounds of cost, and because of the impossibility of keeping the cleared patch where it is wanted.

EDUCATION

Teachers Taught

The Royal Society's scheme to involve school teachers in academic research is now in its fourteenth successful year. The latest report of the society's Scientific Research in Schools Committee shows that 102 teachers are investigating diverse topics under the supervision of Fellows of the Royal Society and other eminent scientists. And as in previous years, several of the teachers have published their results in such auspicious organs as the *Journal of Animal Ecology* and *Spectrochimica Acta*.

When the committee was set up in 1957, thirty-three research projects were started in schools, with the pupils being encouraged to participate whenever possible, and by 1966 there were 107 projects in progress. One of the greatest benefits to the teachers is that this scheme can provide them with an enthusiastic and knowledgeable adviser who will often lend facilities and equipment as well as expertise. In this way some school teachers are able to continue work which they started while at university, and others can gain their first taste of research.

The committee is able to give financial help in the form of grants for equipment, sometimes as large as £600. As well as the Royal Society's own funds, the sources of this money include the United Kingdom Atomic Energy Authority, which has given up to £1,000 annually since 1963, and several large companies.

Last year grants totalled £2,250, but the decline from the £4,500 spent in 1969 is not a consequence of economic constraints; the projects on hand at the moment are just more modest in their requirements. They do not, however, seem to be any less ambitious. Topics under investigation in British schools include the application of gas chromatography to the study of reaction kinetics; the reproduction of the American cockroach; thermal degradation of phosphonitrilic isothiocyanate; erosion processes in the New Forest; and limiting factors in mice populations.

MACROBERT AWARD

Gas from Naphtha

The MacRobert Award for 1971 has gone to a team of five researchers from the Gas Council for their work on gas manufacturing processes. The £25,000 award, which was instituted in 1969, goes to Dr F. J. Dent, formerly Director of the Gas Council's Midlands Research Station, and the team who worked with him—Dr Dennis Hebden, Mr George Percival, Dr Brian Thompson and Mr Ronald Edge.

The award is made for an outstanding innovative contribution in the fields of engineering, technology or the applied physical sciences which has enhanced or will enhance the prestige and prosperity of the United Kingdom. Previous winners are Freeman, Fox and Partners for their design of the Severn Bridge, Rolls-Royce (Bristol) for the Pegasus engine and BP for its exploration of the Alaskan North Slope Oilfield.

Dr Dent's team developed five processes of gas manufacture, one of which, the conversion of naphtha into towns gas or natural gas substitute, has already earned the Gas Council £0.5 million with a further £2 million to come and more orders expected, principally from America and Japan.