NASA denies negligence

Washington

CLAIMS that the National Aeronautics and Space Administration (NASA) has, through neglect and inaction, lost valuable data from early space missions have been dismissed by the agency as old news. NASA officials concede that storage of magnetic data tapes at a number of facilities falls below federal standards, but deny that any significant amount of information has been either lost or irretrievably damaged, and say that efforts to assemble a comprehensive data archive are well in hand. But some space scientists agree that data management has not been one of NASA's strengths, and say that the current programme of data restoration is due largely to the initiative of the research community.

The criticism of NASA comes from the US General Accounting Office, an investigative body of the Congress, in a report issued last week*. The bulk of the report claims that NASA's storage facilities for magnetic tapes are substandard. Only two out of ten centres (the Smithsonian Astrophysical Observatory in Cambridge, Massachusetts, and the Center for Astrophysics and Space Sciences at the University of California in San Diego) received GAO's partial approval; the other facilities failed to meet two or more federal tape-storage standards. GAO's evidence includes photographs of tapes stacked in hallways, packed in cardboard boxes rather than hung on racks and stored near air-conditioning units and in damp basements. Also, says the GAO report, many tapes have been untouched for years, contravening requirements that they should be regularly rewound to prevent magnetic 'print-through' of data between adjacent layers of tape.

NASA's official response to the GAO report accepts most of these charges, but points out that no specific evidence is given of tapes having been lost or become unreadable. At the Jet Propulsion Laboratory (JPL) in Pasadena, California, where much of the data from early planetary explorations is stored, recent attempts to transfer data from old tapes have been 99 per cent successful. Art Zygielbaum, manager of the Science Information Systems Office at JPL, denied the GAO's allegation that half of 135,000 old tapes in his charge might be useless; he says that of 35,000 examined so far, 90 per cent contained useful, and readable, material and the remainder were back-up or duplicate copies.

JPL's 'data salvation' programme was cited by Ray Arvidson, of the McDonnell Space Sciences Centre at Washington University in St Louis, as proof that

GAO's criticism is "behind the times".

The JPL programme is part of the Planetary Data Systems project (PDS), begun in the mid-1980s on the advice of scientists who constituted the Committee on Data Management and Computation (CODMAC), of which Arvidson is a past chairman.

CODMAC was in turn formed in 1978 on the advice of the Space Sciences Board of the National Academy of Sciences.

The success of PDS, says Arvidson, hinges on its direct involvement in data archiving of the scientists who need the data for their research. As PDS progresses, JPL will transfer planetary data to compact disks, and complete copies of the archive will be given to several interested institutions, including the McDonnell Centre.

The biggest stumbling block in PDS, according to Arvidson, is not the technical matter of getting data off old tapes, which has been highly successful, but the archival problem of working out what the data in hand actually represent. In early missions such as Viking and Mariner, much of the scheduling was worked out 'with pencil and paper' as the mission proceeded: data were recorded, but frequently the mission logbooks were cast aside in the rush of events. The hasty and improvisatory pace of these missions was not conducive, says Arvidson, to good data management.

Nevertheless, data from planetary missions appear to be generally safe. The same cannot be said of other areas, according to Chris Russell, a planetary geologist at the University of California at Los Angeles who was chairman of CODMAC after Arvidson. In the early 1980s, CODMAC made recommendations to all the departments of NASA with responsibility for data, and the Office of Space Science and Applications proposed the PDS project. But in Earth sciences little was done; Russell says that NASA scientists felt that the data were in "such a bad mess" that they may have been irretrievable. Although some committees and workshops were set up to study the problem, Russell says there was a general feeling that it was better to concentrate on new missions that would bring better data. In planetary research, by contrast, there were few assurances that new missions would ever come about, and the existing data were therefore more highly prized.

But with concern over the global environment having led NASA to embark on its comprehensive Earth Observing System (EOS), old data, even if of poor quality, take on new importance for the investigation of long-term global trends. The National Space Science Data Center, at the NASA/Goddard Space Flight

Japan looking for a profitable solution

Tokyo

THE curiously named Institute of Industrial Technology for the Global Environment — Japan's practical response to worries about global climate change — is to be located in Kansai Science City, near Osaka, and should be in business early in 1992, according to an announcement made last week. The institute, set up with massive financial support from Japan's Ministry of International Trade and Industry (MITI), will work on chlorofluorocarbon substitutes, biodegradable plastics, new biologically based production processes that consume little energy, and technology for converting carbon dioxide emissions from industrial sources into useful products, such as methanol.

Attempts will be made to convert carbon dioxide both by conventional catalytic hydrogenation and by a more fanciful approach using vast vats of photosynthetic microorganisms or algae fed with concentrated sunlight delivered through optical fibre cables. These and related projects are the subject of a ¥6,010 million (\$43 million) a year programme beginning in 1990 and expected to continue for 10 years.

Until the institute opens, research will be carried out at other MITI laboratories and in private industry. Chemical engineering and biotechnology companies will provide additional financial support and most of the 80 or so researchers who will work at the institute. David Swinbanks

Center in Maryland, is now embarked on an agency-wide effort to transfer all important data to optical disks. But too little has so far been, says the GAO report, for the ultimate success of this programme to be judged.

In its response to the criticisms, NASA emphasizes its plans to look after the data from current and imminent missions. In the past, according to NASA spokesman Charles Redmond, ten per cent of the cost of every mission was set aside for 'mission operations and data analysis', but for EOS the figure for data management alone is set at 35 per cent. A similar commitment has been made for the Hubble Space Telescope.

Arvidson and Russell agree that NASA is doing a better job now than in the early days, when the agency's success was measured by the number of new missions carried out and safeguarding data won promotion for nobody. In 1988, the National Academy of Sciences decided CODMAC was no longer needed, and despite Russell's feeling that it still had a purpose in reviewing the products of NASA's new-found diligence, the committee was disbanded. Now, as before, it is up to individual researchers to look over NASA's shoulder. David Lindley

* NASA is not properly safeguarding valuable data from past mission, US General Accounting Office IMTEC-90-1.