

Mir emergency management:

National arrangements for managing public safety aspects of the re-entry of the Russian Mir Space Station

The Mir space station

At 4:59 pm Australian Eastern Daylight Saving Time on the 23rd of March 2001, the Russian Mir space station plunged safely into a remote and uninhabited area of the Pacific Ocean, midway between New Zealand and Chile. This seemingly uneventful operation was the culmination of months of concentrated effort on the part of the Russian Aviation and Space Agency (RASA), directed at executing a dignified conclusion to a significant era in Russian Space exploration. Notwithstanding, had the Russian plans gone awry, a large proportion of the world's population may have been placed at risk through the impact of re-entering debris. Accordingly, many nations, including Australia, saw fit to develop emergency management arrangements appropriate to this risk.

Mir, meaning 'peace' in Russian, was launched in February 1986 and was intended only to spend about three years in space. However, with the addition of further modules, Mir's stay in space was extended a further 10 years, playing host to 28 long-term missions, conducted by 106 astronauts. In addition, almost 17000 experiments were conducted aboard Mir, providing a wealth of scientific knowledge. By February 2001, Mir weighed around 137 tonnes and measured 33 metres along its longest axis. Mir orbited around the Earth at an altitude of around 400 kilometres, every 92 minutes and between the latitudes of 51.6 degrees North and South.

De-orbit

In late 2000, Emergency Management Australia (EMA) became aware of the Russian Government's intention to de-orbit Mir. Based on EMA's experience in late 1996 with the failed Russian Mars Space Probe, which threatened to impact on Australia, and discussions with other Commonwealth agencies, it soon became evident that the de-orbit of Mir could place Australia at some level of risk. What followed was four months of planning at a level of intensity matched only by preparations in 1999 for the Year 2000

by Mark Sullivan and Rod McKinnon

(Y2K) computer date change. Indeed, many of the lessons learnt during the planning for Y2K were valuable in planning for the re-entry of Mir.

There were three main phases to the Russian plan for the de-orbit of Mir. The first was to dock a Progress rocket containing 2700 litres of fuel to Mir in late January 2001. The second was to allow Mir to descend naturally to an altitude of 220 km. The third was to apply braking impulses using the thrusters of the Progress rocket to slow Mir to enable it to adopt the desired re-entry orbit.

Stakeholder identification

EMA was given the lead role of coordinating national arrangements to manage the risks to of public safety in the remote possibility of debris falling onto Australia. EMA's first task was to identify the stakeholders. These included each State and Territory, as well as a large number of Federal Government agencies. It was important to engage stakeholders from the outset, as they needed to have ownership of any arrangements that were to be put in place for managing any impact of Mir on Australian territory. In addition to considering the needs of our own country, it was also deemed important to ensure our South Pacific neighbours were apprised of the situation. This was effected through the Department of Foreign Affairs and Trade.

At the same time that stakeholders were being identified, a draft contingency plan was developed, briefing material for meetings prepared, and speaking points for media interviews formulated. These documents were evolutionary. Hence, a great deal of flexibility needed to be incorporated into them. This flexibility was invaluable during what was to become a constantly changing information environment.

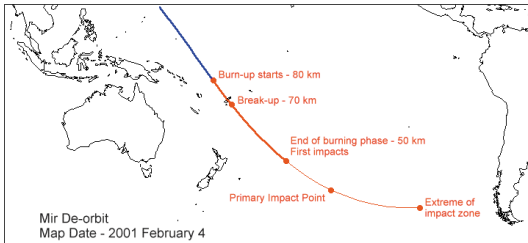
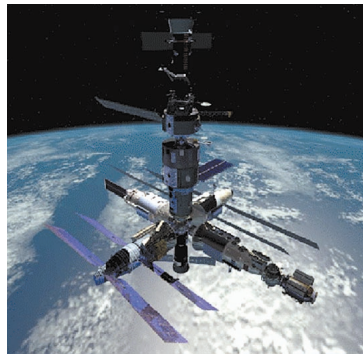
A central objective identified during

initial planning was to place an Australian liaison officer in the Mir Mission Control Centre (MCC) outside Moscow. At the time this idea was first mooted, it was perceived by many as an admirable but far-fetched proposition. Fortunately, this proved not to be the case, with an Australian representative present in the MCC and in continuous telephone contact with EMA throughout the re-entry. The representative showed extreme dedication in ensuring the passage of real-time information to the National Emergency Management Coordination Centre in Canberra. This enabled all Australian stakeholders to be apprised of developments as they occurred which was vital to EMA's ability to rapidly pass information to those who sought it, particularly the media for their reports to the public.

Contingency plan

Through past experiences involving the return of space craft carrying hazardous material, there was concern throughout the planning process that Mir too might have been carrying such material. The presence of radioactive materials would have brought into play the Australian Contingency Plan for Space Re-entry Debris (AUSCONPLAN SPRED). Significant effort was therefore directed at obtaining information from a number of sources. Ultimately, an official from the Russian Embassy in Canberra visited EMA to deliver a letter from RASA stating that there were no hazardous materials on board and all fuel was expected to 'cook off' on re-entry.

At the core of Australia's planning arrangements was a contingency plan developed by EMA and containing several key elements. The first element was the formulation of a Mir National Warning Group (MNWG). The MNWG comprised representatives from all key stakeholders who were kept informed of developments throughout the planning process. The second key element was a pager network. This was used to relay real-time messages to the MNWG during re-entry as soon as new information became available. Each of these messages was confirmed by



above: the Mir space station and its planned de-orbit trajectory

facsimile. Finally, the contingency plan contained a set of operational procedures for dealing with the re-entry and possible impact on Australian territory, supplemented by maps and technical information on aspects such as the fuels used by Mir.

Information management

In addition to the contingency plan, EMA's media liaison officer prepared a media management plan. This ensured that accurate information was disseminated to the Australian public through media channels in as timely a manner as possible. As EMA was the official point of contact for Mir-related issues within Australia, it was important to have the latest and most accurate information delivered in such a way as to avoid misinterpretation and panic. Accordingly, media briefs were prepared on a continual basis, fact sheets were developed, and a National Media Centre was established at EMA. Some 350 media calls and requests for interviews were fielded by EMA in the three days leading to the re-entry on 23 March. This enabled EMA to work with the media to reach the public with accurate information—a strategy applauded by media representatives.

Information management comprised a significant portion of EMA's activities. One of the most valuable tools for keeping stakeholders informed was a weekly situation report that was emailed to each stakeholder. This was well received and often served as the basis for similar information being passed by them to their respective organisations. Situation

reports were issued to stakeholders on a daily basis during the week prior to Mir's re-entry.

The World Wide Web (WWW) played a crucial role in satisfying many of the information needs at all stages of the process. In the early stages, the WWW provided many useful sources of background information on Mir ranging from the history and construction of Mir to the nature of the rocket fuels used by the engines. As the re-entry date drew nearer, the WWW was extremely valuable in providing daily trajectory reports from the MCC. These formed the basis of the situation reports which were sent to stakeholders. Although access to the MCC web site became increasingly difficult in the week prior to re-entry due to its inability to handle the massive traffic load, the use of the WWW was nevertheless an effective emergency management tool. However, on a cautionary note, information obtained from the WWW was not taken for granted and wherever possible, it was validated through the Australian representative in Moscow.

Conclusions

The re-entry of Mir presented Australia's emergency management community with an opportunity to once again test emergency management arrangements and, more importantly, further enhance the diverse network comprising that community. However, the principal benefits of such occurrences are invariably the lessons learned which can be applied to similar events in future. Based on feedback from stakeholders, the following were assessed as being some of the more important lessons:

- The planning sequence for the Mir re-entry reaffirmed that, provided Australia maintains disaster management networks at the level we currently enjoy, planning for specific national events can occur efficiently and effectively.
- The benefits of a flexible plan were apparent in a continuously changing environment.

- The concept of having a person in the Mission Control Centre was well-received and effective.
- Early stakeholder identification had a positive effect on planning and preparedness.
- The national meeting conducted early in the planning process was highly valued as a source of technical background and relevant contacts.
- The concept of a pager network worked very well and should be considered for future emergency events.
- A comprehensive media/public awareness plan is essential.

It could be said that the re-entry of Mir simply precipitated an exercise in preparedness within the Australian emergency management community. This is, to an extent, a valid statement. However, when prevention is not an option, and mitigation efforts are of minimal utility, preparedness efforts are the only options left open to a vulnerable community. The extent to which preparedness efforts were undertaken by all agencies is testament to a national emergency management system committed to maximising the safety and well being of the Australian community. All involved in planning for the re-entry of Mir embraced the task at hand with selfless dedication, backed up by proven emergency management concepts and arrangements. Australia's response to the Mir re-entry was truly a team effort and EMA would like to express its sincere gratitude to those State, Territory and Commonwealth agency representatives involved for their stalwart efforts. Moreover, it is heartening to see that, in a country that is susceptible to many hazards, our emergency management arrangements, and indeed the personnel who develop and execute these arrangements, are up to the challenge of addressing such unique occurrences as the re-entry of Mir.

Finally, the efforts of the Russian Federation cannot be ignored. The de-orbit of Mir safely and on target was a significant achievement and must be hailed as a success. EMA would like to acknowledge the information, cooperation and assistance afforded by the Head of the Russian Aviation and Space Agency, Mr Yuri Koptev, and his staff throughout the de-orbit operation.

Mark Sullivan is the Manager of Environment Information Planning and Rod McKinnon is the Director of Planning and Operations at Emergency Management Australia (EMA) in Canberra. They were both members of the EMA team involved with the re-entry of the Mir Space Station.