

Reply to Attn of:

CB

June 12, 1989

## **DRAFT**

TO: CA/Director, Flight Crew Operations  
FROM: CB/W. Thornton  
SUBJECT: Concern Over Current STS Crew Operation

A feeling of heaviness of self and external objects and weakness in performing ordinary tasks is a universal experience following spaceflight or even brief duration, as short as 3 days. A number of us have informally expressed concern over previous emergency egress procedures and the abilities of the crew to perform them following flight. While one of the procedures has been greatly improved by a slide, the over the top procedure remains and requires a major reduction of normal strength from trained individuals. Bailout procedures have been instituted which, during entry, require descent of the ladder by some crew members. This problem has been exacerbated by the addition of almost 80 lbs of emergency protective gear. The crews recently flown have expressed concern over successfully executing these procedures.

I have been concerned for a number of years with this problem, which is a transient neuromuscular phenomena in contrast to the usual loss of muscle mass and strength from disuse. In so far as can be determined, there has been no interest in it by American space sciences<sup>ists</sup> or space medical groups to date. The Russians recognized the source of this problem and made some studies but have failed to do the definitive ones required during entry and immediately after flight. Based on the small amount of data I have been able to obtain, and after review of all other pertinent information, I feel that there can be up to a 40-50% loss of strength during entry and immediately following and while this will be rapidly reversed (tens of minutes to hours), it now constitutes a real threat to emergency egress procedures requiring immediate action. It may also have implication for other operational procedures including control of the spacecraft.

Some two years ago, I defined this problem and began the design of hardware and procedures to 1) detect and document such losses of strength and 2) means of either preventing or reversing this. Last year funding was obtained to procure this hardware, which is unique, and the contract to do this has been in procurement some four months now. With the recent concern expressed by the crews, I briefed

the chief and assistant chief of the astronaut office on this phenomena and presented a plan for a rapid solution to it which included a DSO. It was concluded that this was a reasonable approach and was told to implement the DSO. This was done using care to follow standard procedures. This was like many other problems which arise in this office; it is not a "medical" problem and the solution was not a medical problem and did not involve medically hazardous operations any more than exercise in the gym does. This aspect, medical vs non medical DSO, was carefully explored with members of Mr. Nicholson's staff. The DSO draft was coordinated with the cognizant astronaut office member. He expressed concern that Life Sciences would consider this a gross violation of a)their rights and b)their established procedures. We jointly visited Mr. Nicholson's staff who again reassured us that non-medical DSO's were in fact designed to allow timely response to crew needs which certainly cannot be done with the existing procedures for medical DSO's. After some time, the plan was presented to you and it was my understanding we would continue with it and at the same time inform the chief of the medical sciences division of what we were doing. In the interim, crew members of STS-33 indicated that theirs would be an appropriate mission on which to fly it the first time and procedures were started to present it to the MICB on February 24, the last

opportunity to have it placed on this flight. The DSO was prepared by Rockwell and all pertinent procedures on such a non-medical DSO accomplished. On the day before presentation of this to the MICB, following a meeting between the chief of the astronaut office and chief, medical sciences division, it was concluded, as I understand it, that a larger issue was at stake involving ability in general to accomplish such procedures in a timely fashion and in the interest of that issue, the DSO would not be presented.

It has long been obvious that the existing procedures involving medical DSO's do not allow a rapid response and have many other difficulties, but this is an expression of concern about an immediate problem which in the event of an emergency procedure, possibly prevent its successful accomplishment by a number of the crew members. While the utmost attention has been paid to emergency hardware, there has been absolutely no attention paid to the capacity of crew members to perform these procedures after space flight other than by performance of skilled and well-trained individuals in excellent 1g condition. This is a very questionable assurance.



It is recognized that there are two issues here; one which I feel potentially involves crew safety and the other a long standing administrative issue which now stands in the way of a timely solution of the first. In view of the experience of recent years with such issues, I feel that safety should be given paramount attention and that the simple procedures required to insure successful egress be implemented as soon as possible for they have minimal impact on operations. The second issue is one I have been involved in for many years, and will address separately.

William Thornton.