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DEPARTMENT OF PREVENTIVE MEDICINE
SCHOOL OF AVIATION MEDICINE
RANDOLPH AIR FORCE BASE, TEXAS

SAMAPM 8 April 1959

SUBJECT: Trip Report

THRU: Chief, Aviation Medicine Division

TO: Commandant
School of Aviation Medicine
Randolph AFB, Texas

1. Wing Commander W. B. Thorburn travelled by air to Vandenberg AFB, on 29 March 1959. He was met by Major J. Wheaton, USAF (MC), who acted as guide during most of his visit of six days.

2. The objects of the visit were:

a. Briefing on AF missile weapons systems and the medical support programs concerned.

b. Enquiry into training programs at Vandenberg for Phase III of USAF Aviation Medicine Specialty Training.

3. Briefing on medical support was received from Colonel Howard F. Currie, USAF (MC), Surgeon, 1st Missile Division. Briefing on the missile weapons systems was provided by numerous officers from the appropriate organizations within 1st Missile Division, and by civilian contractor safety personnel.

MISSILE OPERATIONS IN GENERAL

4. The operation of missiles differs from that of aircraft in one particularly important respect. Missile operation consists of a long chain of serial unduplicated links; failure of any single one will abort the mission. This is not so in the operation of aircraft, where parallel duplication and human control more often than not can compensate for failures.

5. The result is a new training concept, which aims to eradicate the old virtues of initiative, improvisation and the "press on regardless" spirit. Every man must know his own technical limitations; when he comes to these he must stop and pass the problem up the line to his more expert superior. This clearly raises new problems of orientation in the supervisor-worker relationship and in leadership. It also emphasises the importance of physical and mental fitness, for these might well lower a man's limitation - threshold.

6. There are further differences from aircraft operation, in that once a squadron has its missiles ready to go, there is little left to do but watch and wait. This burden of inactivity will bear most heavily on operations block staffs and on men on duty at the pads. Maintenance men may be rather more occupied but, unlike aircraft ground crews, they can never expect or wish to see their birds fly.

PROBLEM AREAS

7. The problem areas in missile operations arise because of:

a. The chain-like nature of the operation which puts a premium on physical and mental health (apart from problems of training and leadership).

b. The wait and watch situation, which puts a premium on morale.

c. The fact that missile fuels and oxidants are toxic materials, and are used in huge quantities.

d. The need to contain gases and liquids, within the missiles and on the pads, under very high pressures (up to 8000 psi).

e. The danger of injury from electric shock and fire.

8. The medical support program must, therefore, have a wide spectrum, with preventive, industrial, clinical, psychiatric and laboratory aspects. Aviation Medicine also has a place, for a large proportion of missile officers are active

aircrew. Lastly, there is clearly an essential requirement for the closest relationship in the missile field between doctors and executive.

BASE MEDICAL SUPPORT

9. At Vandenberg AFB medical support is required for Thor, Atlas and (in the future) for Titan weapons systems. The medical support program is centered on the Base Hospital; it is expected to contribute materially to the combat readiness and effectiveness of the 1st Missile Division, and to maintain a capability to deal with disaster. It is organized in two parts, a community medical service and an occupational medical service.

10. Community Medical Service. Besides providing balanced in and out-patient facilities, this service includes the disaster capability, for example Missile Accident Emergency Teams. It requires full laboratory backing to deal with the surveillance of those exposed to toxic substances. The medical staff are specially briefed to be alert for the early signs and symptoms of toxic absorption. The Community Medical Service contributes to morale because men can rest assured of competent medical treatment for themselves and their dependents in all eventualities.

11. Occupational Medical Service. This service is chiefly concerned with preemployment medical examinations, with the surveillance of those in hazardous occupations and with education. It is also closely concerned with the industrial hygiene aspects of hazard elimination and environmental control. Aviation medicine comes within its scope, through the care of those who fly in support of missile operations. The service also has an important advisory role, in that the medical implications of missile operations must be kept continuously before the planners and the executive.

PRE-EMPLOYMENT MEDICAL EXAMINATIONS

12. It is clearly necessary to eliminate from the missile program men likely to be susceptible to fuels or oxidants that may be hepatoxic, nephrotoxic or neurotoxic. In addition people whose general health is likely to make them unreliable members of the missile team are of particularly doubtful value. However, apart from these generalities, the only specific physical attribute that appears essential is normal color vision. Missilry embraces a maze of colors.

13. As already mentioned psychological problems seem inevitable in an operational missile squadron. The psychiatric evaluation of potential missile personnel seems worth considering. It is possible that this might be a profitable research field for SAMUSAF. Such investigations might be integrated with the psychological research now starting at Vandenberg in a crew procedures laboratory, under the auspices of the Space Technology Laboratories.

14. One particularly valuable function of the pre-employment physical will be the establishing of a base-line for each individual and of group norms. These will lend meaning to future laboratory results, in the event of toxic exposures. Considerable thought has been given at Vandenberg to suitable pre-employment examination regimes, and Major J. Wheaton has evolved one which is to be tested.

PERIODIC MEDICAL EXAMINATIONS

15. Medical surveillance by periodic physical examination aims at the early detection of toxic absorption. It is consequently also a test of the effectiveness of preventive measures. The form and frequency of such examinations depend on the nature of the toxic hazard. In an operational missile squadron this will be known and will not vary; for example in Thor, the fuel is the hydrocarbon RP-1, the oxidant, lox, and there are also risks of exposure to

liquid nitrogen and trichlorethylene. However, at a base like Vandenberg experimental work results in the additional use of a greater variety of toxic substances, for example red fuming nitric acid, aniline and UDMH. It is clearly a problem of liaison to ensure that men (who in addition may have been exposed to more than one type of harmful substance) get the appropriate examinations at the right intervals. On the other hand, the impression was gained that chronic exposure to low toxic concentrations was not a likely event; gross accidental contamination, from for example the bursting of a pipeline, seems the greater potential hazard.

16. Apart from physical examination, it seems desirable that, in addition to continual alert for signs of psychological stress, periodical check should be made on the mental stability of missile personnel in operational squadrons.

HEALTH EDUCATION

17. The importance of men knowing the dangers inherent in their work or in their working material is an accepted principle of industrial medicine. They must also know the early symptoms of toxic absorption and what to do if they think they have such symptoms. The why and wherefore of preventive regulations and of personal protection should be emphasied as a corollary. However, in the missile field (at least at present) it may be difficult to achieve effective educational results without also producing some degree of hypochondriasis.

18. The mystery has not yet gone out of missiles and to many they are awesome things. In consequence it is only too easy to endow substances having alarming names (e.g. unsymmetrical dimethyl-hydrazine) with hair-raising properties. It therefore appears an equally important function of health education to provide reassurance and to play down any emotional approach to missilry. This may be particularly applicable to the dependents of missile personnel.

19. All missile personnel should have first aid training, so that they can deal at remote sites with contamination, trauma, burns and electric shock. Medical corpsmen assigned to disaster teams should be trained to a high standard in the same items.

ACCIDENT PREVENTION

20. A study at Vandenberg showed that few, if any, serious accidents sustained by missile personnel were attributable to missiles or propellants as such. But the disastrous potential results of accidents are such that an accident prevention program is of the first importance. Much of such a program will belong to the engineers, but medical support and stimulation should be continuously applied. One medical area, for example, might be the elimination of the accident prone.

PHASE III USAF SPECIALTY AVIATION MEDICINE TRAINING PROGRAM

21. Major J. Wheaton, USAF (MC), was the first Phase III Aviation Medicine Resident, to spend a month on temporary duty at Vandenberg AFB. During this time he has done an enormous amount of groundwork in establishing contacts and investigating the overall medical aspects of missile operations. Colonel Currie expressed deep appreciation of Major Wheaton's contribution and the hope that the periodic attachment of residents to Vandenberg would continue.

22. From the point of view of the residents, the field of missile operations is an important one which presents interesting problem areas. Experience in this field should be of value to any Flight Surgeon and essential to one in a teaching or staff assignment.

CONCLUSION

23. Medical support can contribute substantially to combat readiness and effectiveness in missile operations. The firing of a missile requires meticulous preparation and perfectionist performance by its crew. In the same way medical

support must be detailed, thorough and persistent; there is no place for drama in the program, which must consist of the enlightened application of accepted occupational and preventive medical principles, backed up by good clinical and laboratory facilities.

24. In an operational missile squadron the main problems may well be psychological. Toxic hazards are likely to be more in the nature of massive exposure as the result of accident than in the form of chronic exposure. Accidents are potentially disastrous; safety standards and supervision must be of the highest order and have strong medical backing. The prevention of communicable illness should not be forgotten, for weak (or absent) links in the missile chain of operation can render the system impotent. Health education can contribute to safety and morale.

W. B. THORBURN
Wing Commander, R.A.F.