

Medical Problems Associated With Use of Air-Borne Mechanical Spraying System : A Preliminary Study

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Helicopter operations in sandy terrain cause kicking up of a dust-bowl due to down wash of rotors. This impairs visibility during landing and can lead to disorientation. Therefore, stabilisation of sand particles is considered useful for a safe landing in desert. It is achieved by chemical stabilisation of sand by aerial spray of sodium silicate solution. The equipment used for this purpose is Air-Borne Mechanical Spraying System (AMSS) that is mounted in the cargo compartment of a Mi-8 helicopter. A helipad is made by the spray of 800 litres of this chemical from the helicopter hovering at the height of about 20 meters AGL. The spraying process lasts about 1.5 to 2 minutes.

The stabilising chemical is an aqueous solution of sodium silicate (Na_2SiO_3) with specific gravity of 1.2. It is highly alkaline (pH 11.5-12) and is corrosive in nature¹. Its contact with eyes cause severe pain and irritation and ingestion of the chemical leads to nausea, vomiting and diarrhoea². The spraying system discharges the chemical at different velocities through a system of curved pipes. It is rotated by a motor and is required to be projected out from the floor of the cargo compartment. For this purpose, a triangular portion of the clamp-shell door is removed.

In terms of health hazard, it was reported that during the use of the equipment, the operators had uncomfortable feeling in form of headache, choking sensation, nausea and irritation of upper respiratory tract. This preliminary study was undertaken to assess the severity of medical problems associated with use of AMSS equipment by a questionnaire survey conducted on the operators.

A structured proforma was designed for carrying out the survey on 13 aircrew consisting of

pilots, Flt/Gnr and Flt/Eng of two helicopter squadrons. All of them had operated the equipment during the inflight trials of AMSS. All the subjects were in full flying medical category. Their age ranged within 30 to 39 years. Number of trial sorties flown by each of them varied from 1 to 10. The total number of trial sorties operated by them was 47. We also conducted a few inflight trials of the system to observe the actual process in operation and to look into the efficacy of the protective measures.

The questionnaire survey revealed that all subjects had experienced some symptoms or other during the operation and a few subjects continued to be symptomatic after the spraying operation (Table I).

Table I: Symptoms Reported by the Subjects Operating AMSS

| Symptoms | No of subjects reporting the symptoms | |
|------------------------|---------------------------------------|---------------------|
| | During the Operation | After the Operation |
| Irritation of eyes | 7 (54%) | Nil |
| Dry Cough | 5 (38%) | Nil |
| Headache | 5 (38%) | 3 (23%) |
| Nausea | 4 (30%) | Nil |
| Feeling of Suffocation | 7 (54%) | Nil |

Subjective opinion on the grade of symptoms and requirement of personal protective device is reflected in Table II. During the spraying operation, personal protection in form of flying goggles and wet cloth to cover the nose was reported to be tried out by 4 out of 13 subjects. The remaining 9 subjects did not use any form of self protection. Grade of symptoms varied from 'mild' to 'severe' in the whole group. The self protected group appeared not to have much of protection and reported to have experienced 'moderate' to 'severe' symptoms. All the subjects recommended use of some protective equipment to ameliorate the short term ill effects.

