



UNITED STATES MARINE CORPS

MARINE HEAVY HELICOPTER SQUADRON 464
DETACHMENT-ALPHA
CAMP LEMMONIER
DIBOUTI, AFRICA
APO AE 9943

IN REPLY REFER TO:

MED

27 AUG 05

From: Flight Surgeon, Marine Heavy Helicopter Squadron 464
To: Commanding General, Combined Joint Task Force - Horn of Africa

Subj: RESULT OF OPERATIONAL EVALUATION OF STEELE ICE VEST IN DESERT ENVIRONMENT IN AVIATION COMMUNITY

1. Volunteer members of Marine Heavy Helicopter Squadron 464, Detachment-Alpha tested and evaluated the STEELE ICE VESTS during normal training and maintenance evolutions while deployed to Combined Joint Task Force - Horn of Africa. The STEELE ICE VESTS were provided by CDR Caron Shake of Naval Health Research Center Warfighter Performance Director from the periods of 04 AUG 05 to 04 SEPT 05.
2. The safety and practical application of the evaluation was reviewed by CDR Caron Shake of the Naval Health Research Center as well as the Officer In Charge, Safety Officer, Operations Officer, Aviation Maintenance Officer, and Flight Surgeon of HMH-464. It was determined that testing of the STEELE ICE VESTS would be limited to aircrew and maintenance personnel. The Helicopter Aircraft Commander (HAC) and Helicopter Co-Pilot (H2P) were restricted from evaluation due to the added bulk of the STEELE ICE VESTS, which would restrict rotational movement of the head hence limiting the area of visibility.
3. Initial evaluation occurred on a routine training evolution involving a 2 helicopter section day-into-night flight with Closed Area Landings (CAL), Terrain Flight (TERF), and Aerial Refueling (AR). CDR Caron Shake and the HMH-464 Flight Surgeon were present on the flight to aid in evaluation. 2 aircrew members on each aircraft used the STEELE ICE VESTS. Objective data was gathered by the PORTABLE HEAT STRESS MONITOR, ADHESIVE DERMAL TEMPERATURE SENSOR, and a commercially available POLAR HEART RATE MONITOR. Although a CORE TEMPERATURE TRANSMITTER PILL was available, medical clearance was not requested to Naval Aerospace Medical Institute for use of the TEMPERATURE TRANSMITTER PILL in members of HMH-464.
4. All 4 of the aircrew members to evaluate the STEELE ICE VEST were in favor of continued use. The aircrew subjectively reported that they all felt noticeably cooler throughout the flight. They all experienced less sweating and felt less discomfort from the heat. 3 of 4 aircrewman reported that they had almost no sweating throughout the flight while the 4th aircrewman reported only minimal amounts of perspiration. The weight added was negligible, however the necessity of adding an additional layer of equipment to the already required personal ballistic protection and flight vests did make working slightly more difficult. 2 of 4 aircrewman reported that the additional bulk was minimal but still noticeable. All 4 of the aircrewman unanimously agreed that the benefit of extended cooling far outweighs the difficulty of the additional layer of equipment. None of the aircrewman felt that the vests hindered them from performing their duties within the aircraft at any time. Due to the modular nature of the "cooling packets" used in the

STEELE ICE VESTS it was relatively easy to replace the cooling packets mid-flight. The manufacturer projected that the effective cooling period would last approximately 4 hours depending upon Outside Air Temperature (OAT) and level of humidity. The evaluation flight lasted less than 3 hours and none of the aircrewman reported a loss of the cooling effect although 1 of 4 reported that there was a decrease of the cooling effect towards the end of the flight. Subjectively, all 4 aircrew felt that they were noticeably cooler throughout this flight. All 4 aircrew were willing to continue use of the STEELE ICE VEST and would recommend its use to other aircrew. The remaining aircrewman who were not evaluating the STEELE ICE VEST subjectively reported that they experienced the usual amount of discomfort and sweating due to heat as they normally do on this flight.

5. Throughout the flight and on the deck, objective temperature readings were taken from the PORTABLE HEAT STRESS MONITOR. While the aircraft was on the deck with rotor engaged the temperature on the ramp exceeded 148.8-degrees Fahrenheit and continued to climb. During the flight intermittent temperature readings indicated that the median temperature range was within the upper 90's with the temperature in the cockpit approximately 5 to 10 degrees higher than in the main cabin. PORTABLE HEAT STRESS MONITOR performed adequately without major malfunction or grossly incorrect data. Intermittent comparisons of the PORTABLE HEAT STRESS MONITOR readings were consistent with readings taken from a digital wrist thermometer.

6. Further objective data was recorded from the ADHESIVE DERMAL TEMPERATURE SENSOR. 2 sensors were placed on an aircrewman who was evaluating the STEELE ICE VEST while an additional 2 sensors were placed on another aircrewman who was not wearing the STEELE ICE VEST. One sensor was placed on the left forearm and the other sensor was placed on the chest. Throughout the flight data collected from the 2 aircrew showed that the temperature of the aircrewman evaluating the STEELE ICE VEST was routinely 10 to 15 degrees lower than the aircrewman who was not using the vest. No core temperatures were taken in this evaluation.

7. Objective data involving the effects of increased temperature on heart rate could not be obtained due to equipment failure. The POLAR HEART RATE MONITOR took consistent and reliable readings under normal conditions outside of the aircraft. However, when the monitor was used within a turning aircraft it gave grossly incorrect data if it gave any data at all. Most of the flight the POLAR HEART RATE MONITOR indicated that the subject had no heart beat. When it did register a pulse, the monitor showed a heart rate of 350 beats per minute. Manual determination of the heart rate by aircraft rated medical equipment indicated that the subject had a normal pulse of 62 beats per minute when both readings were taken. After the aircraft had shutdown the POLAR HEART RATE MONITOR once again gave normal readings.

8. Further testing of the STEELE ICE VESTS were performed on an additional flight by aircrew and during maintenance evolutions by several of the aircraft maintenance personnel. No objective data was collected. Subjectively, all members of HMH-464 who evaluated the STEELE ICE VESTS agree that it provided a noticeable cooling effect that made work in high temperature environments much easier. All reported a decrease in sweating, fatigue, and general discomfort.