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SECTION 13

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FULL PRESSURE SUITS AND PERSONAL HYGIENE

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SECTION 13

FULL PRESSURE SUITS AND PERSONAL HYGIENE

The subjects put on full pressure suits on the 15th day of the study and wore them continually for the last 20 days of the experiment. Ideally, suits like those used on an actual mission would have been preferable, however these were of limited supply and individually sized. From the suits supplied by NASA, only two could be fitted to the men in this study. The rest of the subjects were dressed in U.S.N. full pressure suits. The suits worn are listed below:

| | |
|---------|--------------------|
| Subject | 1 - Apollo |
| | 2 - Mark IV |
| | 3 - Mark IV |
| | 4 - Mark IV |
| | 5 - Mercury Suit X |
| | 6 - Mark V |
| | 7 - Mark IV |
| | 8 - Mark IV |

The subjects were observed and questioned as to the effects of wearing this type of garment for extended periods of time. Of particular interest was individual comfort, problems of elimination, sleeping, odor, bacteriological contamination, and emotional reactions to living in a relatively uncomfortable body covering.

In an effort to substitute conditions found in the NASA supplied suits, the naval suits were fitted loosely. All suits were constantly ventilated at 60°F with individual adjustments to regulate flow up to 12 liters/minute.

The subjects were required to wear helmets and gloves for a minimum of three hours each day with the times to be chosen by individual preference. Most of the subjects preferred to wear the complete pressure suit during periods of sleep because the helmet was cumbersome when moving about and gave better ventilation for sleeping. It was necessary to partially remove the suits for defecation, but they were worn continually otherwise.

The suits varied greatly in their design and purpose. Hence, no general conclusion can be made concerning comfort. However, some common problems were found which presumably would have been inherent in all heavy, airtight garments.

Body odor became noticeable after approximately three days. Although individuals had different opinions about this inconvenience, the odor was not found

to be objectionable as to become incapacitating. It was more prominent with the suit partially removed. When the helmet and gloves were worn, ventilation was reversed through the neck region and flowed away from the face giving more freedom from odor.

Most subjects noted a lack of adequate ventilation to the feet, especially those wearing the Navy Mark IV. This resulted in constant dampness of the socks from perspiration. On day 23 it was decided to cut away the forward half of the rubber booty on all Mark IV suits which greatly improved the situation. Subject 1 was also allowed to change his socks and Subject 4 was found to have developed slight "Athlete's foot".

Subject 5 was bothered early in the study by dampness in the groin area and subsequently developed a small area of irritation on the right side of the scrotum.

A common complaint concerned the pressure suit neck ring. This caused some discomfort to the neck during sleep, but became less bothersome as the subjects grew accustomed to it.

On the 23rd day of the run, Subject 5 noted some peeling or flaking of the superficial skin layer of both arms. Over the next few days it spread over his entire body and became pronounced. Eventually, all subjects developed the same symptom. It became quite marked during the last few days of the study and a shower of then dry flakes could be produced by brushing one's body or hair. After termination of the study, a fine layer of powdery scales was found to cover the floor of the chamber.

Subject 4 developed two small pustules over the coccygeal area on day 23. On further examination, 15 - 20 pustules 1-2 mm in diameter, were found on the left chest wall. Cultures from several of these pustules were negative. The rash cleared completely after washing the involved areas with Dial soap (Armour Co.) for two days.

There was no problem with elimination. A toilet was located in a corner of the chamber under an exhaust port. Subjects were allowed to doff their suits sufficiently to permit the normal manner of elimination into the collecting containers provided.

It would seem that a full pressure suit, as worn in this study, is acceptably comfortable when the wearer has a period of time to become accustomed to it. All suits lacked adequate ventilation with the helmet and gloves off. This in turn aggravated skin irritation in areas where moisture and dirt accumulated which probably caused development of "athlete's foot" in one subject, pustules in another, and probable tinea cruris in a third. - These skin reactions cleared rapidly with minimal treatment. However, if constant wearing of the suits would have been

necessary and no treatment were instituted, more serious skin reaction may have resulted. Shedding of superficial skin layers may be the result of lack of body hygiene and probably would have occurred even without the use of full pressure suits.

Personal hygiene articles consisted of a wash cloth and toothbrush for each subject. The subjects had available an unlimited supply of hot and cold water for washing their hands and face and for brushing their teeth (without toothpaste). Soap was not used except as treatment for skin irritations as described earlier. All subjects indicated that, contrary to their expectations, body hygiene did not prove to be a problem. They stated that as long as they could wash their face and brush teeth, they felt relatively comfortable. However, most would have also preferred to wash the armpit, genital, and perineal areas. In addition, all subjects developed itching and oily scalps. They stated that they would have felt miserable if they could not have been able to remove their helmets and scratch to their satisfaction.

The wash cloths became dirty and malodorous after a few days of use. It was found necessary to wash them thoroughly each day in hot water. They were passed out of the chamber twice during the study to be laundered. Nevertheless, all subjects preferred wash cloths to chemically treated hygiene pads.

Small, hard toothbrushes were preferred. However, most subjects thought that, without toothpaste, their teeth became more yellowed toward the end of the study.

The growing beards posed no problem; they were a great morale booster instead. The beards were compared daily as to their length, bushiness, and beauty.