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DEPARTMENT OF THE ARMY  
UNITED STATES ARMY AVIATION TEST BOARD  
Fort Rucker, Alabama 36360

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JUN 14 1968

SUBJECT: ~~Letter Report~~ "Product Improvement Test of UH-1 Main Rotor Blades with Erosion-Resistant Leading-Edge Coating,"  
USATECOM Project No. 4-5-0151-18

⑨ letter rpt.

⑬ USATECOM-4-5-0151-18

Commanding General  
US Army Aviation Materiel Command  
ATTN: AMCPM-IRFO-T  
P.O. Box 209, Main Office  
St. Louis, Missouri 63166

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1. REFERENCES.

a. Letter, AMSAV-EAA, Headquarters, US Army Aviation Materiel Command, 25 May 1967, subject: "Product Improvement Test of UH-1 Main Rotor Blades with Erosion Resistant Leading Edge Coating," with 1st Indorsement, AMSTE-BG, Headquarters, US Army Test and Evaluation Command, 7 June 1967.

b. Letter, AMCPM-IRFO-T, Iroquois Field Office, US Army Materiel Command, 31 October 1967, subject: "Product Improvement Test of UH-1 Main Rotor Blades with Erosion Resistant Leading Edge Coating," with 1st Indorsement, AMSTE-BG, Headquarters, US Army Test and Evaluation Command, 20 November 1967.

2. BACKGROUND. The Army has continuous interest in reducing erosion of helicopter main-rotor blades. In CY 1967, the US Army Aviation Test Board (USAAVNTBD) conducted a product improvement test of an erosion-resistant leading-edge coating on UH-1 main-rotor blades. This coating was developed through US Army Aviation Materiel Laboratories (USAAVLABS), and their personnel observed the test and collected data. At completion of the test, the project was suspended, with no USAAVNTBD

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report required. An improved coating later became available, and US Army Materiel Command requested a test of this coating. US Army Test and Evaluation Command (USATECOM) directed (reference b), as a continuation of the original project, the USAAVNTBD to install main-rotor blades with the test coating on a UH-1 helicopter, and to subject the blades to a normal aircraft environment. Since USAAVLABS personnel were free to make their own observations, no formal reporting requirements were established, but USATECOM requested submission of a letter report to document results.

3. DESCRIPTION OF MATERIEL. The manufacturer's description furnished by USAAVLABS is as follows: Two UH-1 helicopter blades were coated with an MS-48 vehicle. An area on each blade, six inches back on each side of the leading edge, extending nine feet from outboard tip was stripped of original coating. The surface was well washed with acetone and toluene before the primer, Hughson #9924, was applied. About one MIL of primer was put on. MS-48 vehicle, 90% Polymeg 650/10% Poly-G630 PG/TDI at 1.4/1 NCO/OH ratio, was brush applied. The vehicle was uncatalyzed and allowed to air dry, moisture cure. Three coats were put on per working day and cured under a polyethylene tent. The relative humidity was increased with steam after each application. The total number of coats on the outboard 1-1/2 foot section was 19; the entire leading edge received 14 coats. Thickness measurement was not possible with equipment available. Approximate thickness at the outboard tip is 25 to 30 mils and 15 mils inboard.

4. OBJECTIVE. To determine suitability of erosion resistant leading-edge coating on UH-1 main-rotor blades.

5. SCOPE. The coated blades were installed on UH-1H Helicopter S/N 66-1094 on 4 March 1968 and removed 18 March 1968. The aircraft was flown on scheduled T53-L-13 engine test profiles without deviation for this test. The coated blades remained on the aircraft until removal was requested by USAAVLABS for evaluation of the coating deterioration.

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6. SUMMARY OF RESULTS.

The coated blade operated 16.2 hours prior to being flown in rain. Visual inspection revealed no deterioration.

After 1.5 operating hours in heavy rain (to a total operating time of 17.7 hours), the coating on both blades was deteriorated to the point of failure of material. ~~(See enclosures 1 and 2.)~~ However, the blades remained on the helicopter until they had accumulated 55.9 operating hours. During the additional operating time the blades did not appear to deteriorate any further, but they were not operated in rain.

7. CONCLUSION. The main-rotor blade erosion-resistant leading-edge coating is not suitable for operation in rain.

8. RECOMMENDATION. Further studies be conducted through USAAVLABS to develop main-rotor-blade erosion-resistant material that is not susceptible to rain damage.

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Photographs

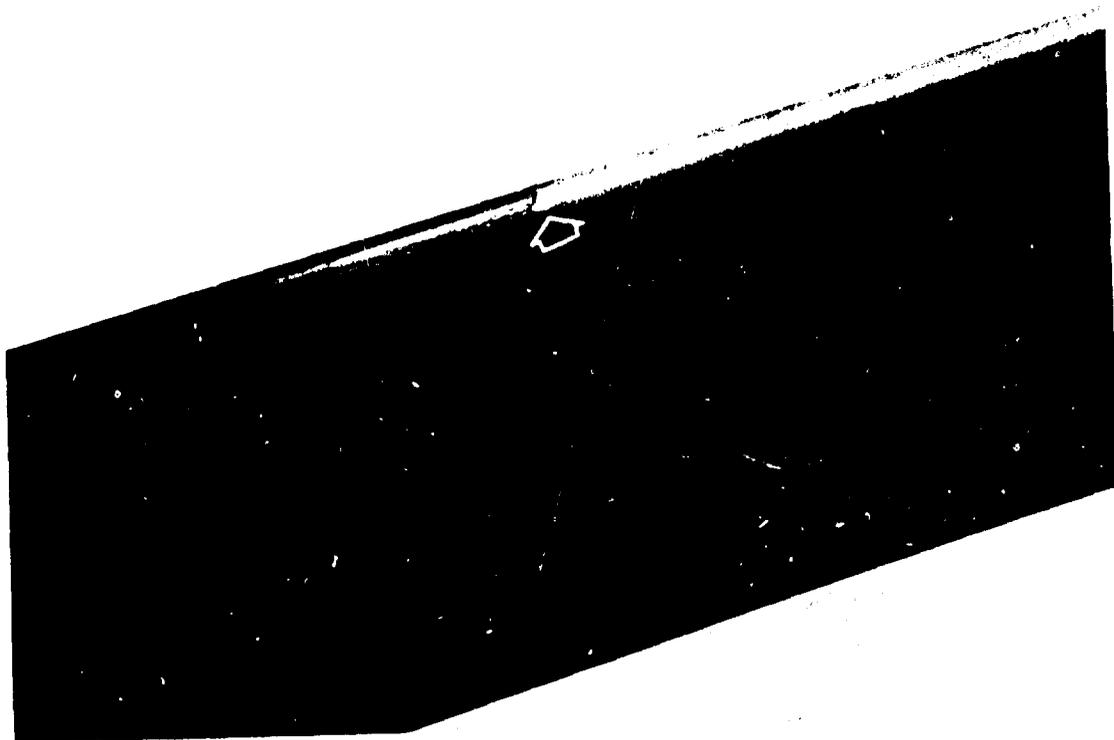
*David M. Kyle*  
DAVID M. KYLE  
Colonel, Artillery  
President

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INCLOSURE 1



INCLOSURE 2