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FEB 1960

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW	
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Name: [Signature]	3. Classification Changed to: UNCL
2 nd Review Date: 5-26-98	4. Contains No DOG Classified Information
Authority: ADD	5. Coordinate With:
Name: W.C. Payne	6. Contains UCAIT
	7. Comments:
	DECLASSIFIED

XW-49, 3-2
 Project No. T-16618
 Case No. 784.10
 Ref. Sym: 1613(152)

TO: DISTRIBUTION

Re: Low Temperature Leak Tests and Ablation Material Tests of Three XW-49-XI INVENTORIED

Summary of Test

AUG 6 '64

This test was requested in A Work Order Authorization from R. Berry, 1245, 3422-M to A. W. Reger, 1613, dated 10-6-59. The original object of the test was to determine if the XW-49-XI warheads would maintain pressure at -65°F; however, during the test sequence, cracking of the warhead ablation material occurred. Further tests were conducted to determine the severity of this problem. Three units were tested; TRM-1, TRM-2 and Environmental Test Unit "B". Ablative material cracks occurred on two of the three units. No leakage was detected on the two units monitored with leak detection equipment.

TRM-1, internally pressurized, was subjected first to -65°F for 24 hours, with no indication of pressure leakage or cracking of the ablating material. Further cold tests of the unit, unpressurized, were made. The temperature was progressively lowered from -65°F to -90°F over a 48 hour period, with no indication of deep cracks. After the -65°F temperature was established, several minute surface cracks were discerned about 14 inches from the forward end of the warhead; an autopsy revealed these cracks to be about 1 1/2 inches long and 1/8 inch deep. Mechanical shocks to the ablative material, with a 13-lb. sledge at the -90°F temperature, caused no apparent damage. Longitudinal shrinkage of the ablating material was 0.077 inches at the steel end and 0.041 inches at the aluminum end of the warhead.

TRM-2, pressurized, was placed at -65°F for 24 hours. Severe longitudinal and circumferential cracking of the ablative material occurred. No pressure leakage was detected.

Environmental Test Unit "B", pressurized, was placed in a chamber at -35°F for 24 hours. Circumferential cracking of the ablating material occurred about 14 inches from the forward end of the warhead. No leakage tests were made.

During cold temperature tests of each unit, the ablating material contracted longitudinally from each end of the warhead, a noticeable amount, and returned approximately to its original position after restabilization at ambient temperature. INVENTORIED

Procedure and Results

TRM-1 was pressurized to 150 cm Hg. absolute at ambient temperature, using the proper Helium-air mixture for use with the Consolidated type 24-210 leak detector.

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CLASSIFICATION CHANGED TO: U	AUTHORITY: W.C. Payne
PERSON CHANGING MARKING & DATE: Emeda Selah 5/28/98	RECORD ID: 985N2120
PERSON VERIFYING MARKING & DATE: W.C. Payne 5-28-98	DATED: 5/24/98

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Pressure was monitored with a Trimount mercury manometer. The unit was placed in a Heatt temperature chamber at -65°F for a period of 24 hours; periodic pressure recordings were made with the manometer. A plot of warhead pressure vs. time is shown in Fig. 1. Absolute determination of pressure loss was not possible from the manometer readings, since no warhead temperatures were monitored; however, no leaks were disclosed by the Consolidated leak detector, either before or after the cold test. No cracking of the ablating material occurred.

TRM-2 was tested exactly the same as listed above for Unit 1. The pressure-time plot is shown in Fig. 2. The ablative material on this unit was severely cracked, as shown in Figs. 3, 4 and 5. No leakage was disclosed with the Consolidated leak detector.

To gain further information concerning the ablative material, TRM-1 was re-tested at lower temperatures. The unit, unpressurized, was subjected to the following temperature conditions: -65°F for 18 hours; -75°F for 9 hours; -85°F for 15 hours; and -90°F for 6 hours. No cracks were noted in the ablative material; longitudinal shrinkage of the material was .077 inches at the steel end and .041 inches at the aluminum end. At the -90°F temperature, mechanical shock tests consisting of repeated, severe blows with a 13-pound sledge were performed on the ablating material, with no apparent damage resulting. During this test, after insertion at -69°F for 18 hours, several minute hairline surface cracks were detected in the ablative material, about 14-inches from the forward end of the warhead. Subsequent autopsy showed these cracks to be about $1\frac{1}{2}$ inches long and $1/8$ inch deep.

Environmental test Unit "B" was pressurized to 17.4 psig at ambient temperature, and placed in the Heatt chamber at -35°F for 24 hours. Circumferential cracking of the ablative material occurred (Fig. 6). No leak detection tests were performed on this unit.

During the cold tests of all three units, the ablating material contracted noticeably from each end of the warhead, but expanded to its original position after stabilization at ambient temperature.

Conclusions

No pressure leaks were noted on either of the two units monitored with leak detection equipment, indicating that the warhead seals will perform satisfactorily at low temperature.

The ablation material used in these tests can not be depended upon to withstand cracking when subjected to low temperatures. Further testing at cold temperatures will be performed.

D. G. WESTFALL - 1613-2

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J. M. Willson

1613 Project Engineers: G. M. WILLSON - 1613-3

Original Signed By
R. S. HOOPER

Approved by: R. S. HOOPER - 1613-3

GM:1613-3 sec

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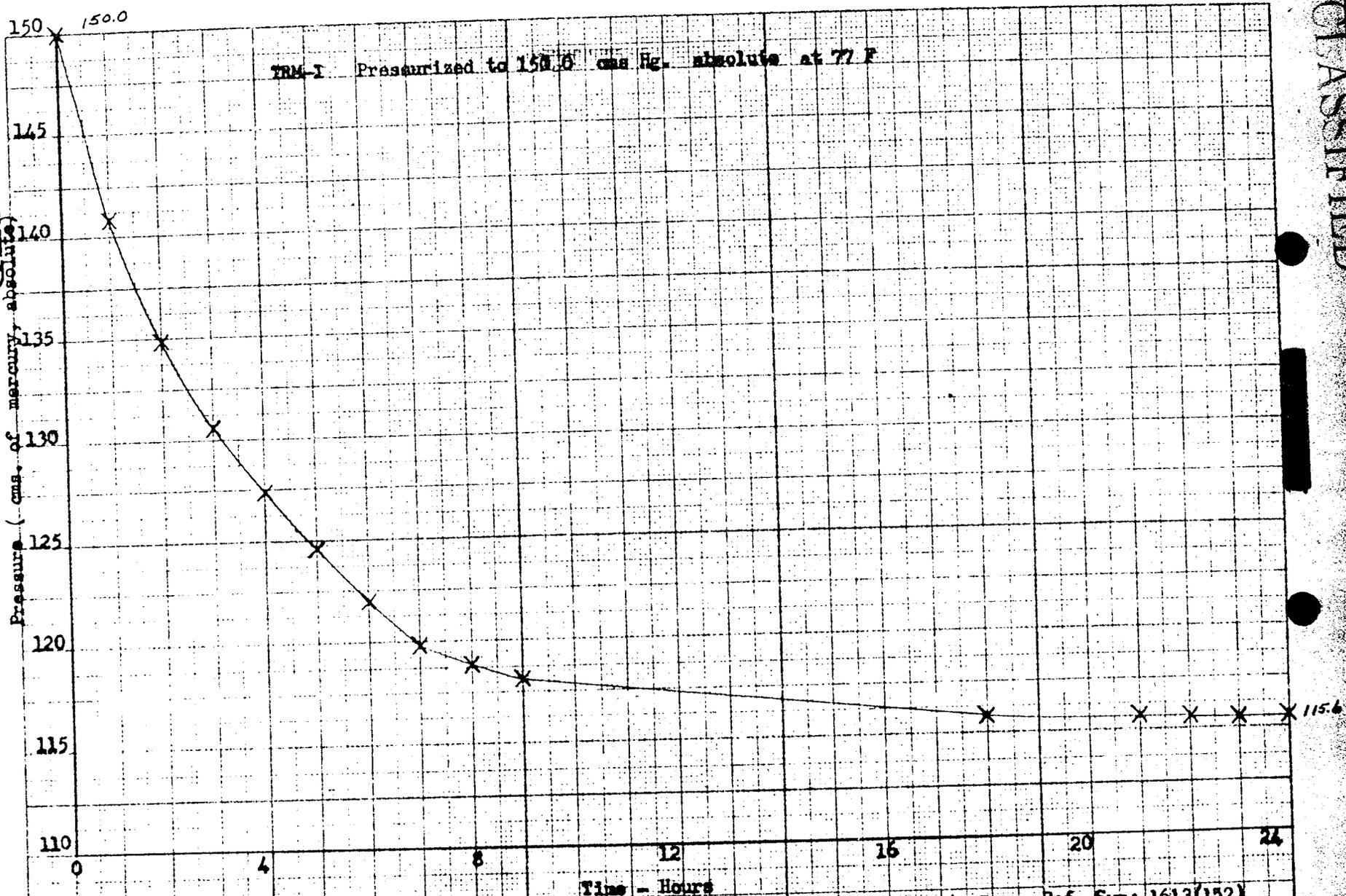
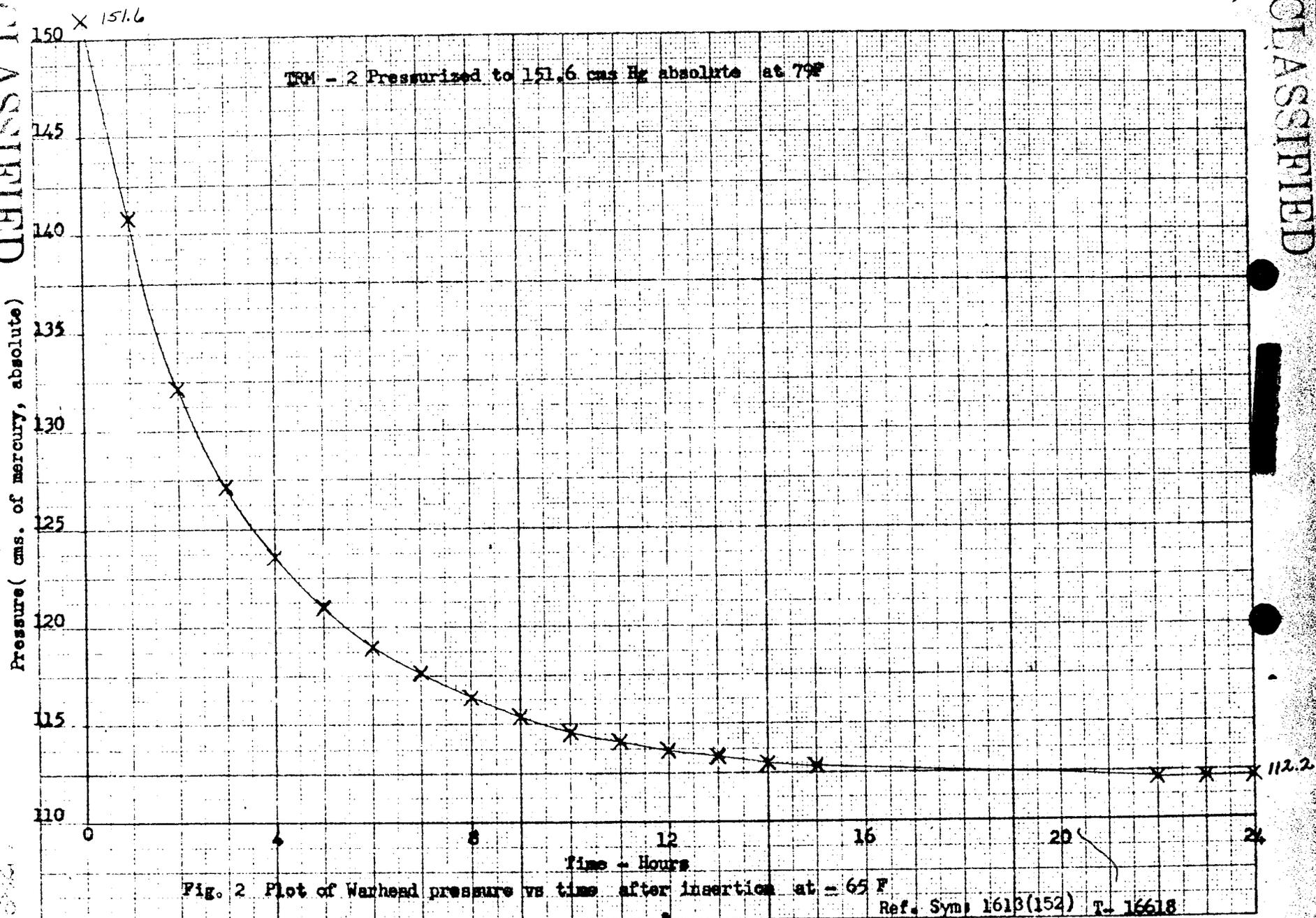


Fig. 1 Plot of Warhead pressure vs time after insertion at -65 F Ref. Syn: 1613(152)
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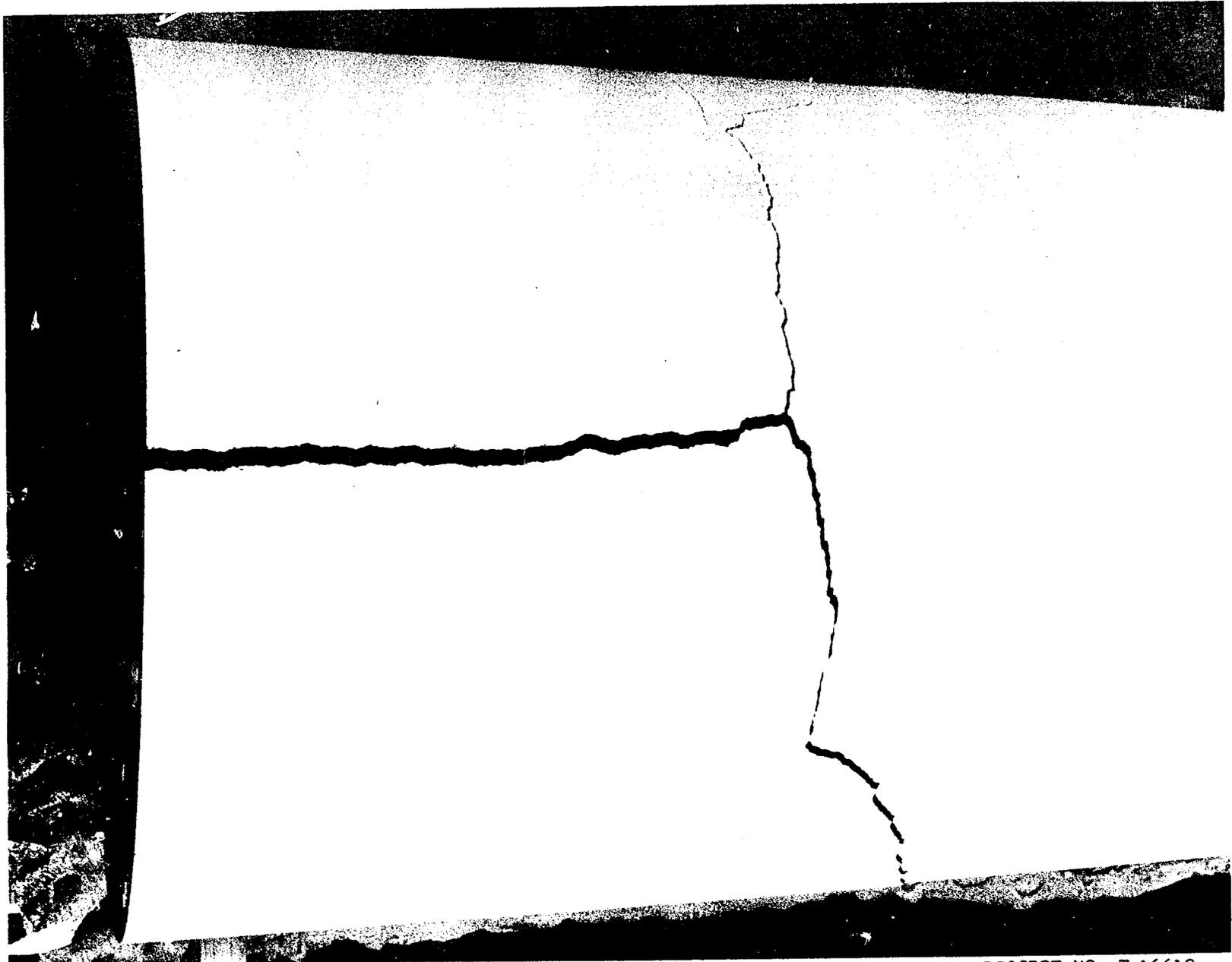


FIGURE 3 - CRACKED ABLATION MATERIAL ON TRM-2 AFTER -65°F TEMPERATURE TEST

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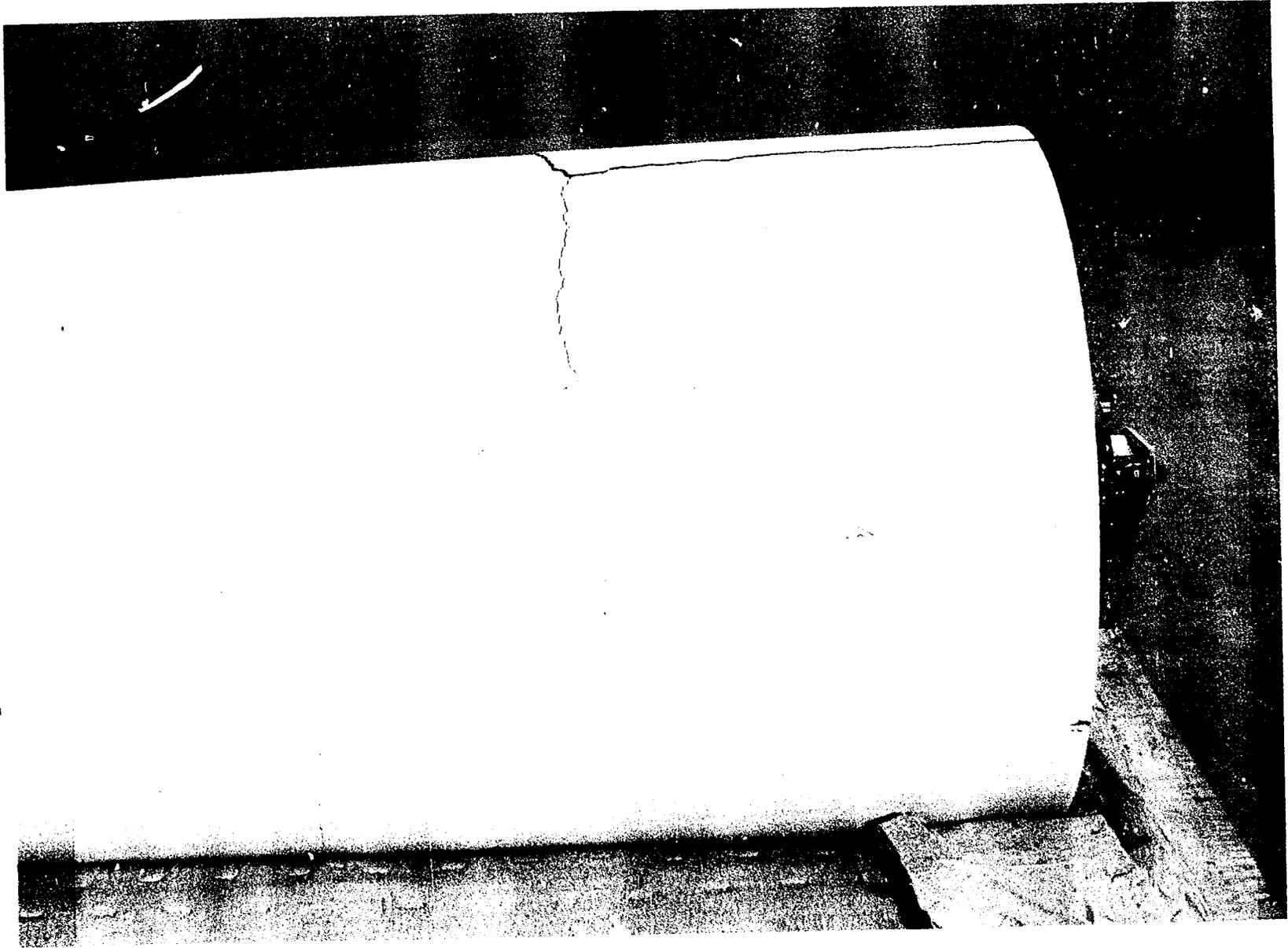


FIGURE 4 - SIDE VIEW OF CRACKED ABLATION MATERIAL ON TRM-2, AFTER -65°F TEMPERATURE TEST

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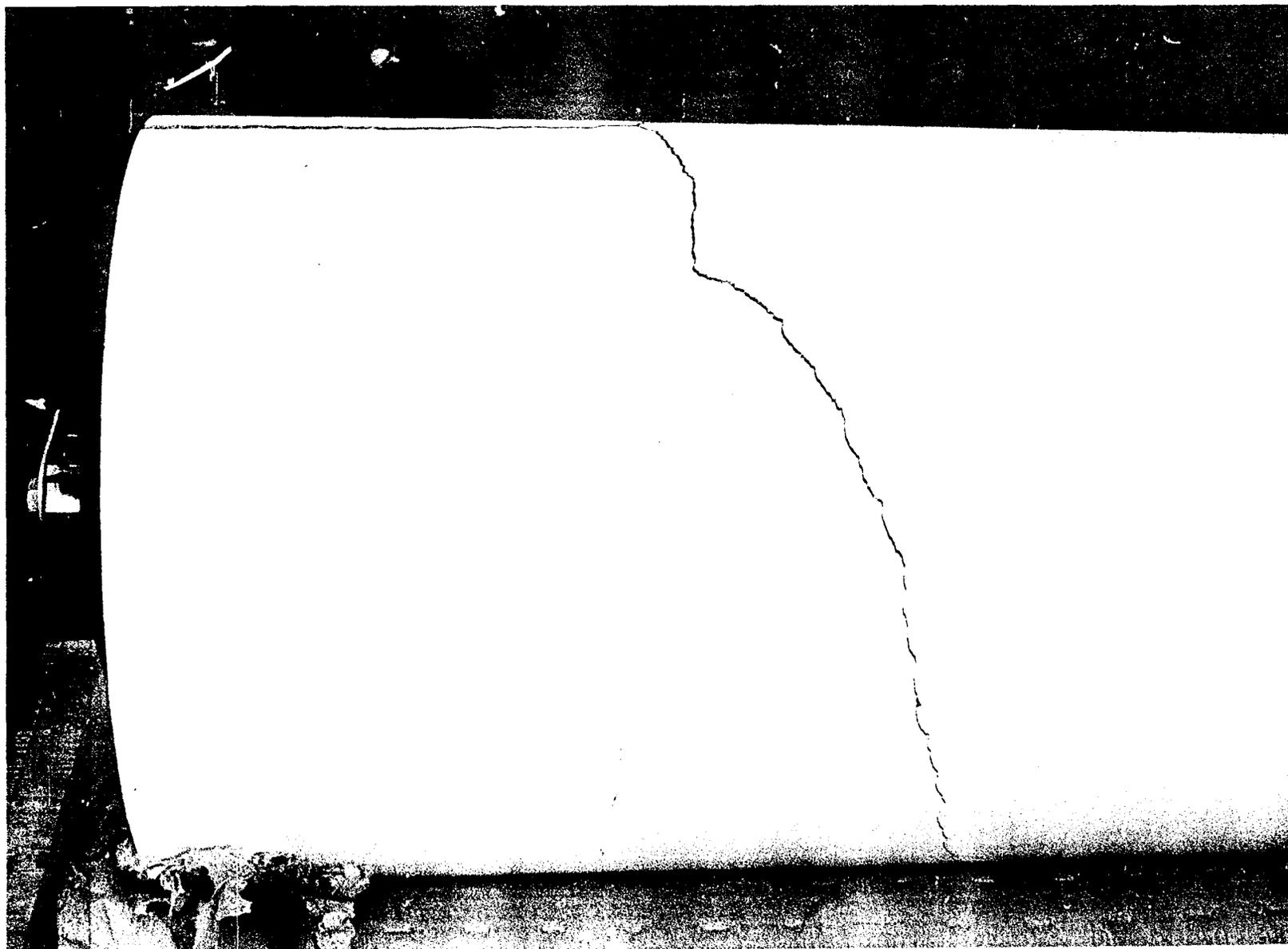


FIGURE 5 - SIDE VIEW OF CRACKED ABLATION MATERIAL ON TRM-2 AFTER -65°F TEMPERATURE TEST

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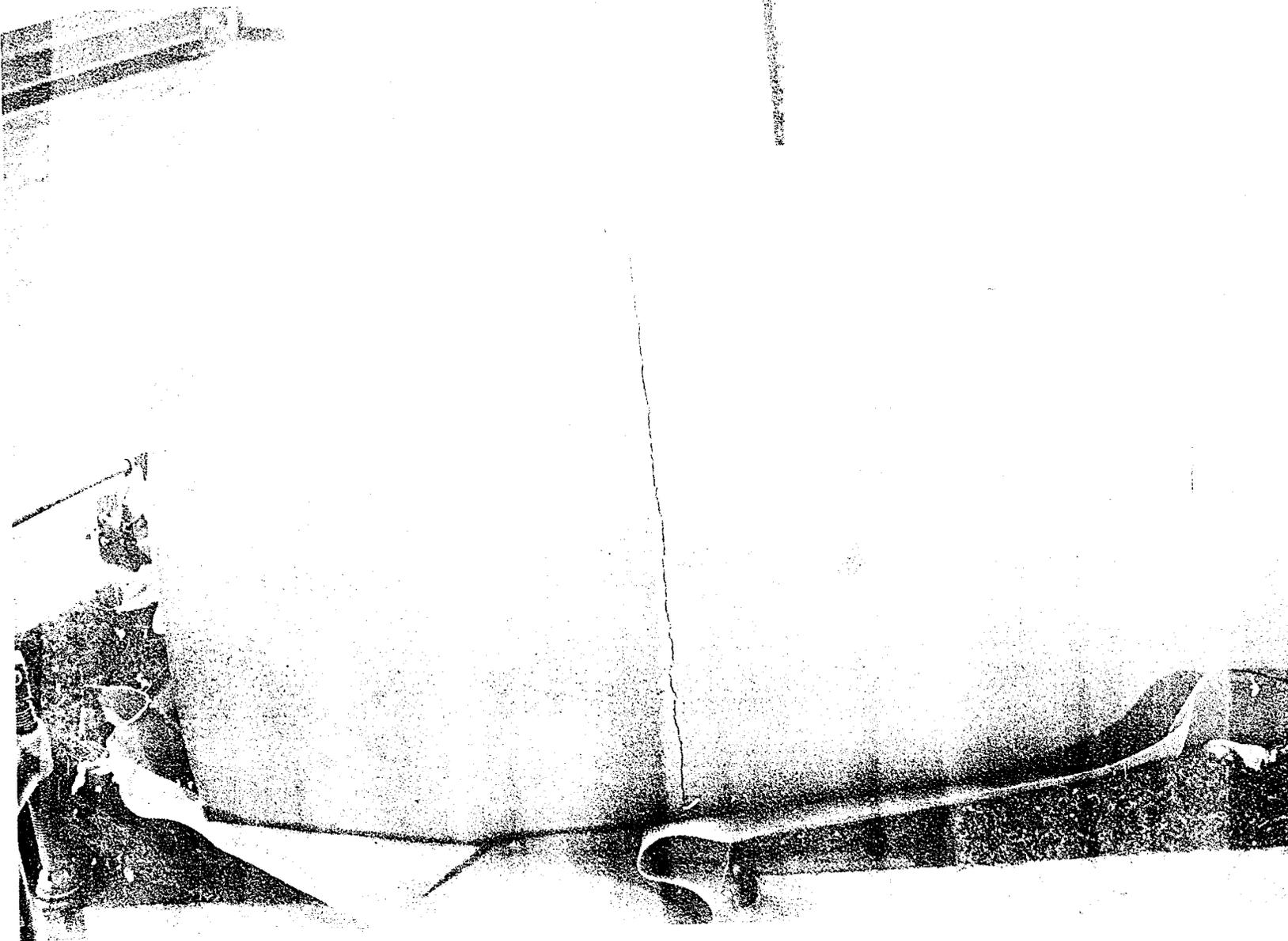


FIGURE 6 - CIRCUMFERENTIAL CRACK IN ABLATION MATERIAL ON UNIT "B", AFTER COLD TEST

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