LMEC-75-10
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FFTF SIV Qualification Test Program
Volume 2
Post-Test Disassembly, Cleaning, and Inspection

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PREFACE

This volume is the second of two volumes presenting the FFTF Secondary Isolation Valve (SIV) test program results. Volume 1 covered the test description and results. This volume covers the post-test inspection and cleaning results.

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ABSTRACT

A comprehensive test program was conducted on the FFTF 8-in. Secondary Isolation Valve (SIV) to qualify its use in the FFTF system. The tests were performed in the Small Components Test Loop/Piping and Valve Test Insert (SCTL/PVTI) facility at the Liquid Metal Engineering Center (LMEC) in accordance with Westinghouse Test Request WDTRS 26.05. Results are presented in Volume 1. Physical inspections were conducted at the conclusion of sodium testing and following an alcohol cleaning process. Results of the investigation indicate that the valve is suitable for use as an FFTF plant spare.

I. INTRODUCTION

The prototype 8-in. Secondary Isolation Valve (SIV) was designed and fabricated by the Crane Company for the Westinghouse Advanced Reactors Division (ARD). ARD provided the test criteria to LMEC with Test Request WDTRS 26.05.

In general, the test program consisted of the following:

1) Presodium service inspection
2) Sodium testing:
   a) Flow testing
   b) Leak tests
   c) Mechanical cycling
   d) Thermal transients
3) Operator testing
4) Post-sodium disassembly, inspection, and refurbishment.

The first three items are documented in Volume 1 of LMEC-75-10.* Upon completion of testing, a number of special shop tests were performed under a contract purchase order to Westinghouse. Results of those tests were shipped with the test article. This volume covers those inspections and tests (Item 4 above) performed in accordance with WDTRS 26.05.

*D. B. Miller, "FFTF SIV Qualification Test Program, Volume 1, Description and Results," LMEC-75-10, Vol 1 (August 15, 1975)

II. TECHNICAL DISCUSSION

The SIV was removed from the Small Components Test Loop (SCTL) on September 22, 1975. The inlet and outlet pipes were cut by trepanning to about 90% of the wall depth and then separating the remainder with a pipe cutter (see Figure 1).* The valve was immediately transported to the SCTL high bay and immersed in a tank full of technical-grade Dowanol (see Figure 3). The valve was visually clean on all exposed surfaces prior to immersion (see Figures 8 through 11).

The valve was soaked for 24 hr in this condition. Sodium reaction was observed to be very slight and completely ceased in about 4 hr. The cleaning mixture was then changed to 10% water by weight to accelerate the cleaning process. The reaction rate then increased dramatically over the 100% Dowanol mixture, and continued for about 3 hr. Visual inspection indicated that all exposed surfaces were clean of sodium except for a minor amount of weeping at cracks and crevices of threads or mechanical joints. The valve was then transported to the LMEC machine shop area for inspection and disassembly (see Figure 4).

The valve was disassembled according to LMEC procedures based on the Crane Co. Operating and Maintenance Manual. A Crane representative witnessed the entire procedure. Special disassembly tools were provided by Crane Co. The valve stem and disk were disconnected by grinding the disk pin weld (see Figure 9), removing the pin, and unscrewing the disk from the stem. The trapped sodium not reacted in the first immersion cleaning is shown in Figures 12 and 14. These surfaces were hand-cleaned with Dowanol. The disk remained in the valve body for reassembly.

All moving and contact surfaces were visually and dye-penetrant inspected for wear or damage during testing. The valve exhibited no signs of damage, and only a slight discoloration at the seat contact indicated any wear pattern. Penetrant inspection did not reveal any cracks or pitting in the Stellite hardfacing.

*Photographs are presented in chronological order in Section III of this report.

The valve stem and disk were then reassembled, the pin plug was welded, and the operator was assembled onto the valve. The assembly was then installed in a vertical leak test structure (see Figure 5).

A leak test with water was then performed by pressurizing under the disk to 250 psig for 4 hr. The leakage rate was considered to be negligible. From the foregoing inspection and testing results, it was judged by HEDL, Crane Co., and LMEC personnel that the valve's condition was satisfactory for use as an FFTF plant spare component.

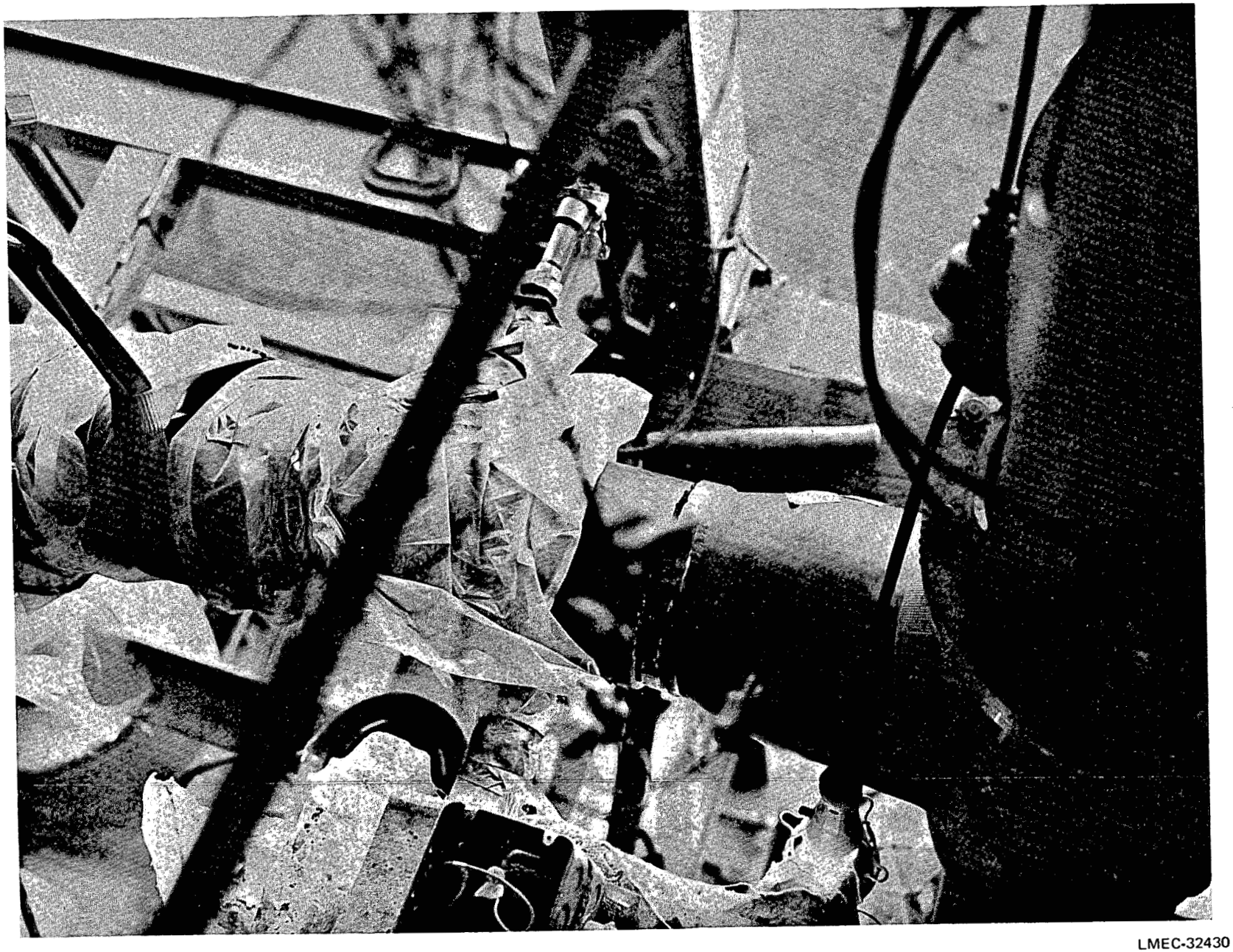
The valve operator was then removed and both components were packaged and shipped to HEDL (see Figure 6). A documentation package of all reports and procedures received or generated by LMEC for the program was included in the shipping container.

With shipment of the test article and publication of Volumes 1 and 2 of this report, the FFTF Secondary Isolation Valve Test Program is concluded at LMEC.

III. PHOTOGRAPHS

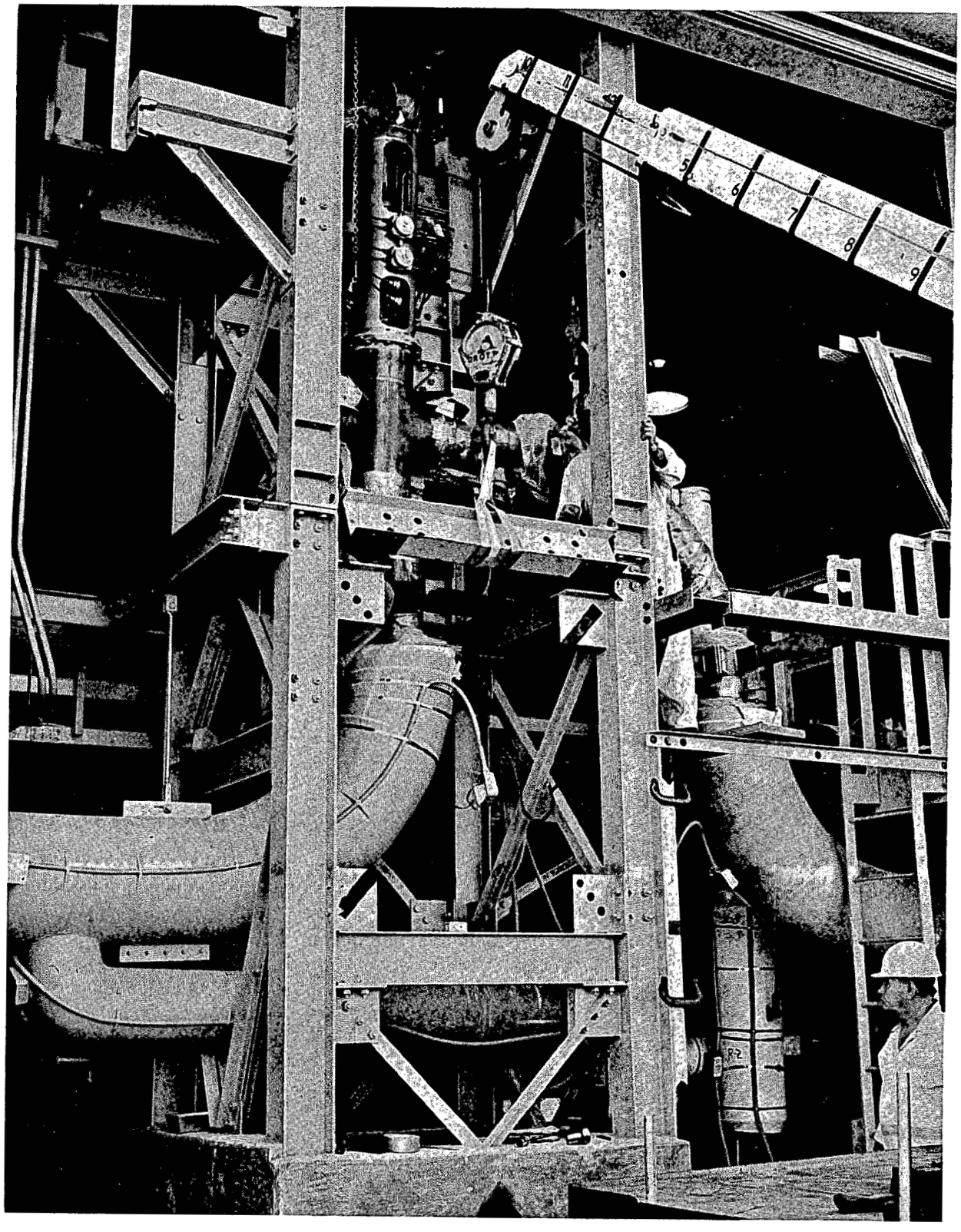
The photographs taken during post-test disassembly, cleaning, and inspection are identified in the following listing in chronological order.

Figure No.	Photograph No. LMEC-	Description
1	P32430	View showing side nozzle of SIV cut from SCTL piping
2	P32423	Support structure being removed; preparatory for lift
3	P32431	SIV being lowered into cleaning tank; checkout of alcohol metering unit
4	P32437	Disassembly of SIV
5	P44240	Seat leakage test (H_2O) on the SIV
6	P32441	SIV in shipping cradle
7	P44241	Packaged SIV in shipping cradle
8	P32445CN	View of SIV disk prior to cleaning
9	P32444CN	Closeup view of SIV disk/internals; dye penetrant added to highlight sodium deposits
10	P32443CN	View of disk bottom and disk seat
11	P32446CN	View of disk bottom/disk seat; dye penetrant added to highlight sodium deposits
12	P32448CN	View of disk disassembled from valve stem; sodium deposit in threaded cavity
13	P32449CN	Valve stem
14	P32447CN	Closeup of threaded position of valve stem showing sodium deposits



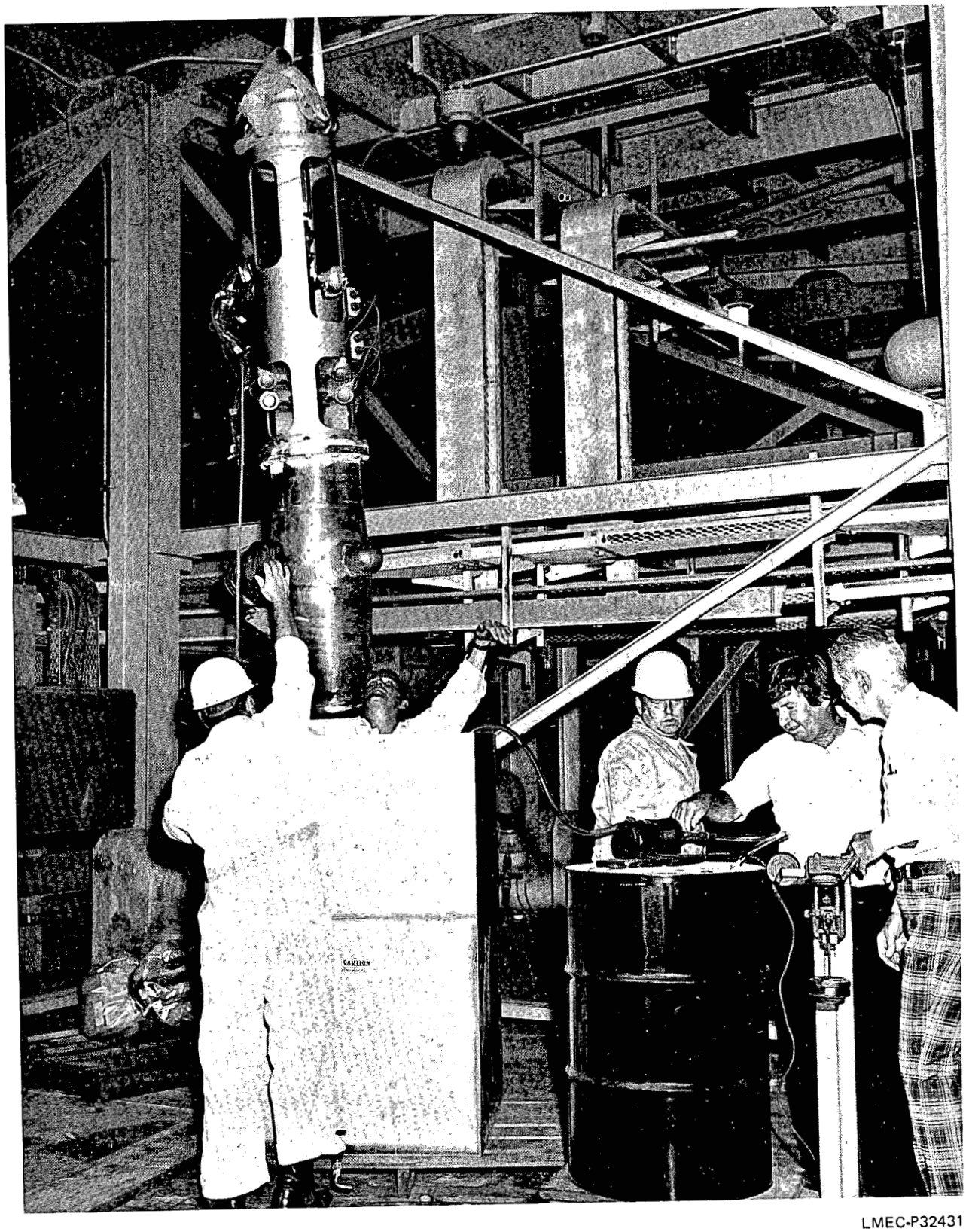
LMEC-32430

Figure 1



LMEC-P32423

Figure 2

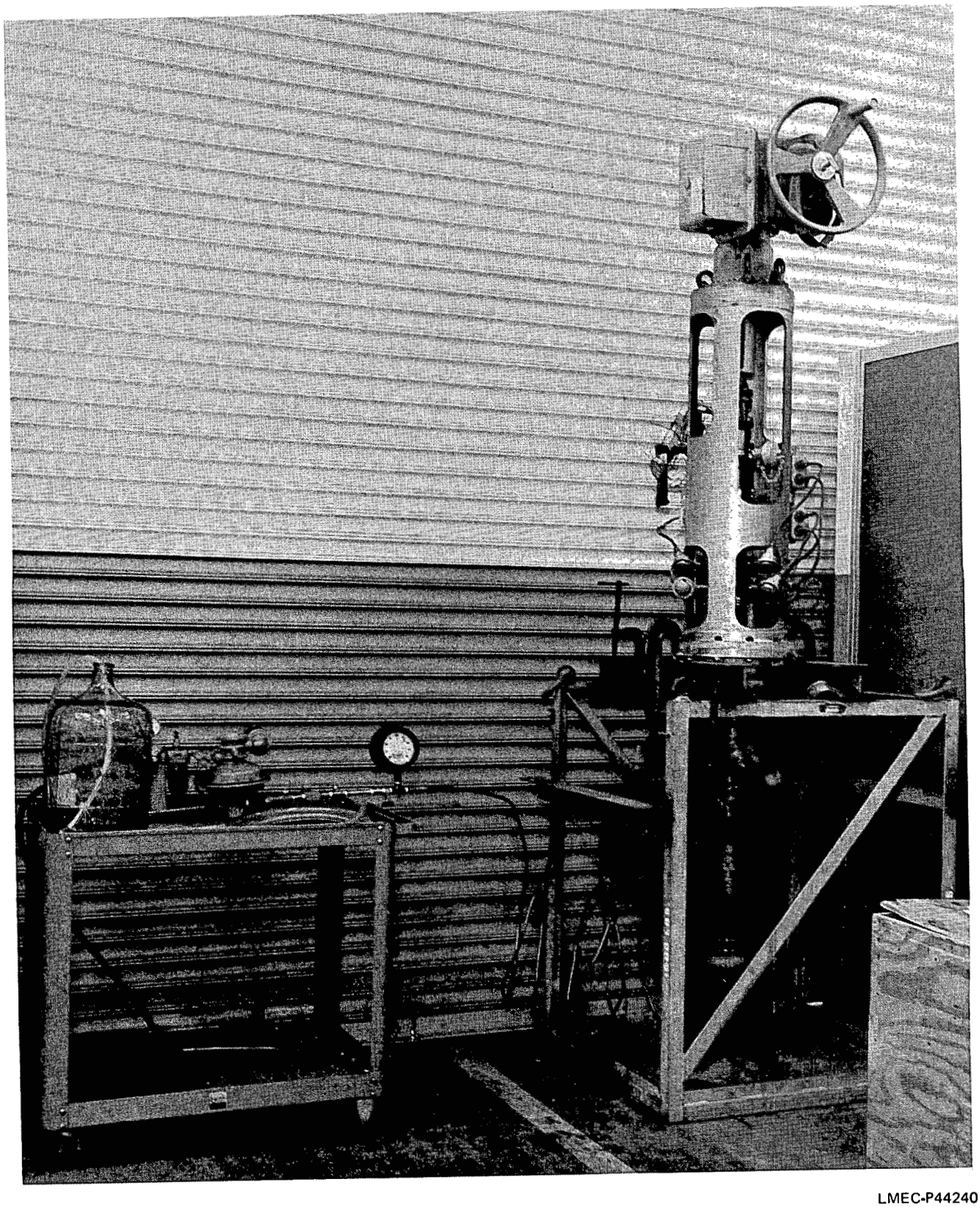


LMEC-P32431

Figure 3

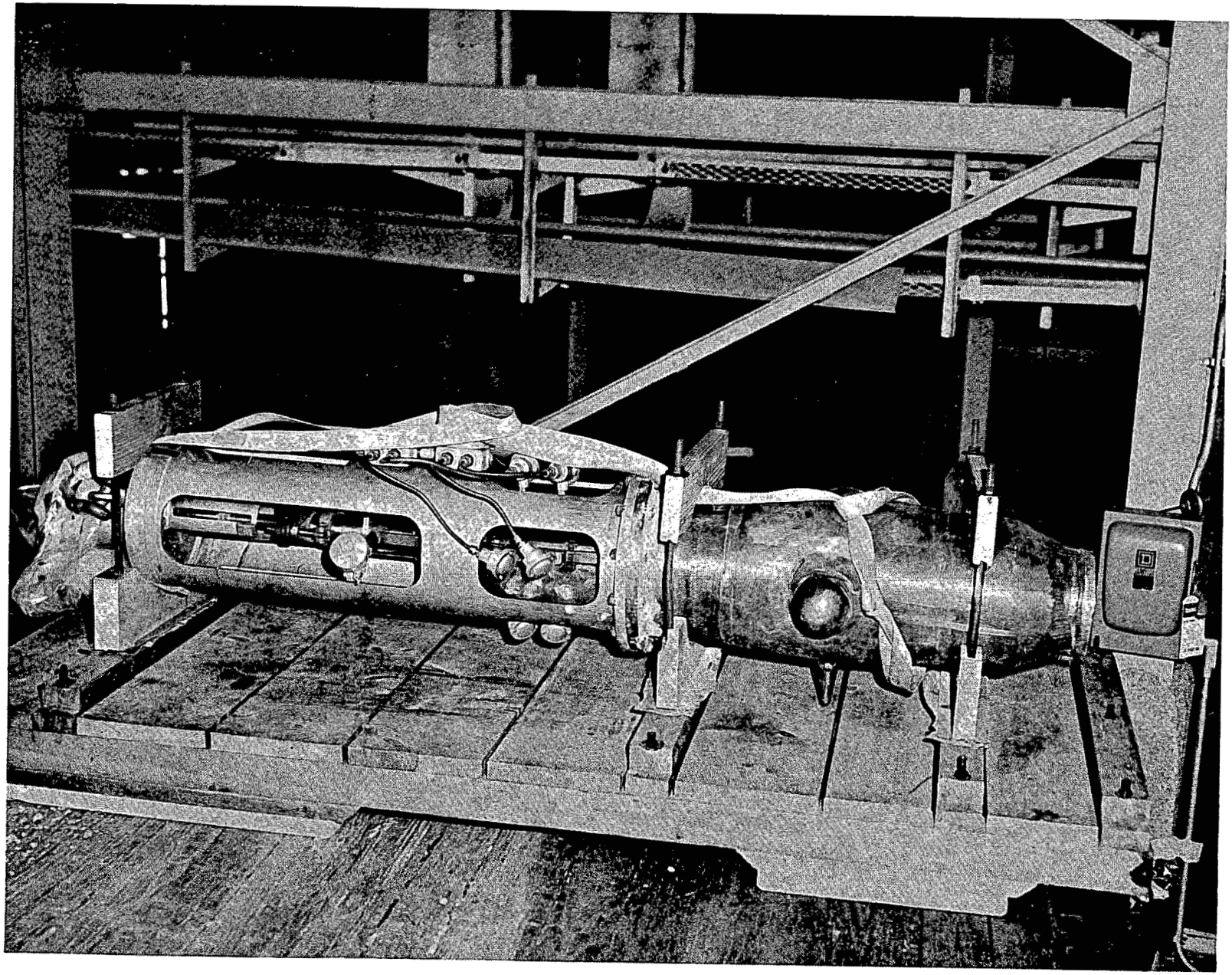
LMEC-P32437

Figure 4



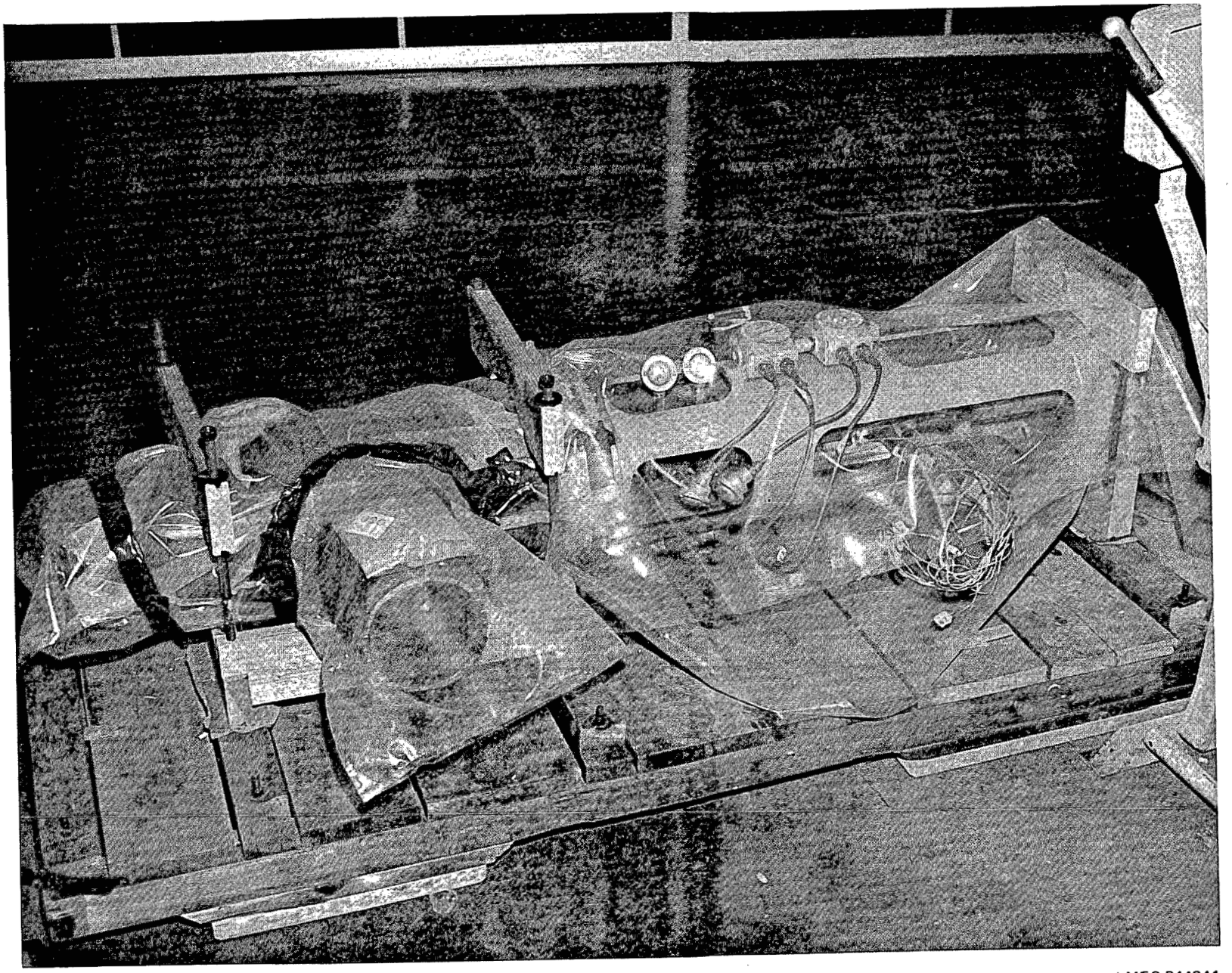
LMEC-P44240

Figure 5



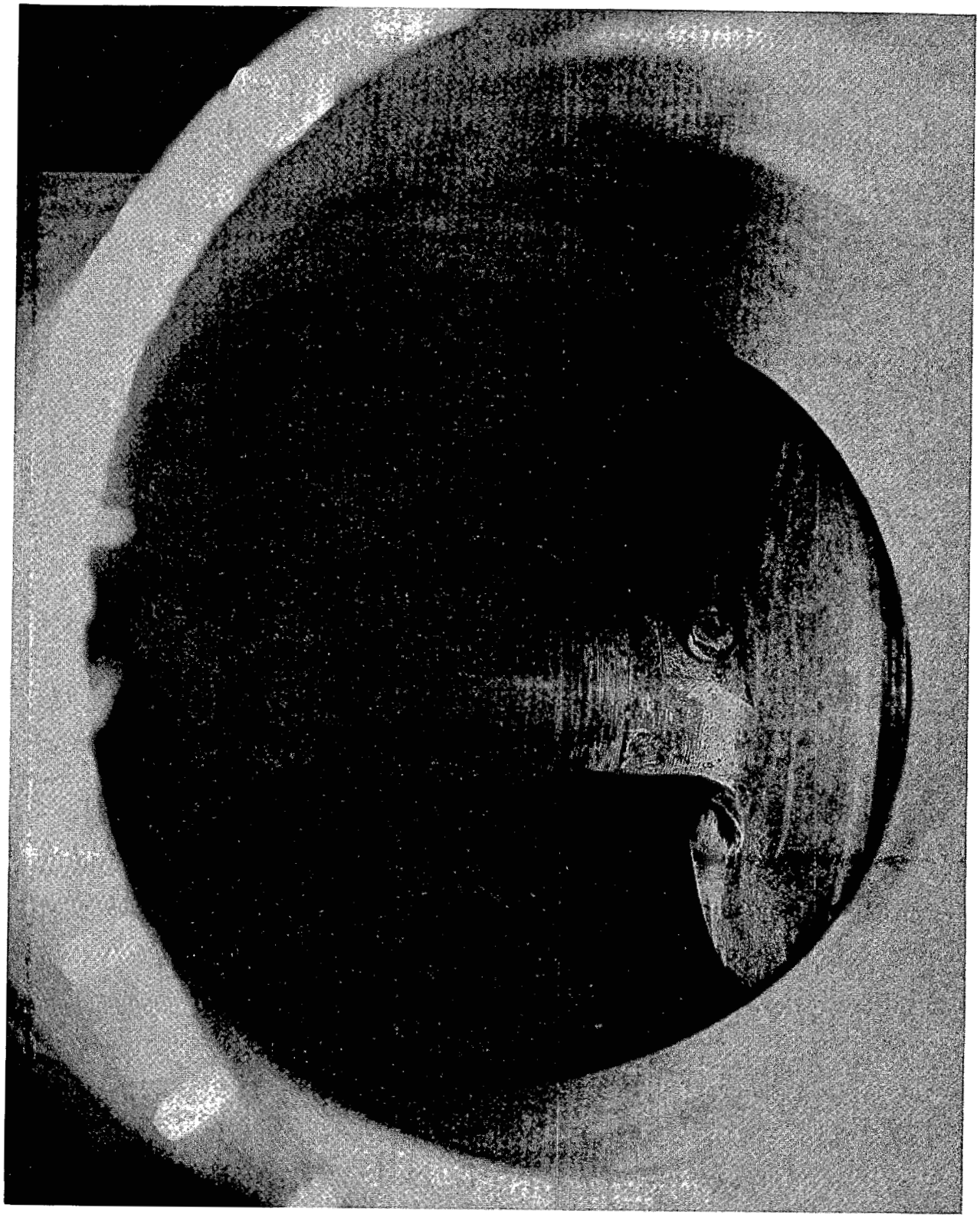
LMEC-P32441

Figure 6



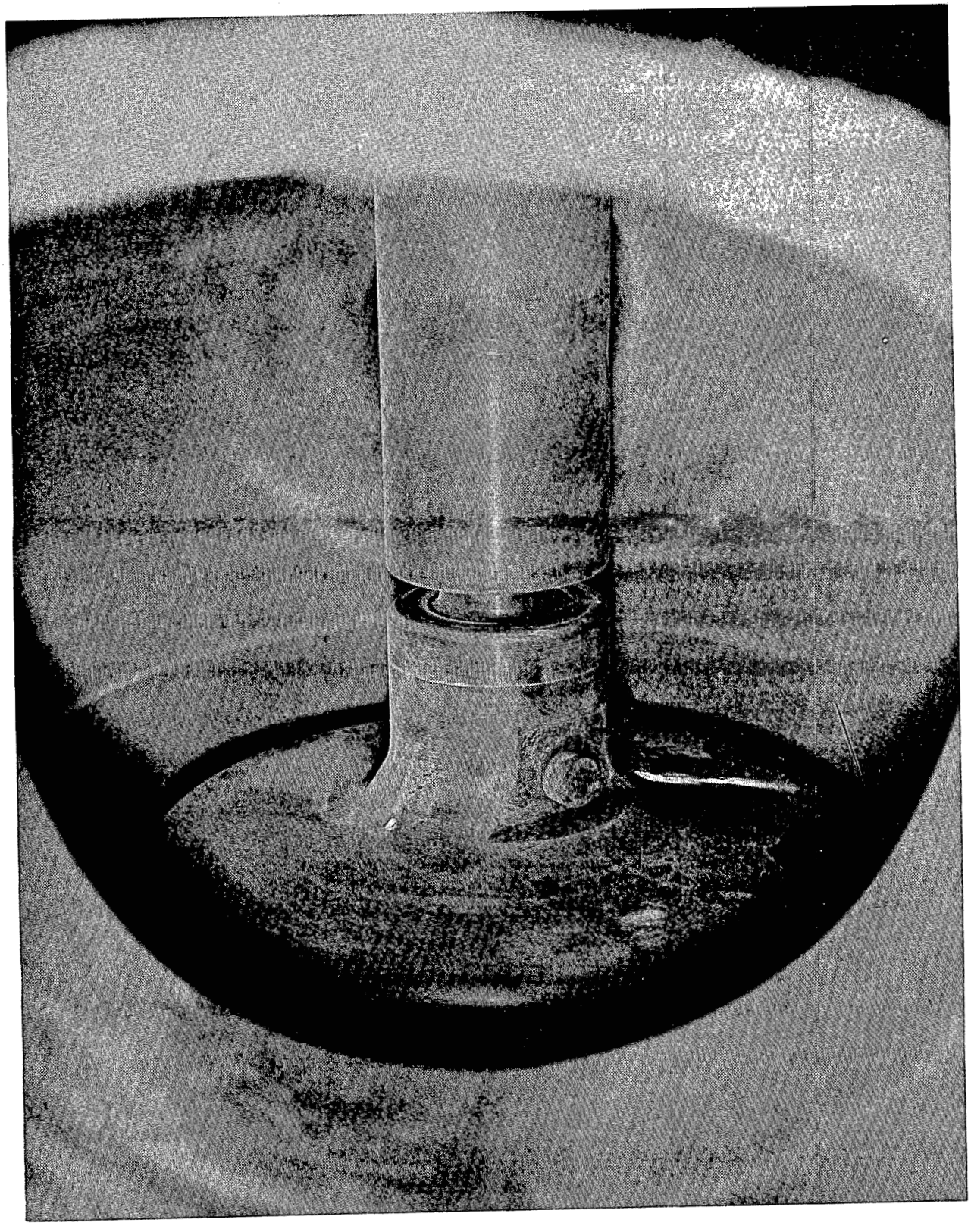
LMEC-P44241

Figure 7



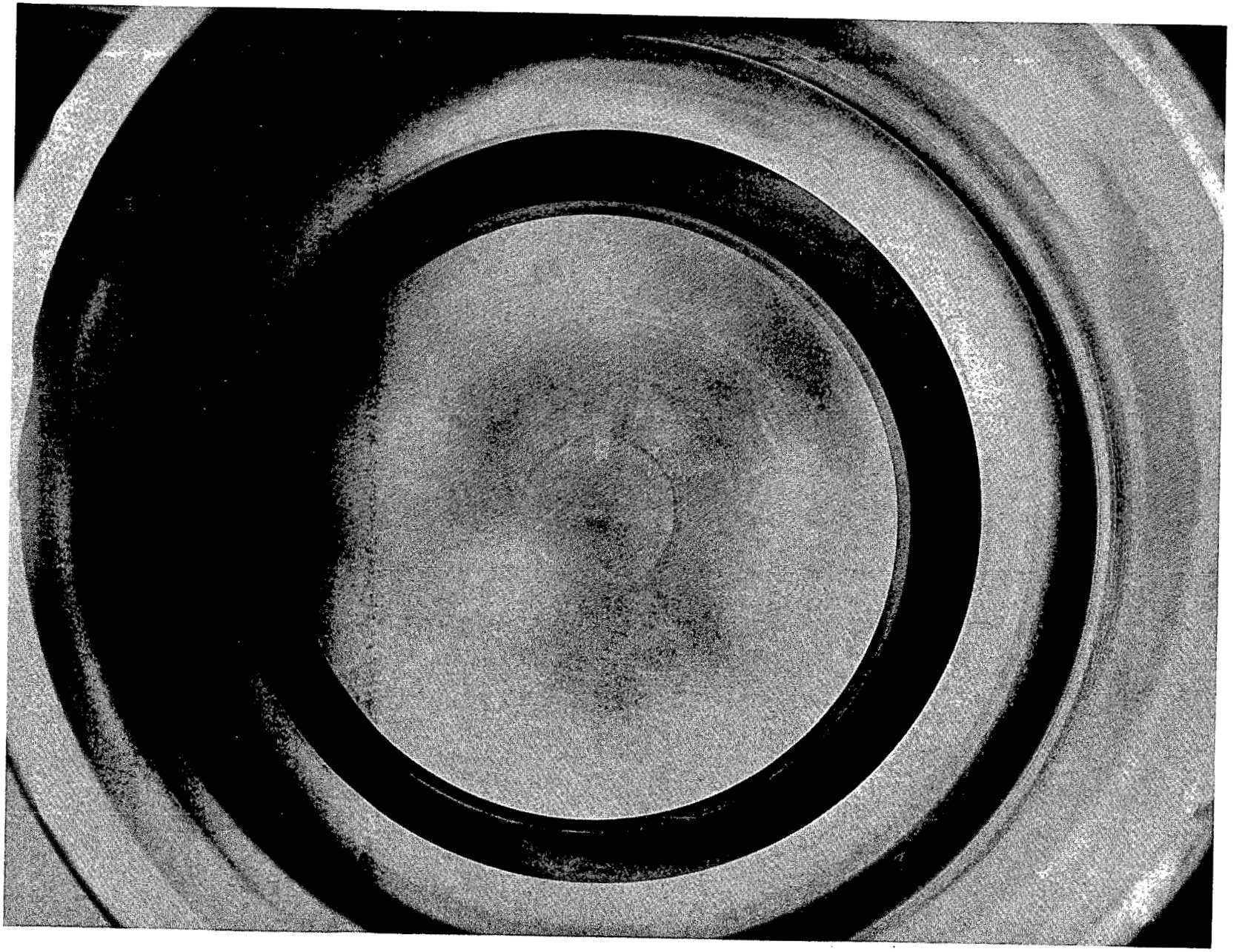
LMEC-P32445CN

Figure 8



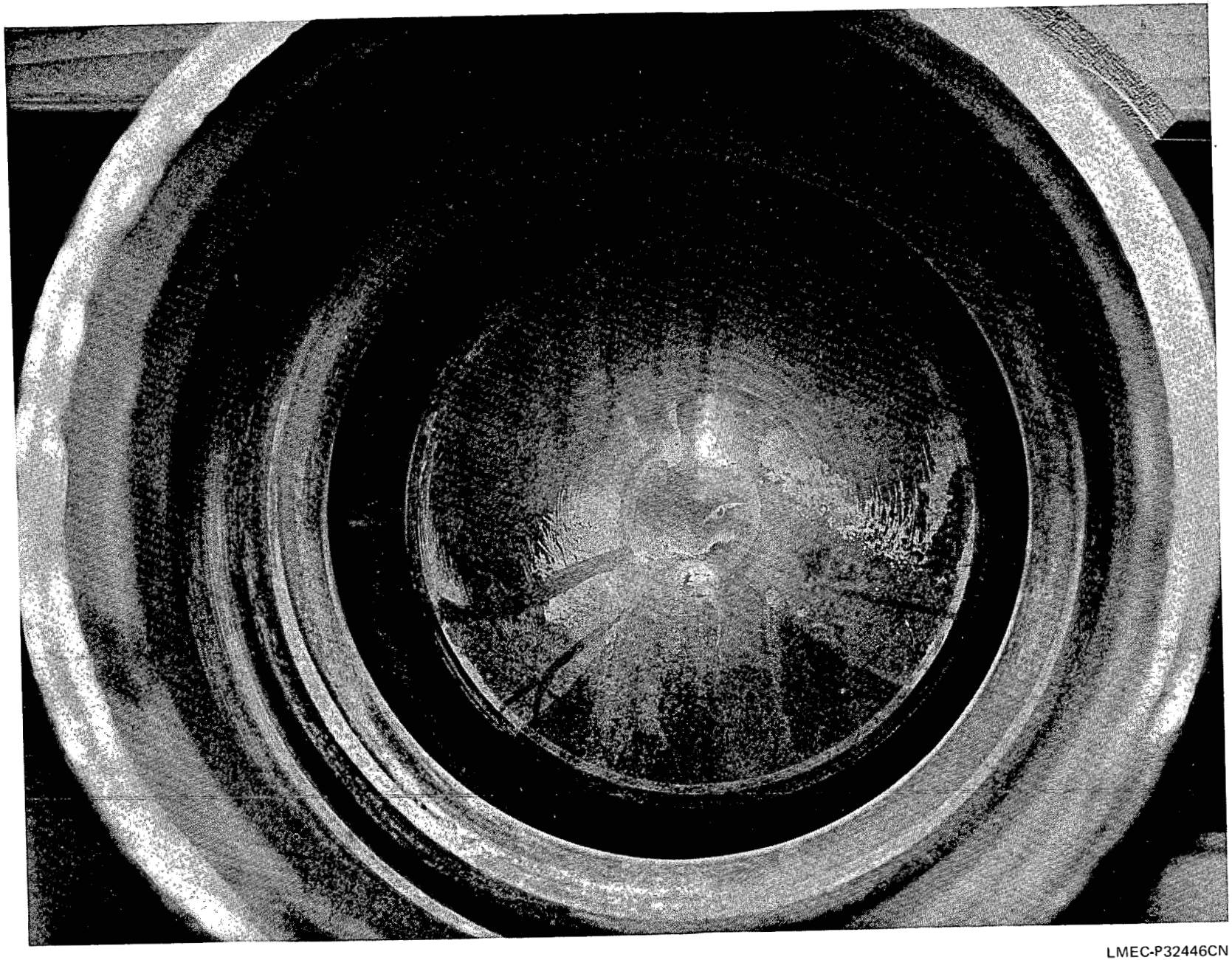
LMEC-P32444CN

Figure 9



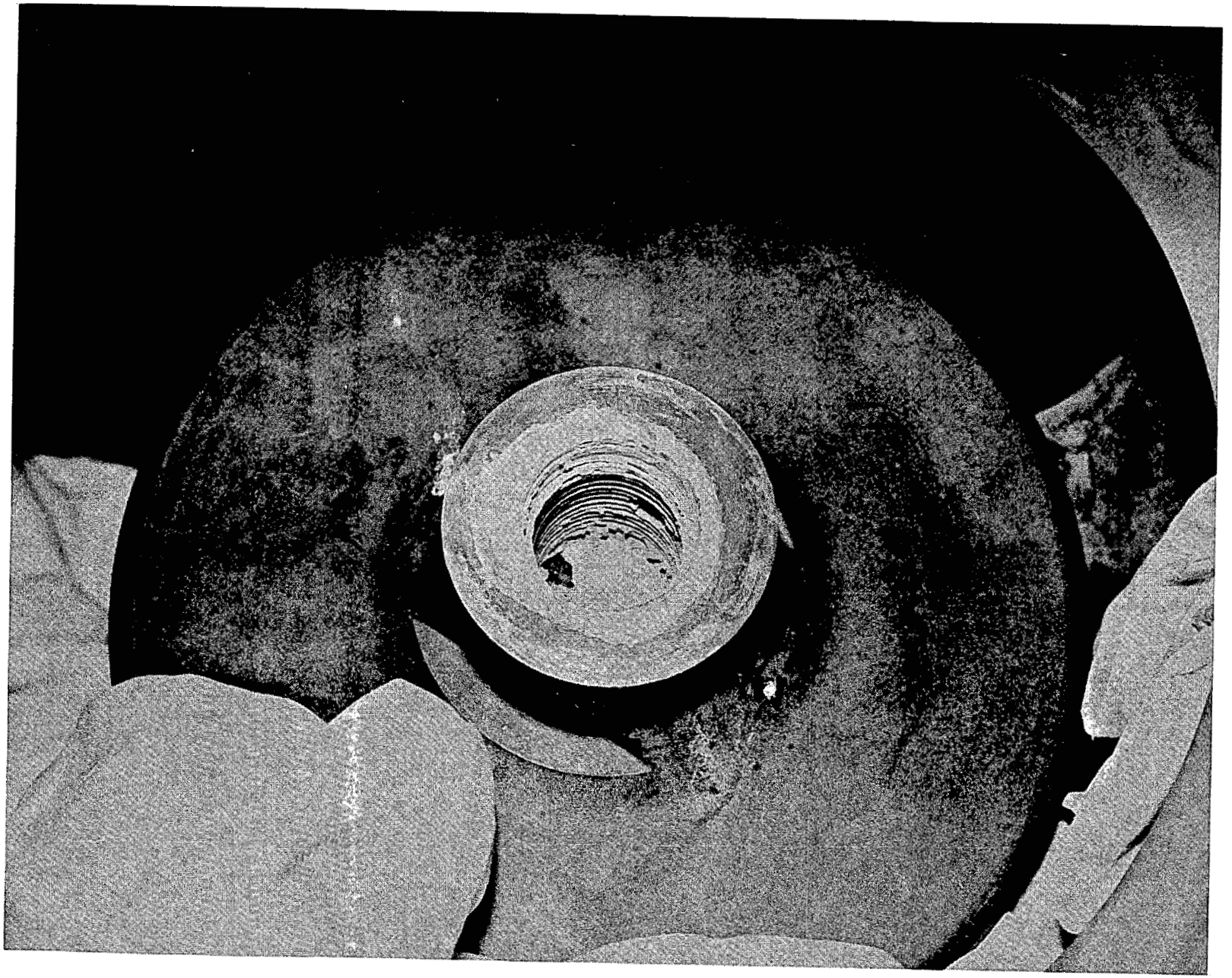
LMEC-P32443CN

Figure 10



LMEC-P32446CN

Figure 11



LMEC-P32448CN

Figure 12

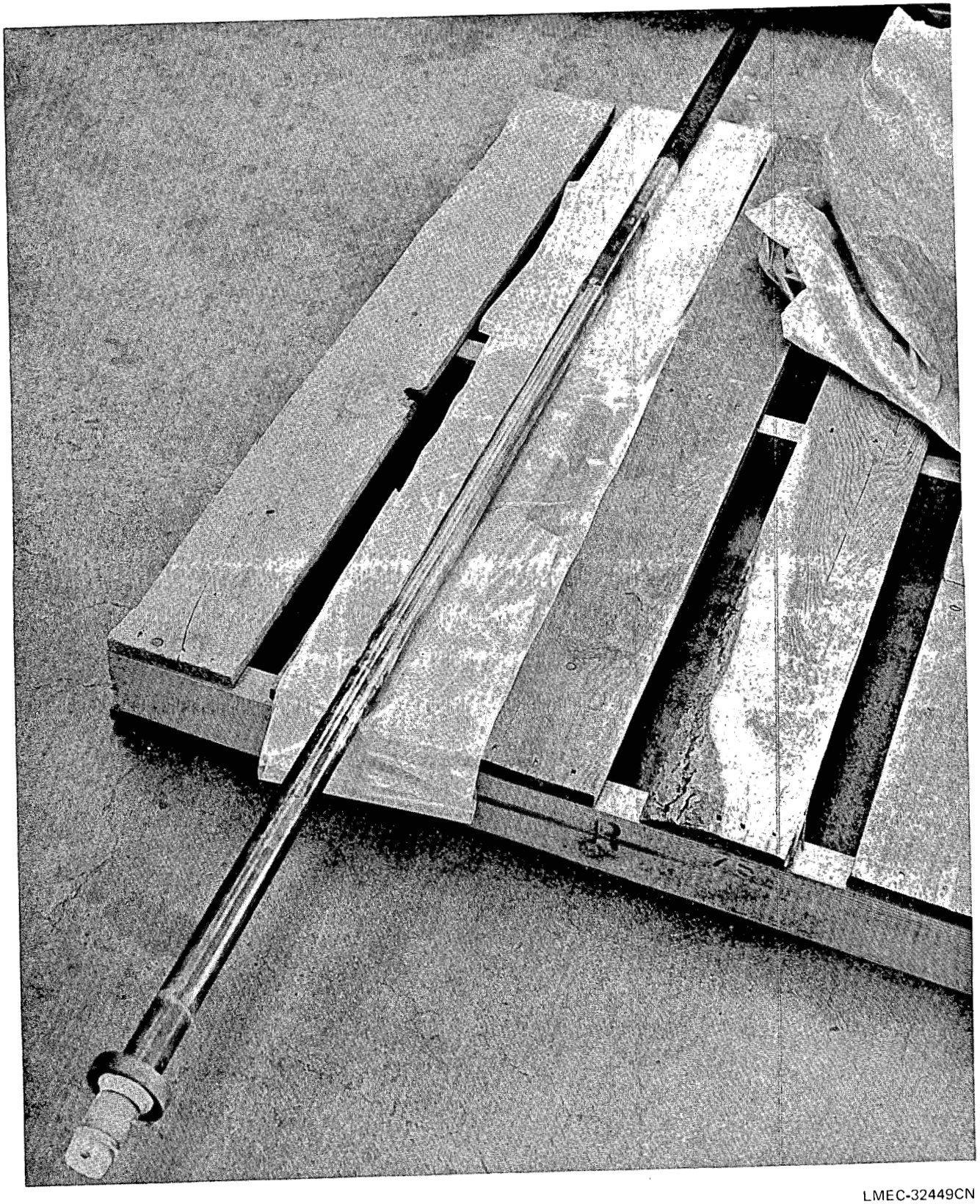


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Figure 13

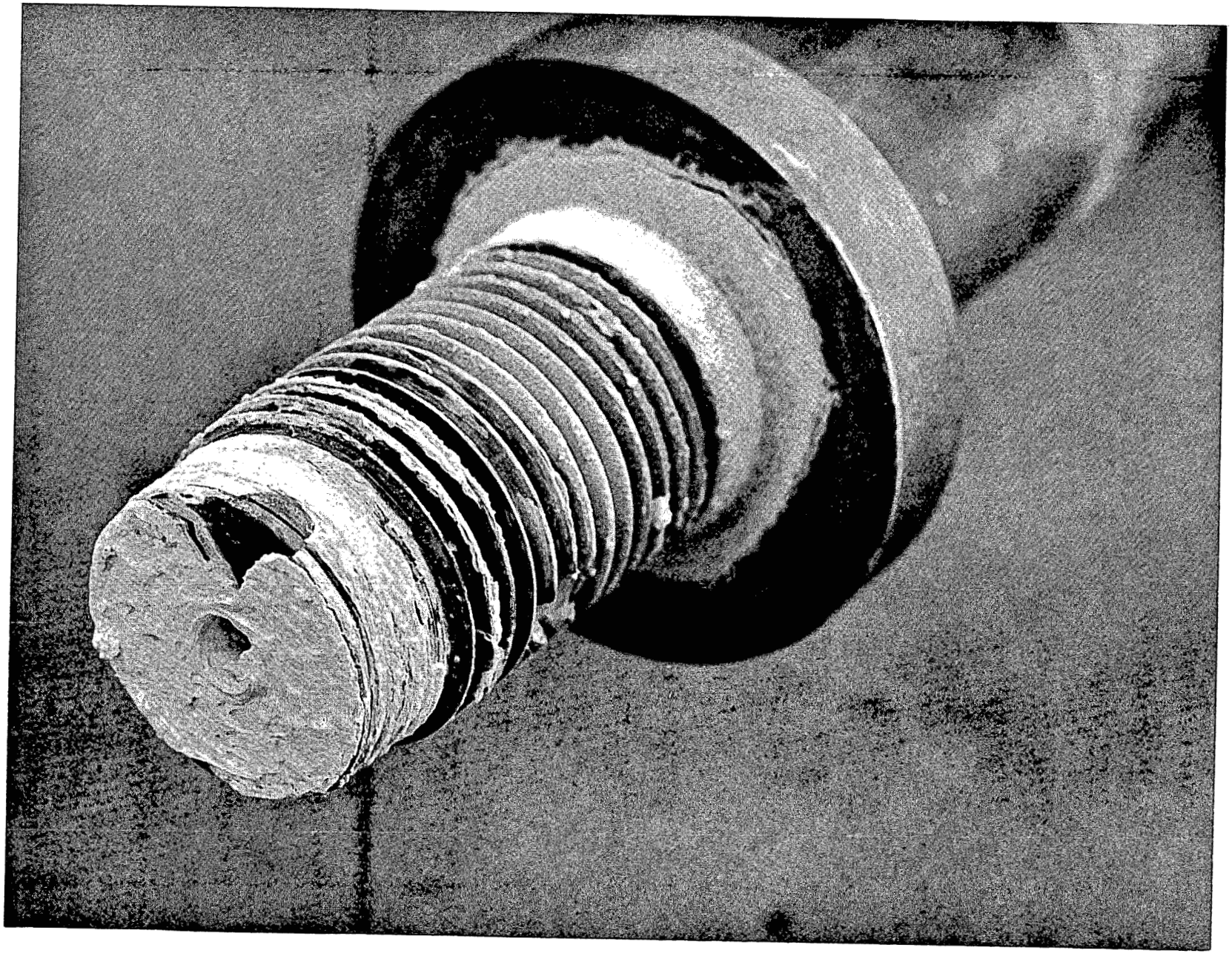

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Figure 14