

Rec'd. 2/14/91

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URANIUM HEXAFLUORIDE PRODUCT  
HANDLING AND SHIPPINGTABLE OF CONTENTS

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## 1.0 INTRODUCTION

### 1.1 Purpose

To establish the procedure for handling and processing empty and filled  $UF_6$  shipping cylinders; filling  $UF_6$  cylinders; sampling  $UF_6$ ; and inspecting, moving, and shipping 2.5-ton, 10-ton, and 14-ton cylinders containing  $UF_6$ .

### 1.2 Background

$UF_6$  from the fluorination process is collected in cold traps as a solid. The loaded cold traps are heated to liquefy the  $UF_6$ . Liquid  $UF_6$  is then drained into steel shipping cylinders. The filled cylinder is sampled, weighed, and transported to the cool down area where it is stored to allow the liquid  $UF_6$  to freeze before being shipped off-site or placed in long term storage at a different on-site location.

## 2.0 SAFETY PRECAUTIONS

Procedure Users must read and understand the following Safety Precautions which address areas of potential risk to life, limb and/or property.

The operating conditions, temperature, pressure, flow rates, etc. included in the body of the procedure are guidelines only.

The specific operating parameters as listed on the Process Parameter Sheet are to be followed.

### WARNING

=====

Do not fill, heat, empty or deliver to a carrier for transport. 48-inch and 30-inch  $UF_6$  cylinders fitted with Superior Model 11246 valves showing a small raised "8", Rego "LH" or DESCOTE "No. 1000 M14-1-51."

WARNING

If the weight of  $UF_6$  in a 30-inch or 48-inch diameter cylinder exceeds by more than 100 pounds and 500 pounds respectively, the maximum fill weights noted in Table I below and as specified in ORO-651, "Uranium Hexafluoride: Handling Procedures and Container Description," Revision 5, September 1987, heating of the cylinder in either a steam chest or an autoclave shall not be allowed without specific procedures approved by the Senior Vice President. The Licensee shall notify NRC of any cylinder filled in excess of these weights and planned remedial action. Heating of other cylinder types containing  $UF_6$  in excess of ORO-651 limits shall not be permitted without special procedures approved by the Senior Vice President, Sequoyah Facility.

TABLE

Cylinder Designation	ORO-651 Maximum Net Weight (lbs)
5A	55
30A	4,950
30B	5,020
48X, 48A	21,030
48Y	27,560

==NOTE==

Always use a torque wrench on  $UF_6$  valve packing nuts.

Only a six-point socket wrench shall be used to apply or break the torque on the nut. The torque for initial packing compaction shall be in the range of 120 to 150 foot-pounds as measured by an indicating torque wrench.

If leakage at the valve stem occurs, the packing nut may be retightened. However, excessive force is not to be used in an attempt to eliminate the leak. The maximum torque permitted for retightening the packing nut is 150 foot pounds.

Any Superior, Rego or French Descote  $UF_6$  cylinder valves that are found with a cracked packing nut should be reported to the Quality Assurance Inspector.

**WARNING**

Do not fill, heat, empty, or deliver to a carrier for transport 48-inch and 30-inch uranium hexafluoride cylinders fitted with Superior Valve Company 1-inch valves manufactured in Superior Valve Company Lots numbered 17 through 22.

The Lot numbers are approximately 1/8-inch figures on the side of the valve castings.

- 2.1 Chemical resistant gloves must be worn when disconnecting the drain line, "pigtails," or sample cylinders to guard against HF contact. Breathing Air Apparatus must be available.

**==NOTE==**

The Operator should wear a full face ~~mask~~ or type respirator when loosening and separating drain line fittings (including pigtail connections) that may contain residual UF<sub>6</sub>.

Normal practice will be to leave the weigh valve open and in the evacuating mode when the drain header and the filter is not in service. Each time the scale cart is moved out of position the fill valve will automatically close, so each time the cart is re-positioned back in the station the fill valve must be reopened by manually pushing the open switch.

- 2.2 A dust collector hose is provided to be mounted over the pigtail connection to capture any product which may be released.

When removing the dust collector hose from the open end of a pigtail always do it with caution, and replace the hose over the pigtail if UF<sub>6</sub> is visible.

- 2.3 Never move a cylinder cart while it is connected to the pigtails. Breaking a pigtail during draining will cause a major UF<sub>6</sub> release. To prevent cart movement, two interlocks are provided.

2.3.1 The cart drive motor has a lock "off" switch and the key ring must be placed around the pigtail before making the pigtail connection to the cylinder valve.

2.3.2 The cart scale plug-in receptacle is interlocked so that the cart drive will not operate when the scale is plugged in.



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- 2.4 The UF<sub>6</sub> cold trap drain header "fill valve" is safety interlocked by photoelectric eye to remain closed unless the cylinder cart is properly positioned on the scale platform.
- 2.5 Localized heating of a manifold system to remove a UF<sub>6</sub> plug can be hazardous. Liquefying a quantity of UF<sub>6</sub> in a restricted space, such as between two solid UF<sub>6</sub> sections or between two closed valves, can readily result in hydraulic rupture of the system and UF<sub>6</sub> release. Localized heating if required must be done under the specific direction of the Shift Supervisor.
- 2.6 Confinement Room: The room in which the UF<sub>6</sub> cylinders are filled is designed to confine UF<sub>6</sub> leaks. The confinement room overhead door can be operated from the following three locations: 1) the field control panel; 2) the field station at the N.E. corner (outside) of the room; and 3) the Control Room. The door will normally remain open, and should not be closed unless there is a UF<sub>6</sub> leak which requires confinement. Closure of the overhead door will normally be initiated by the field operator assigned to the fill station.
- The overhead door must not be closed by the Control Room operator until he has confirmed (by radio, etc.) that all personnel have exited the confinement room.
- 2.7 Cylinder Filling Limit Interlock: Each fill station is equipped with a dual scale weighing system. Each scale has an adjustable interlock that will close the "weigh valve" in the cold trap drain line to the cylinder being filled. The weight limit interlock will be set according to the cylinder size.

## 3.0 REFERENCES

- 3.1 Uranium Hexafluoride: Handling Procedures and Container Descriptions, ORO-651 Rev. 5, September 1987, Oak Ridge Operations, United States Department of Energy.
- 3.2 Operating Procedure, E-101, "Hydrogen Fluoride (HF) Release"
- 3.3 Operating Procedure, E-102, "Uranium Hexafluoride (UF<sub>6</sub>) Release"
- 3.4 Operating Procedure, G-160, "Health and Safety Precautions and Requirements"
- 3.5 Operating Procedure, N-280-5, "UF<sub>6</sub> Cylinder Steam Chest Operation"
- 3.6 Operating Procedure, N-280-7, "Tamper Detecting Devices for UF<sub>6</sub> Cylinder"

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(Corrected 02/05/90)

- 3.7 Operating Procedure, G-310, "Fork Truck Inspection"
- 3.8 Operating Procedure, G-404, "Quality Assurance for UF<sub>6</sub> Shipping Cylinders"
- 3.9 MSDS, Uranium Hexafluoride (UF<sub>6</sub>)
- 3.10 MSDS, Hydrogen Fluoride (HF)
- 3.11 ANSI, N-14.1 (Uranium Hexafluoride-Packaging for Transport)
- \* 3.12 NRC License SUB-1010 including condition #15 and Special Process Commitments #14, #15 and #16.

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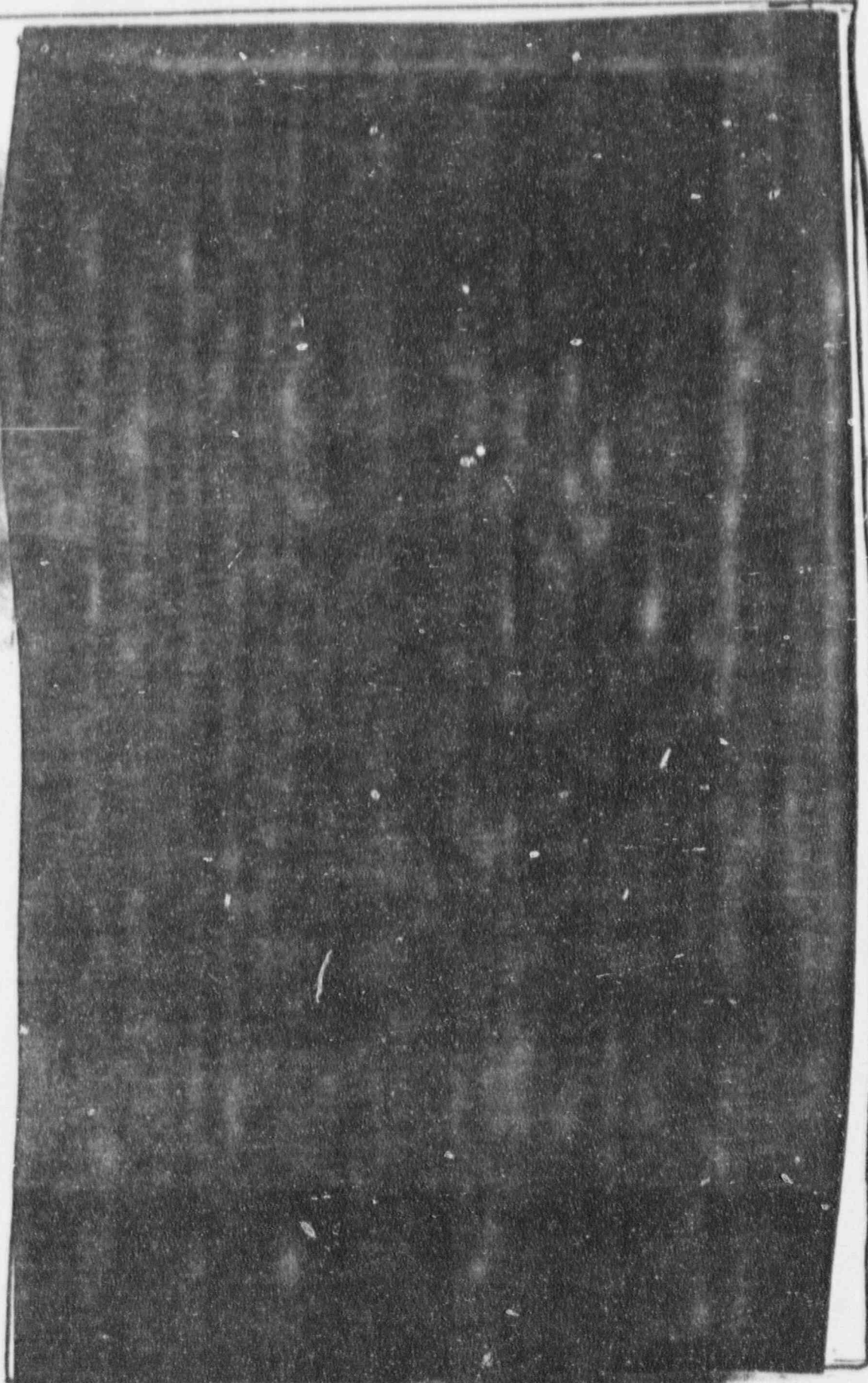
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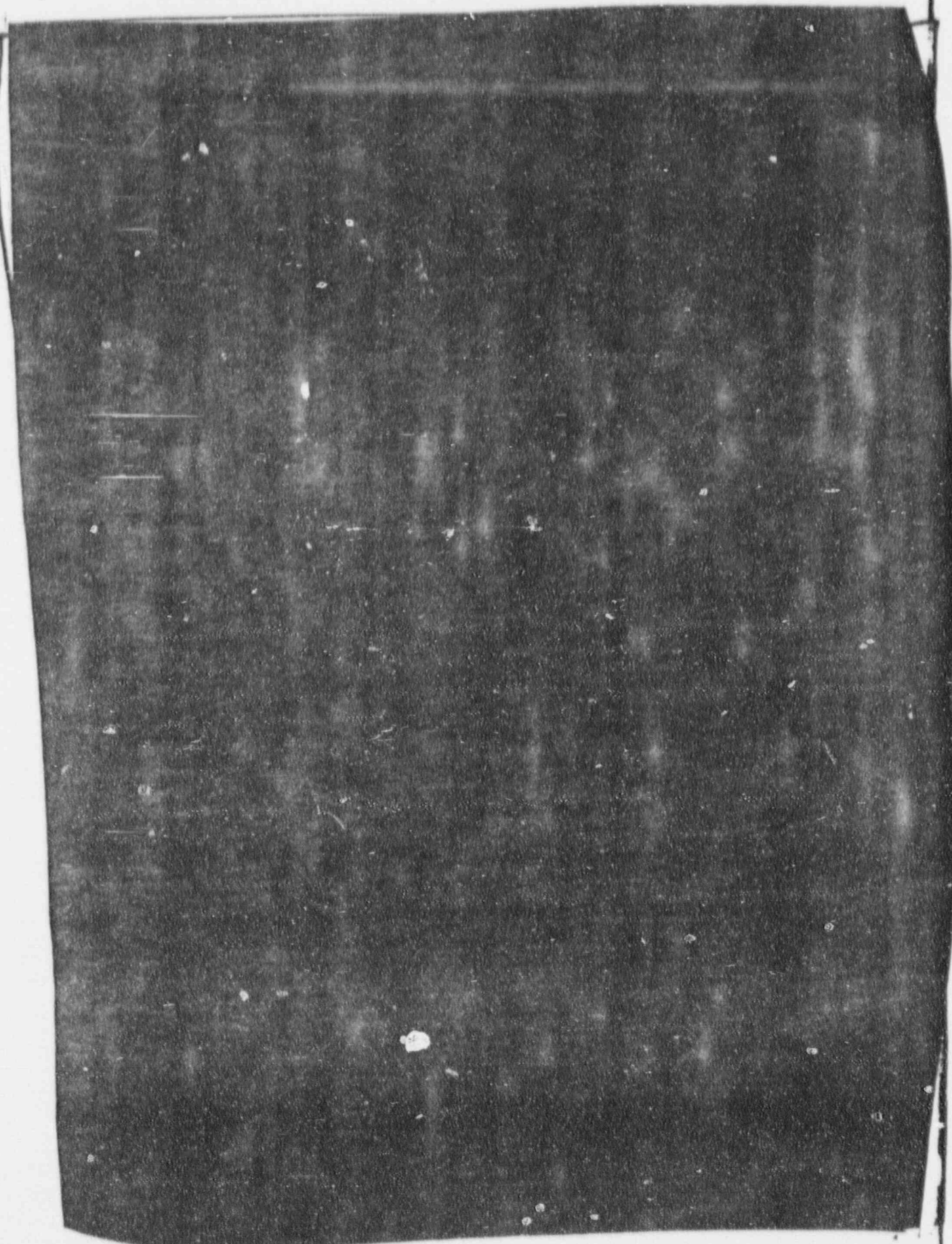
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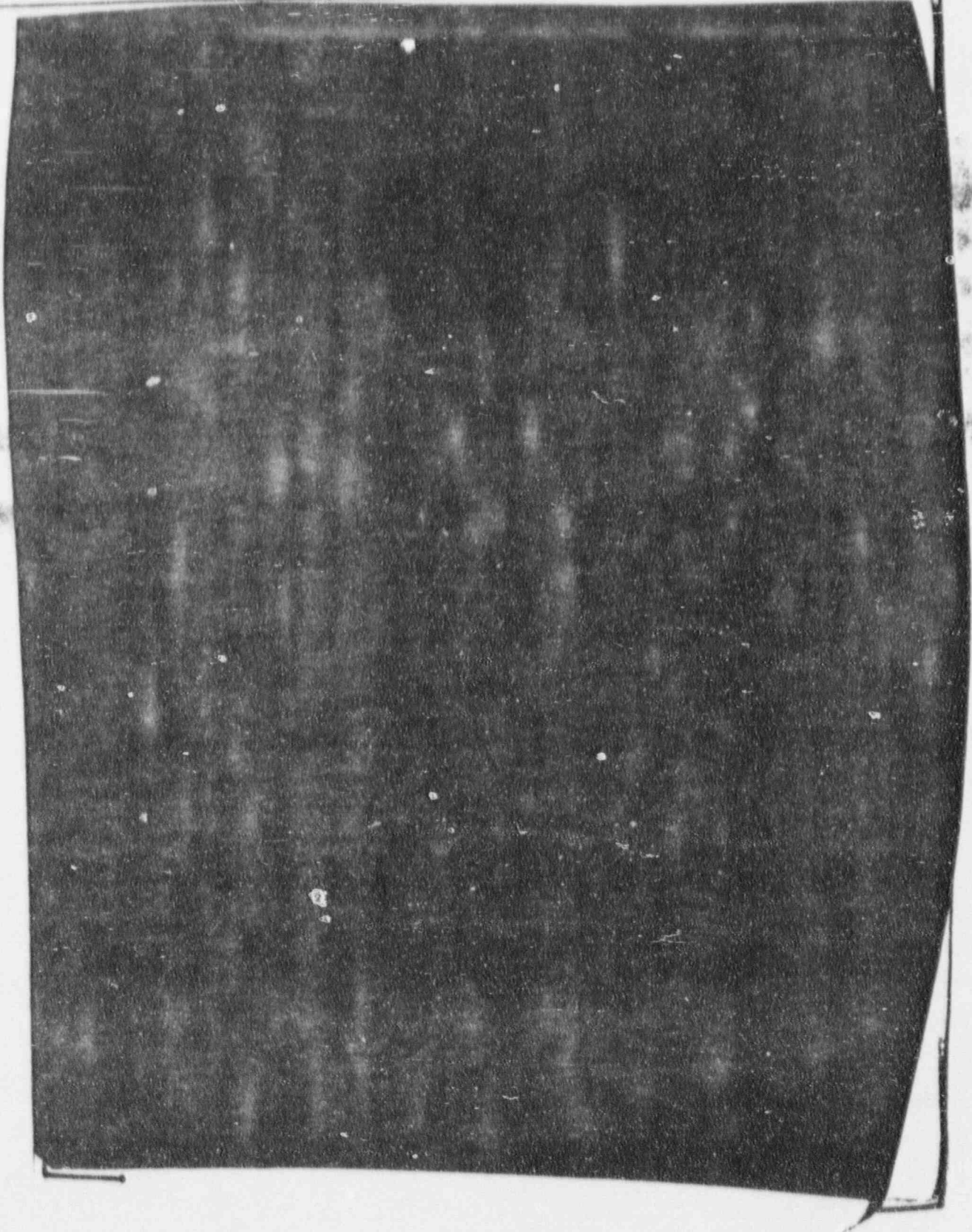
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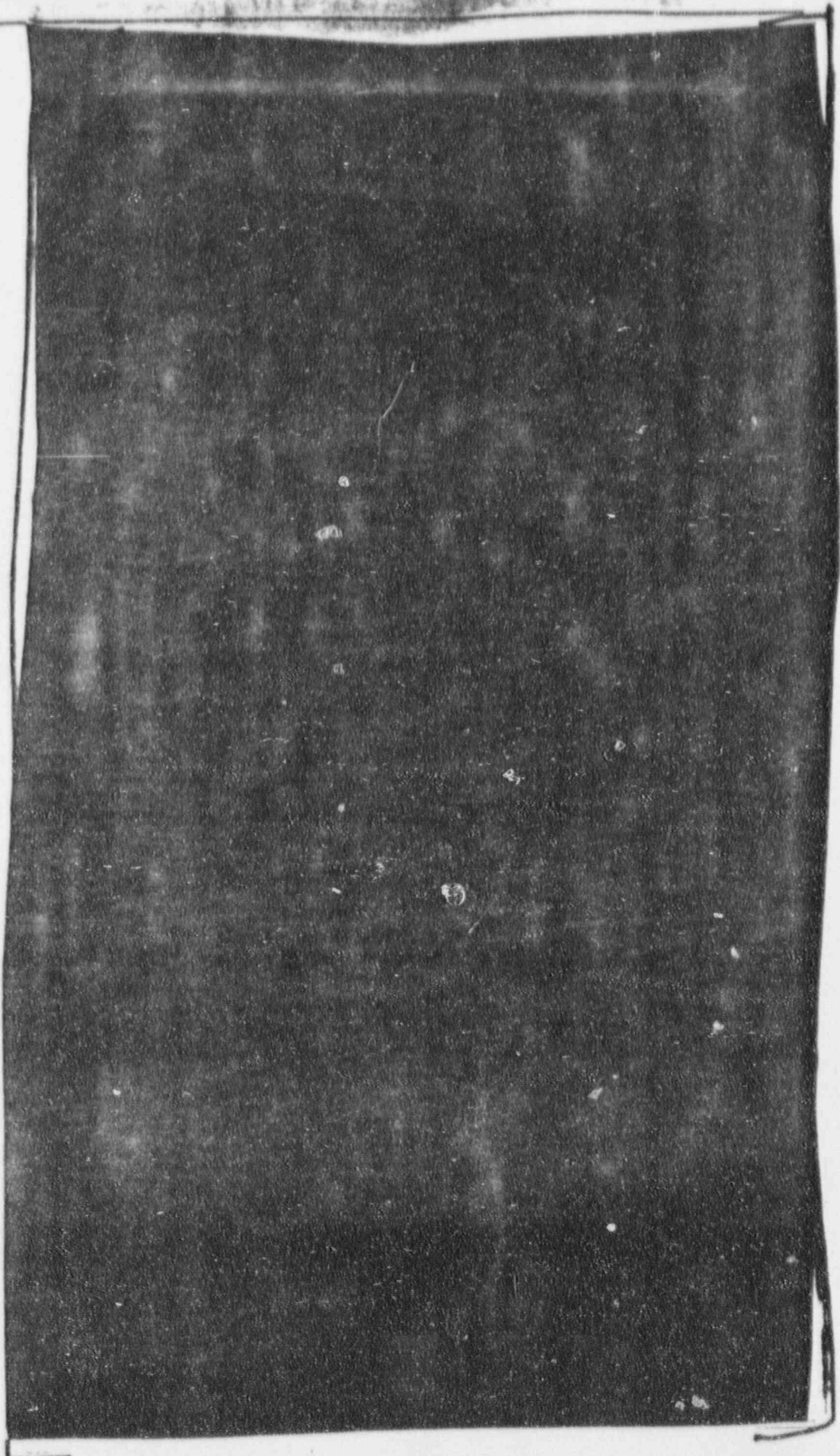
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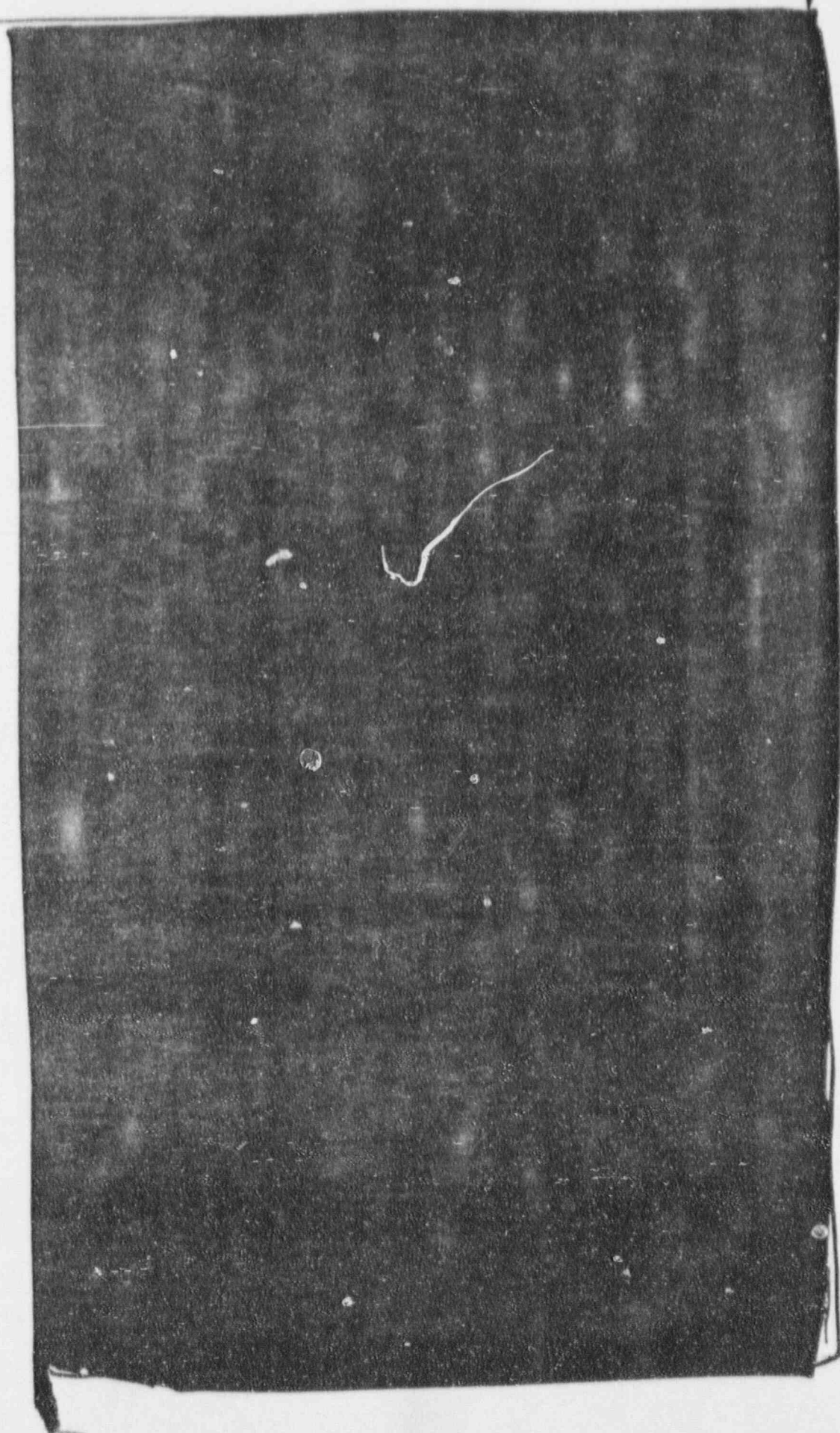


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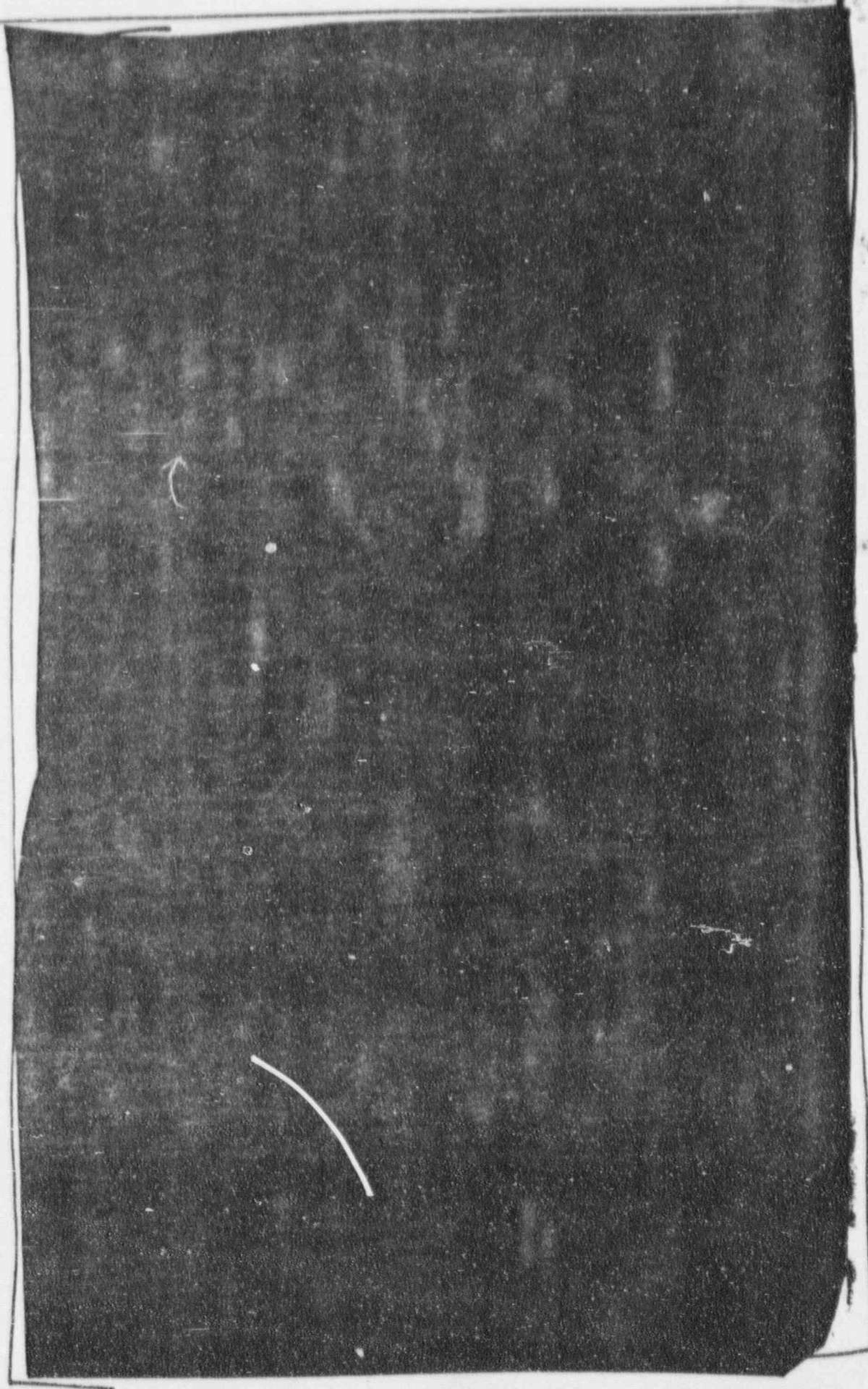


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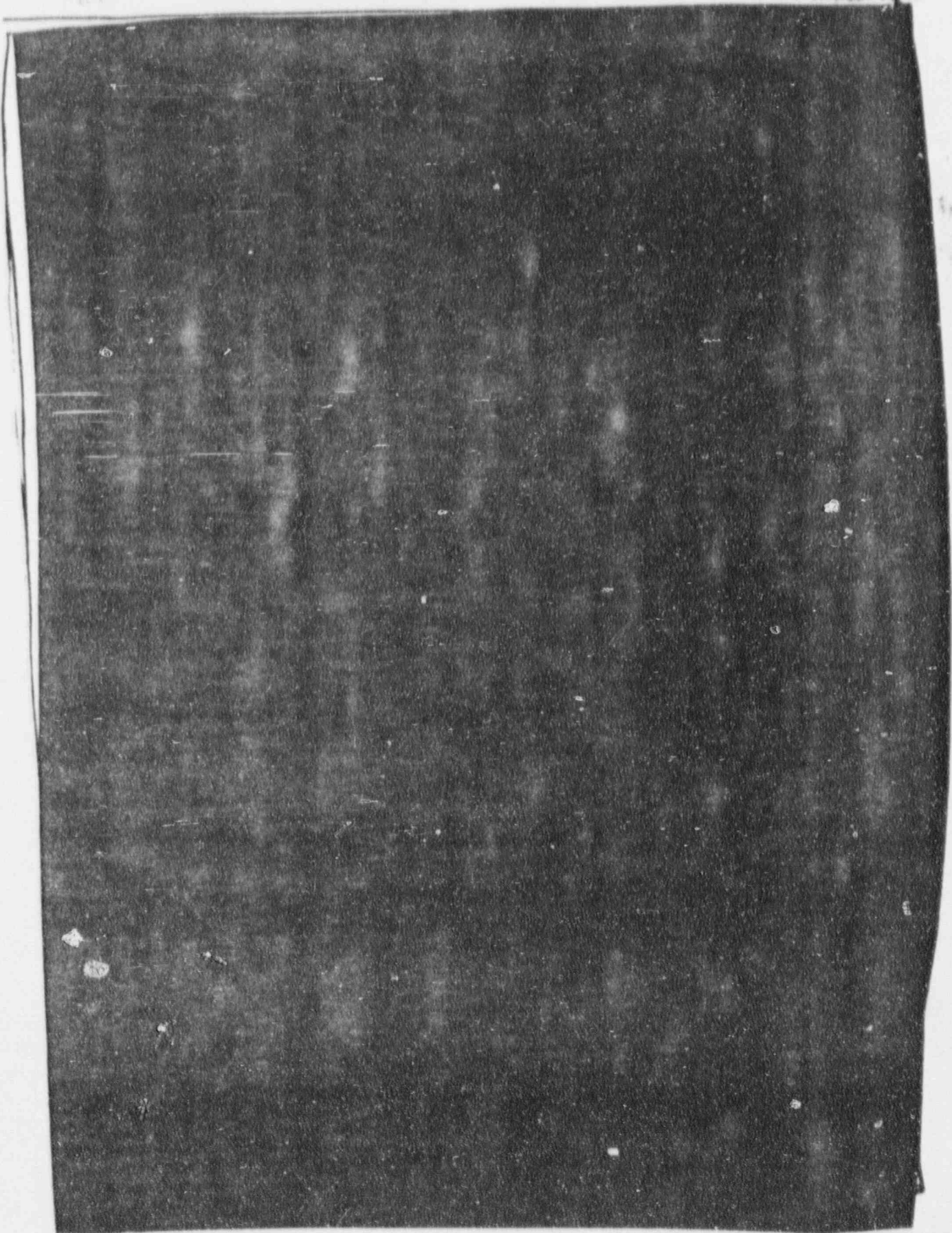


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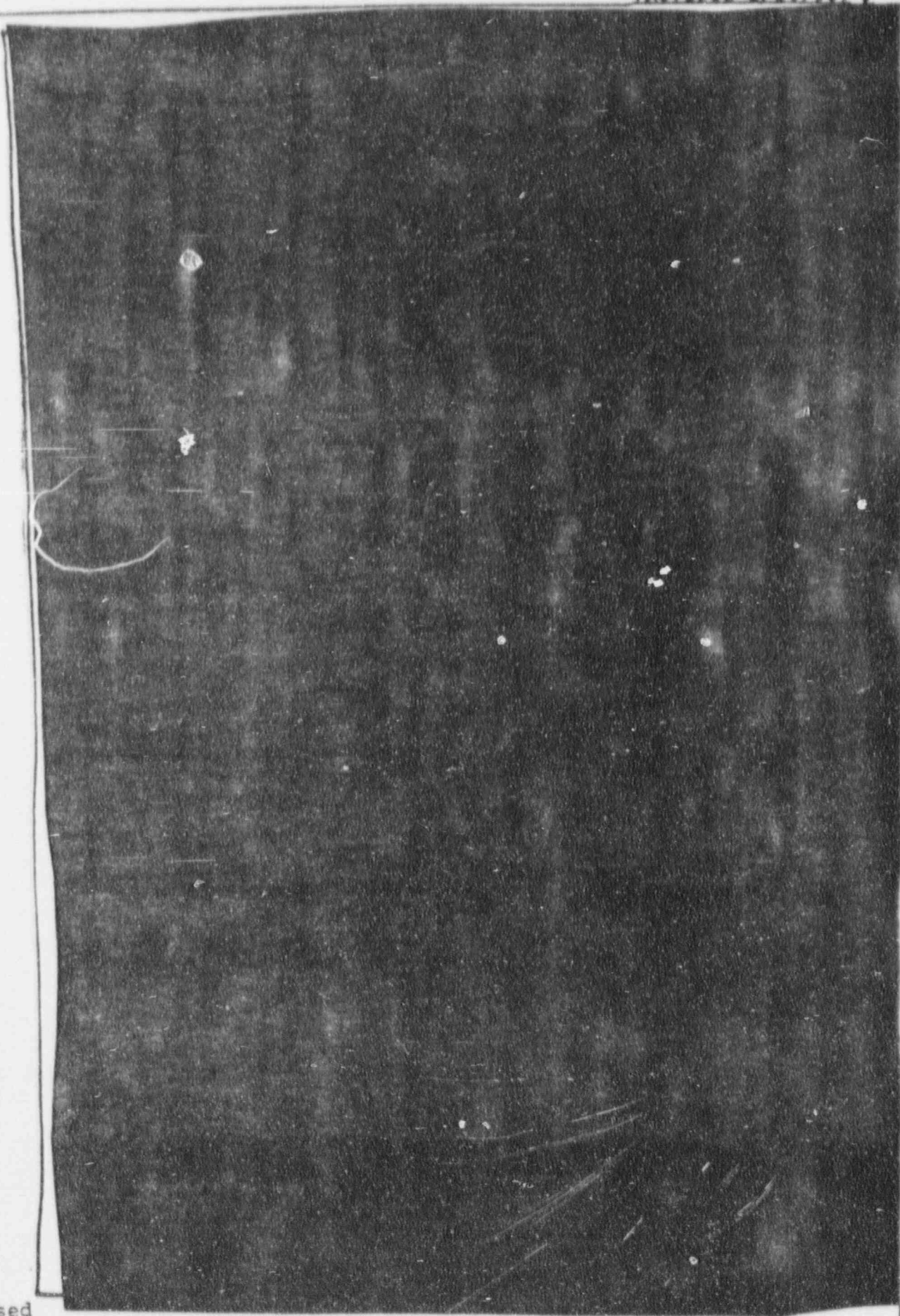


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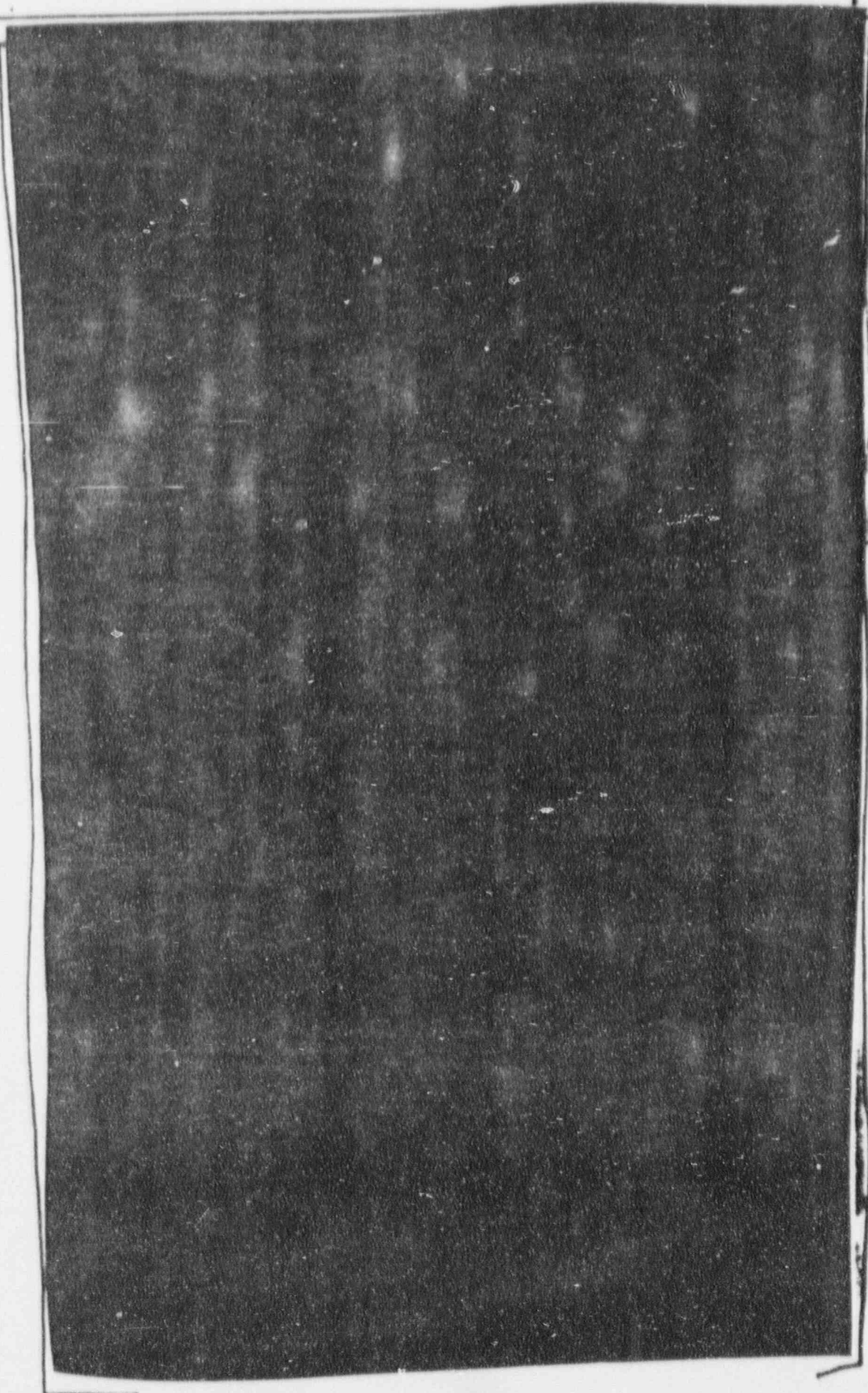
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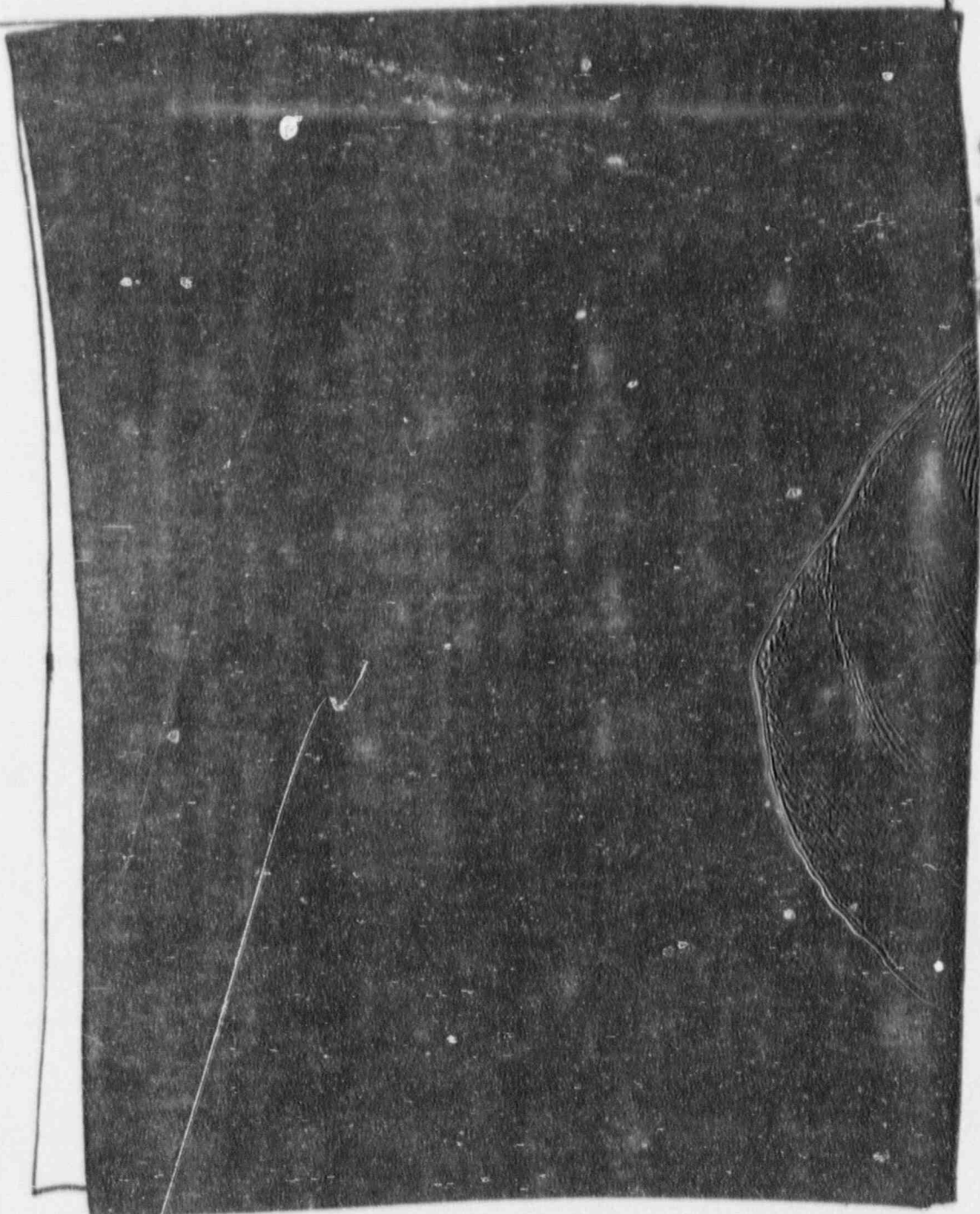
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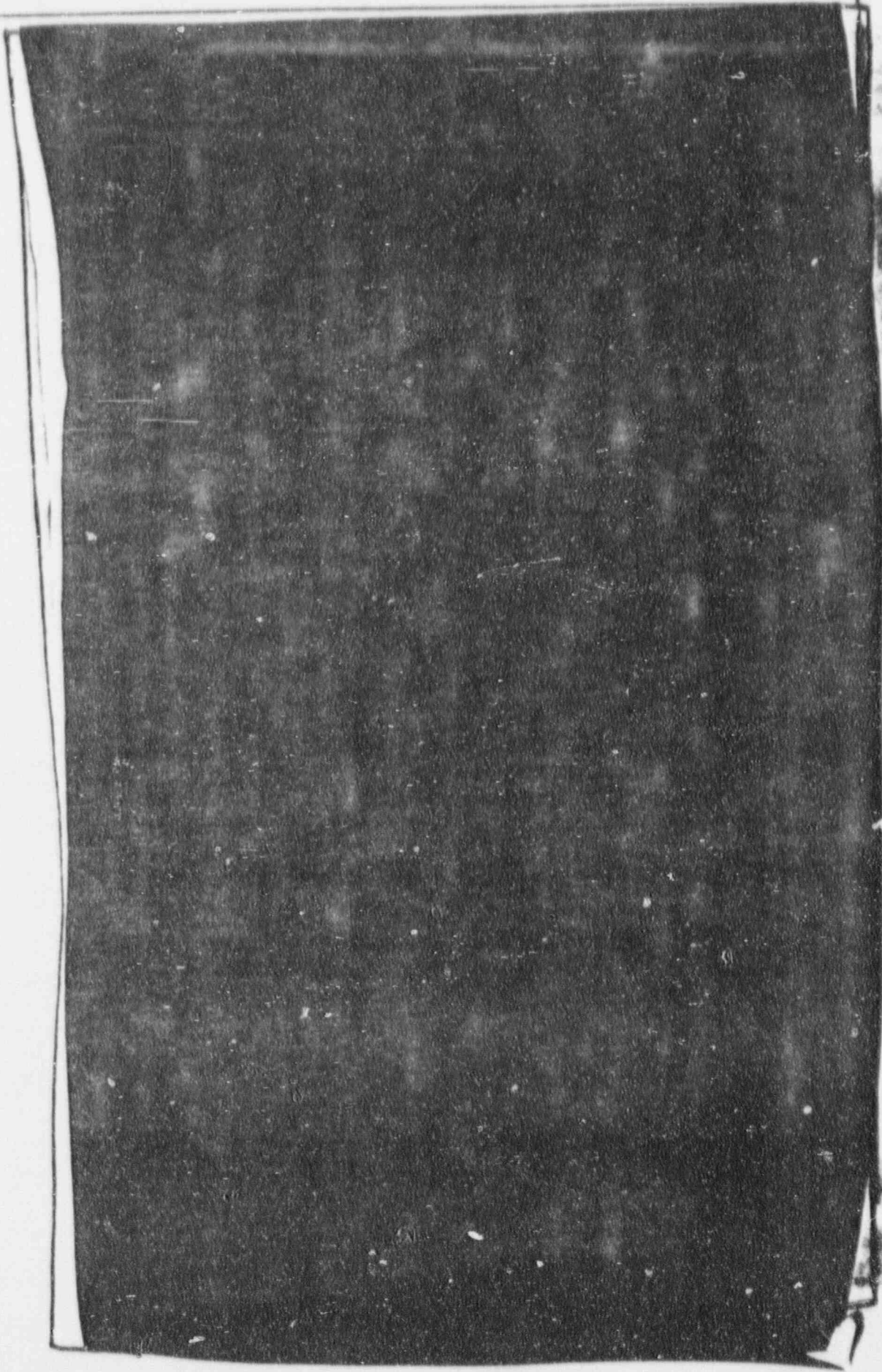
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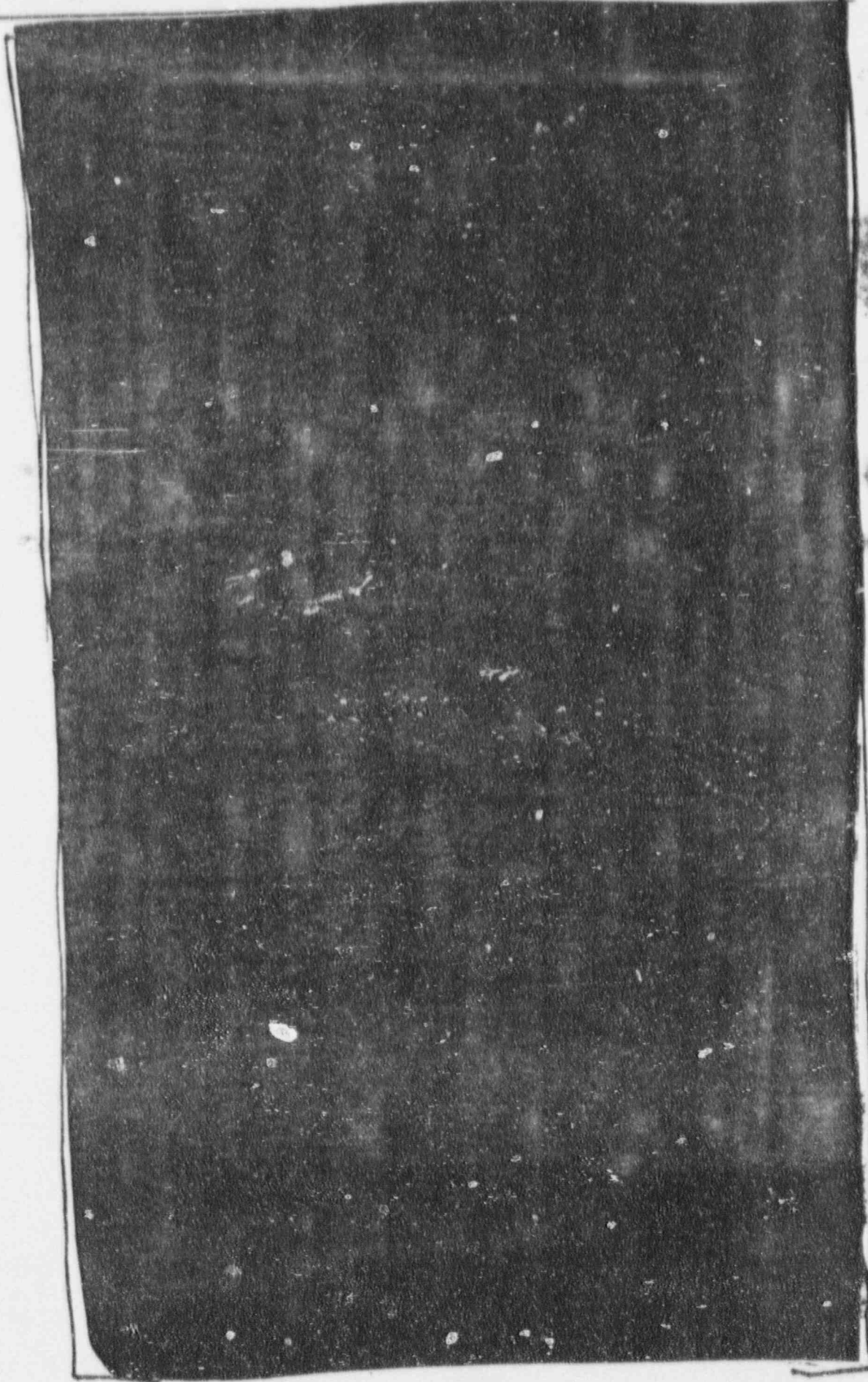
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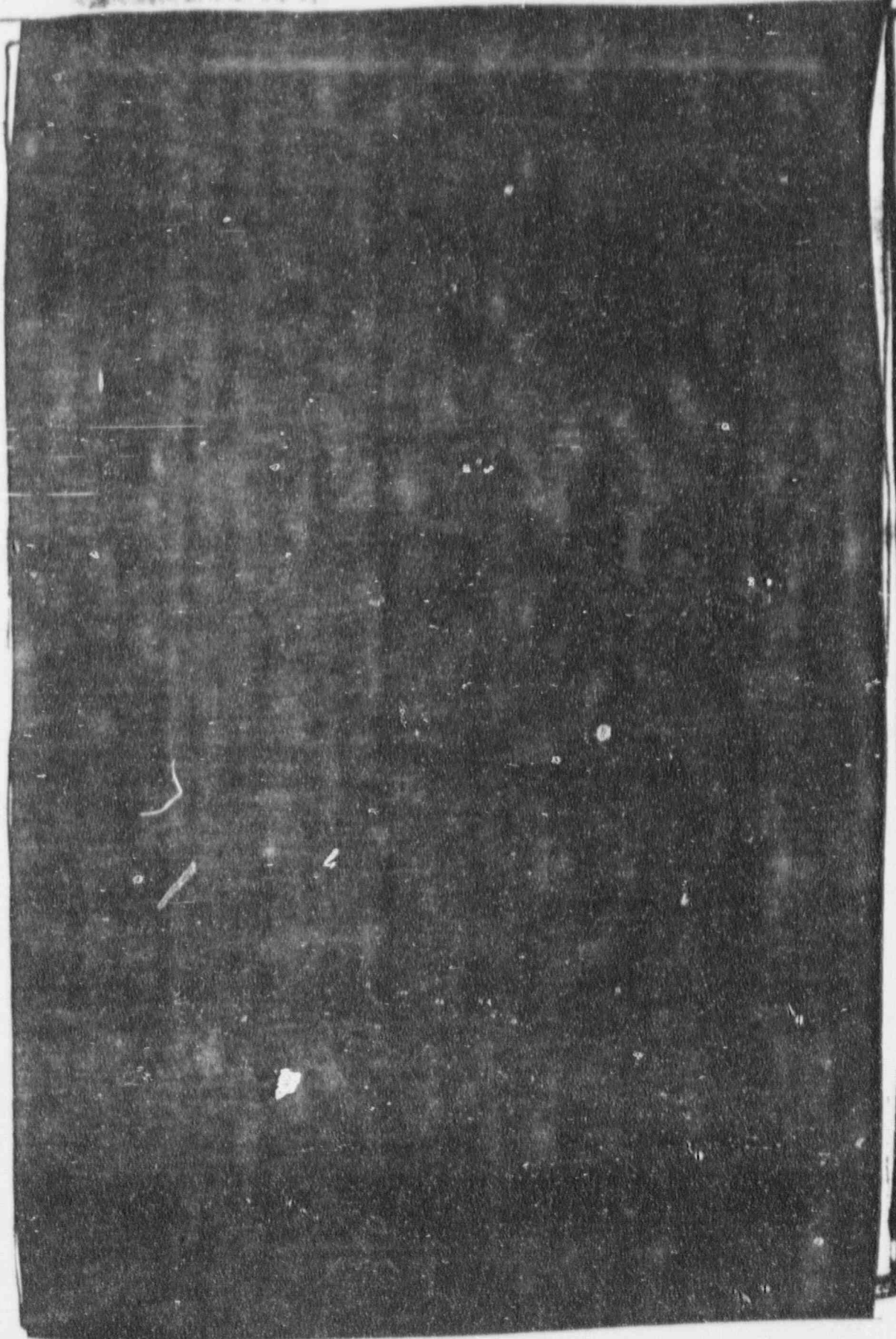
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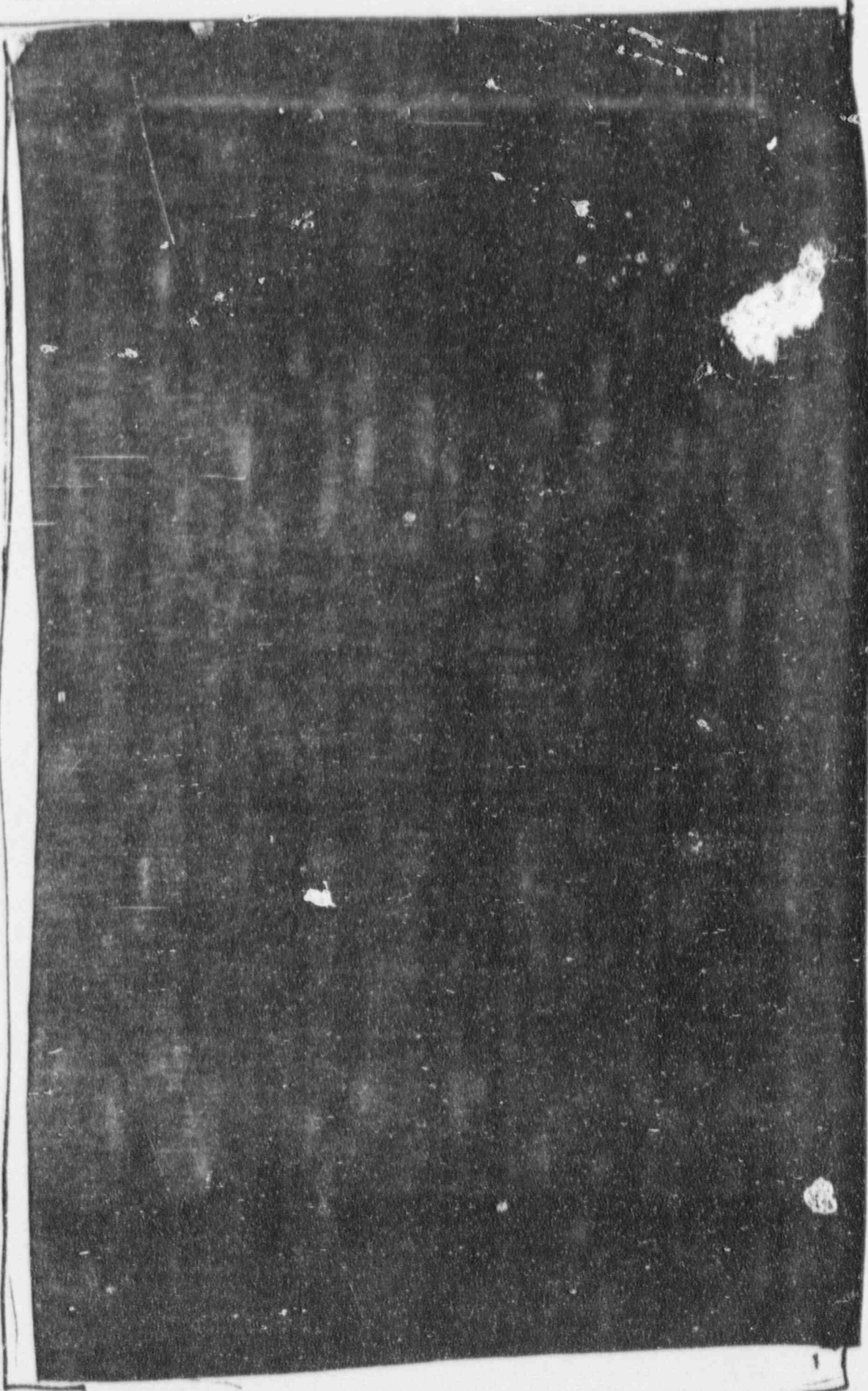


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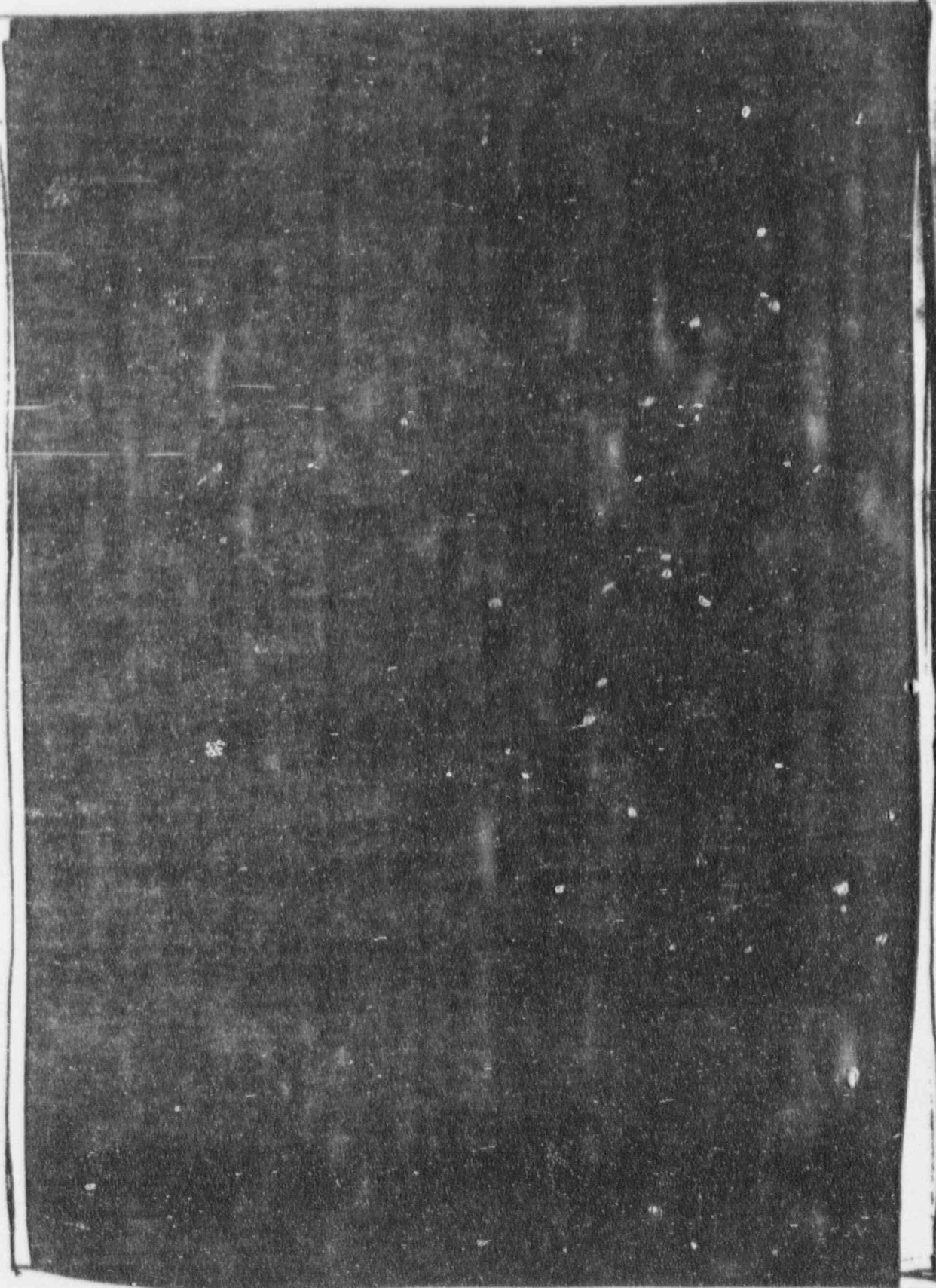
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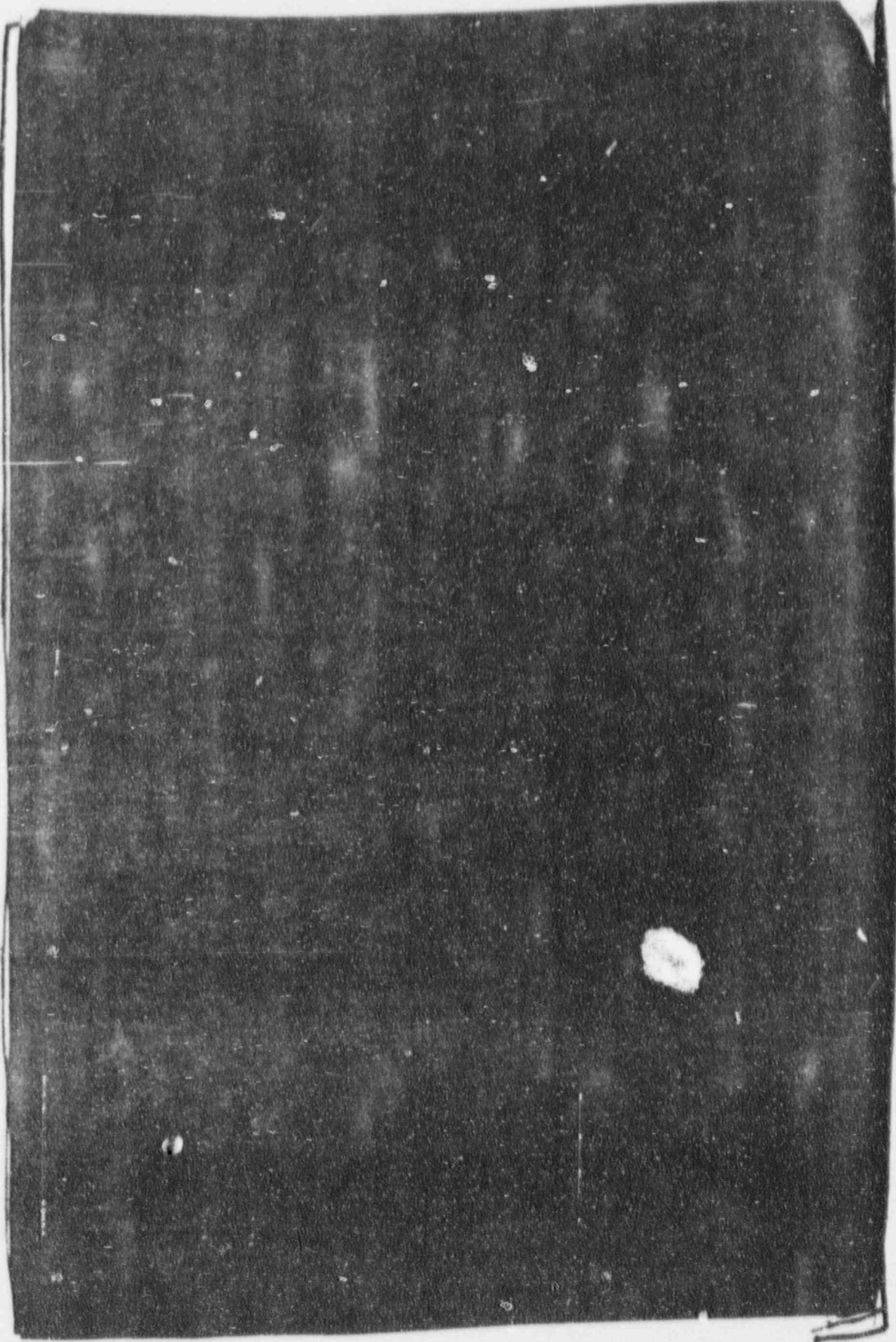
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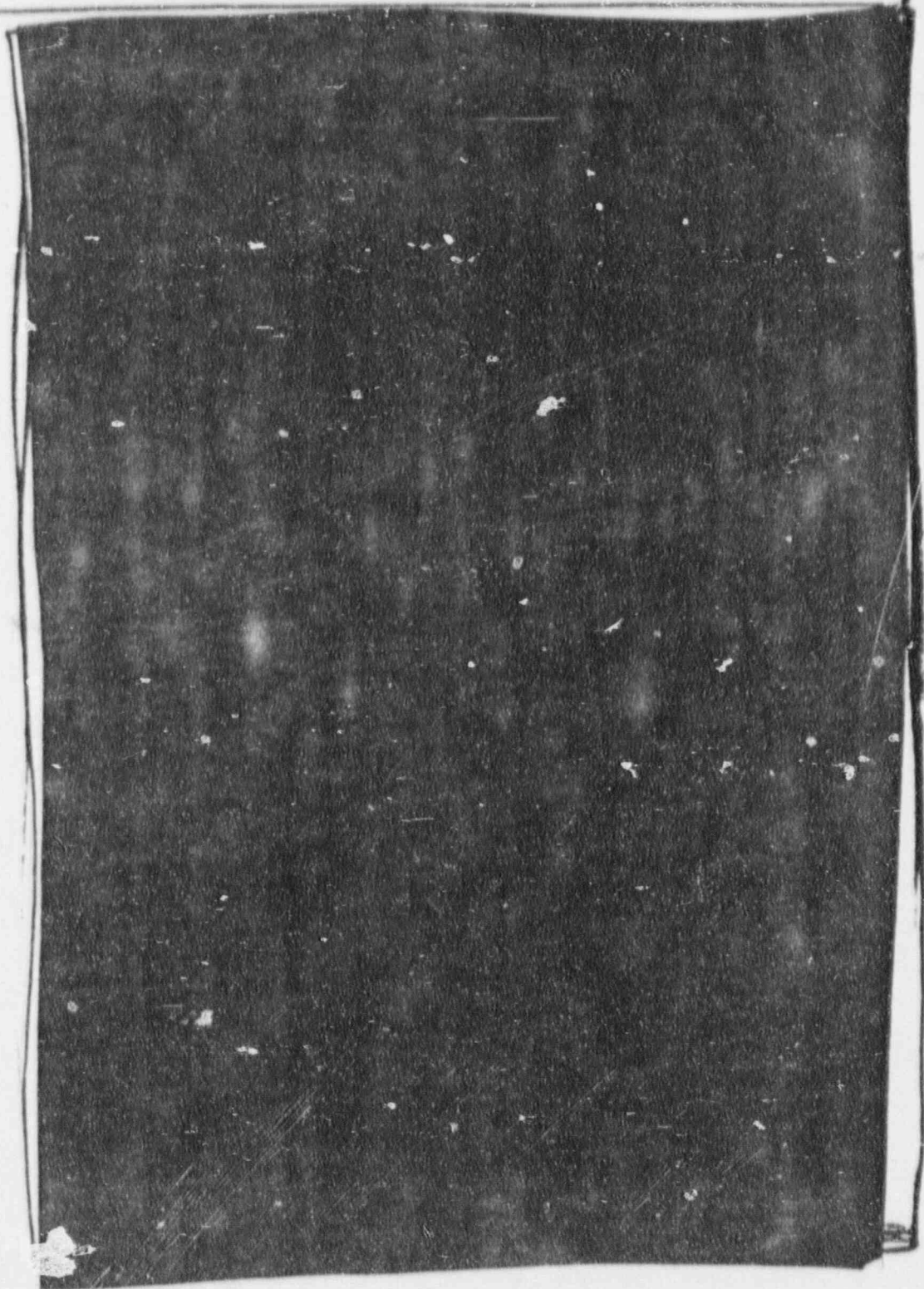


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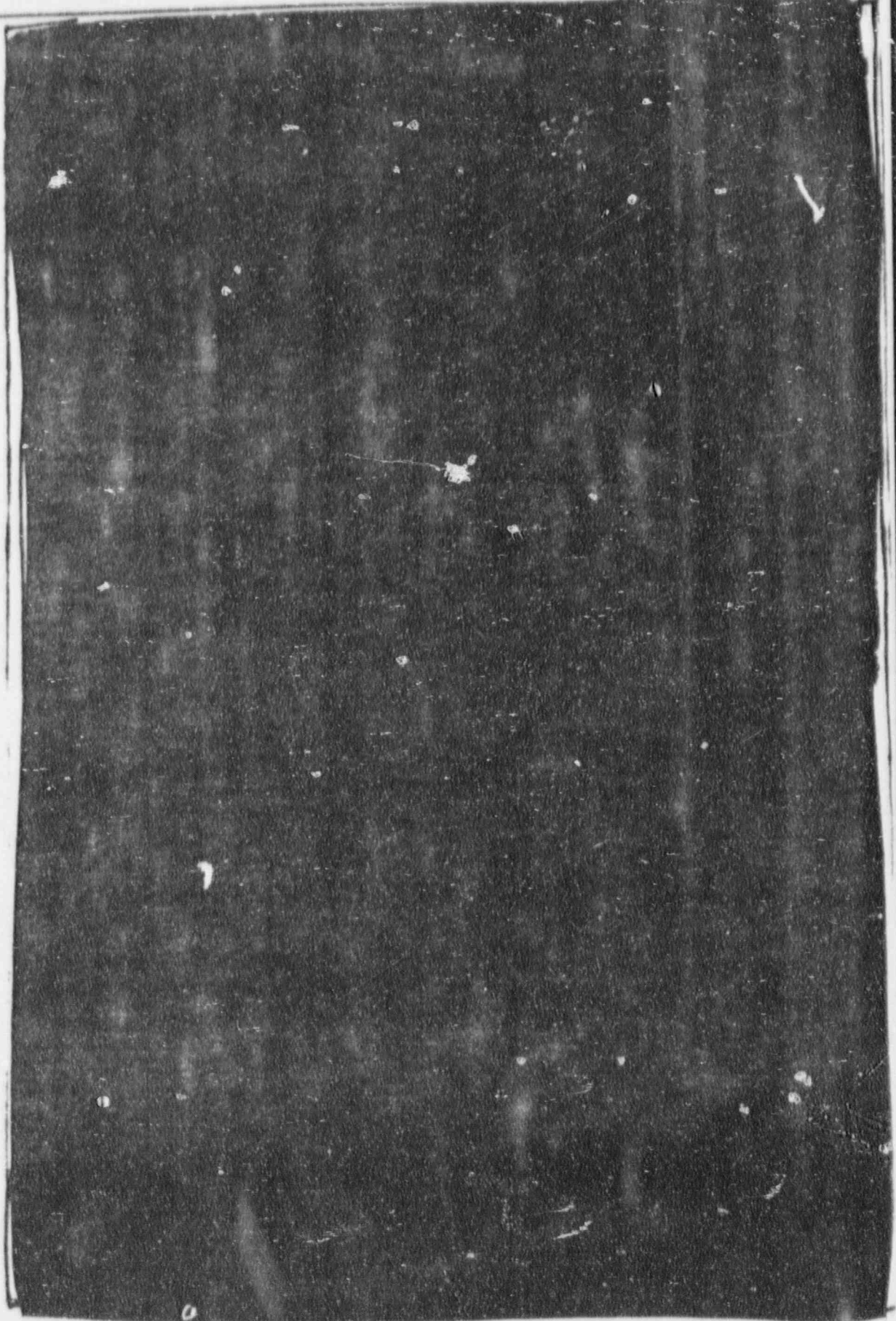
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SEQUOYAH FACILITY OPERATING PROCEDURE

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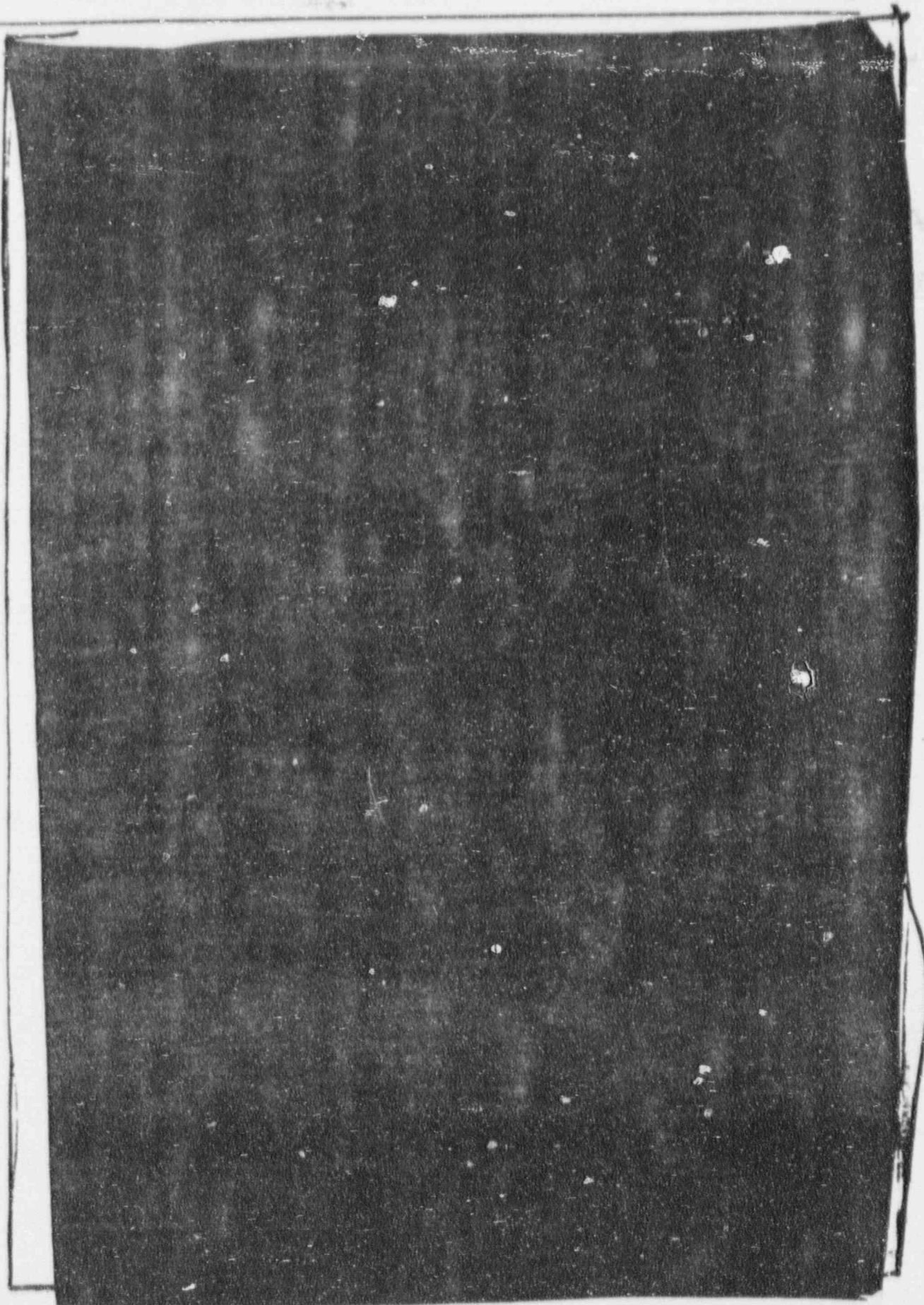


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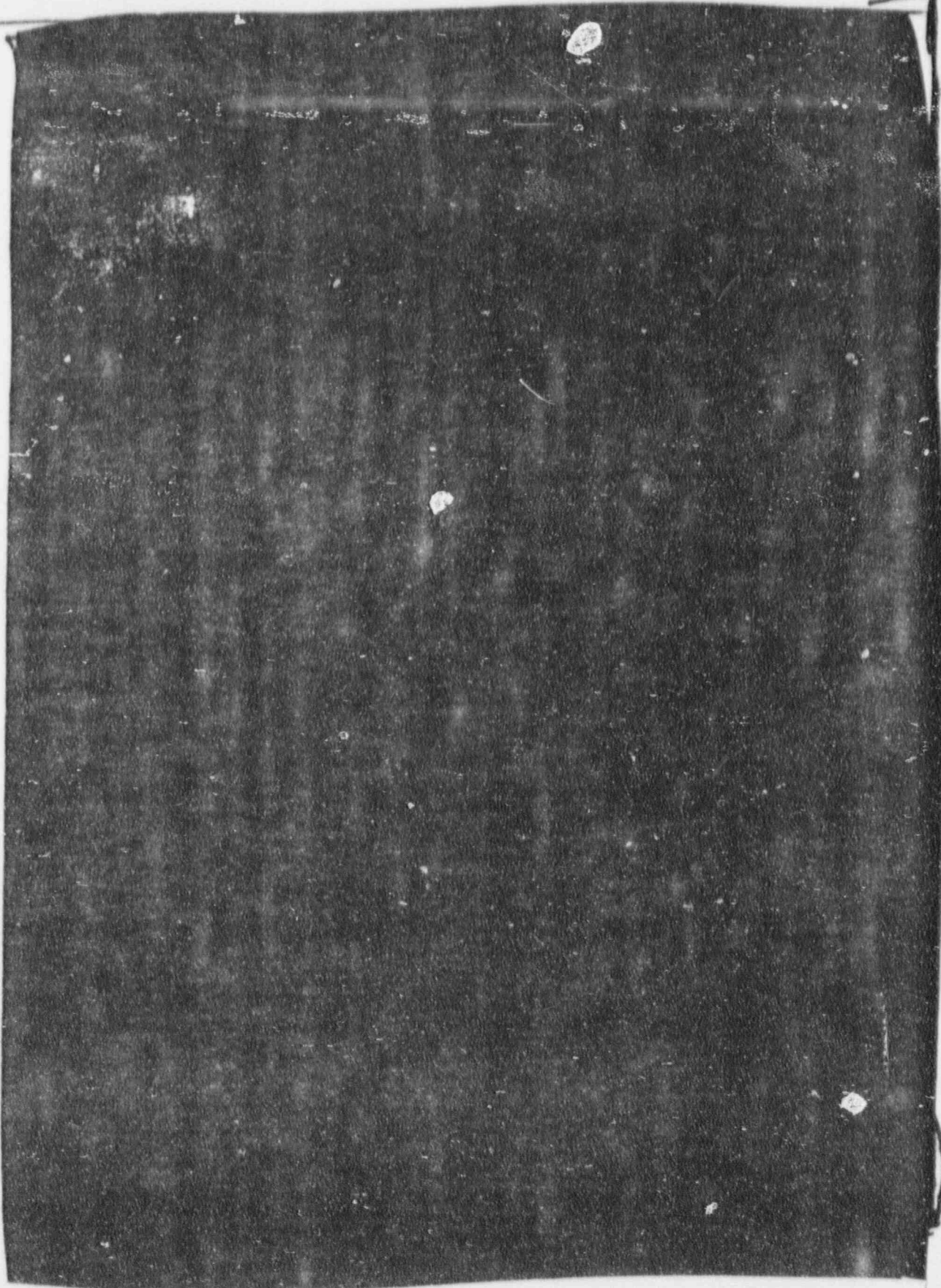
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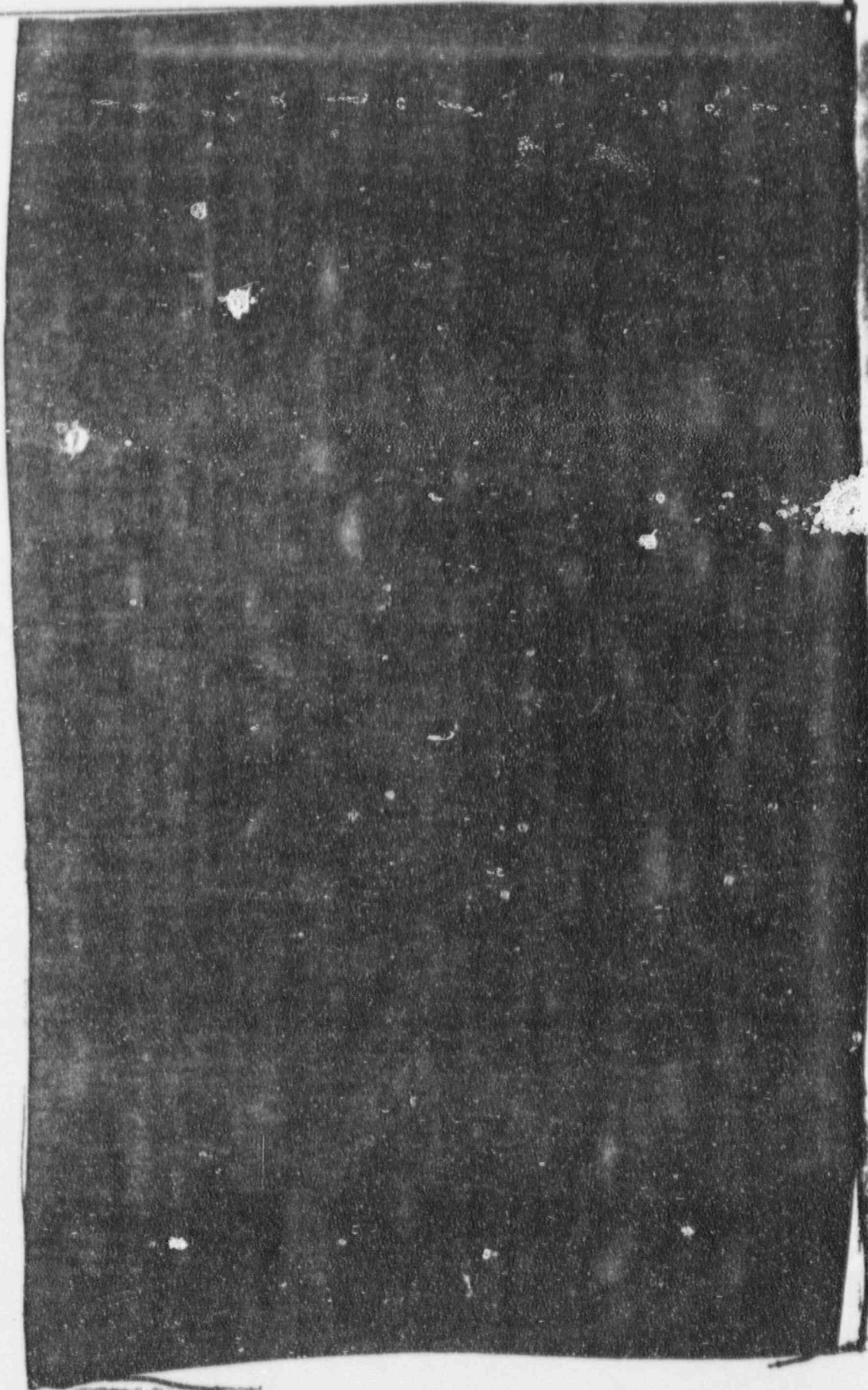
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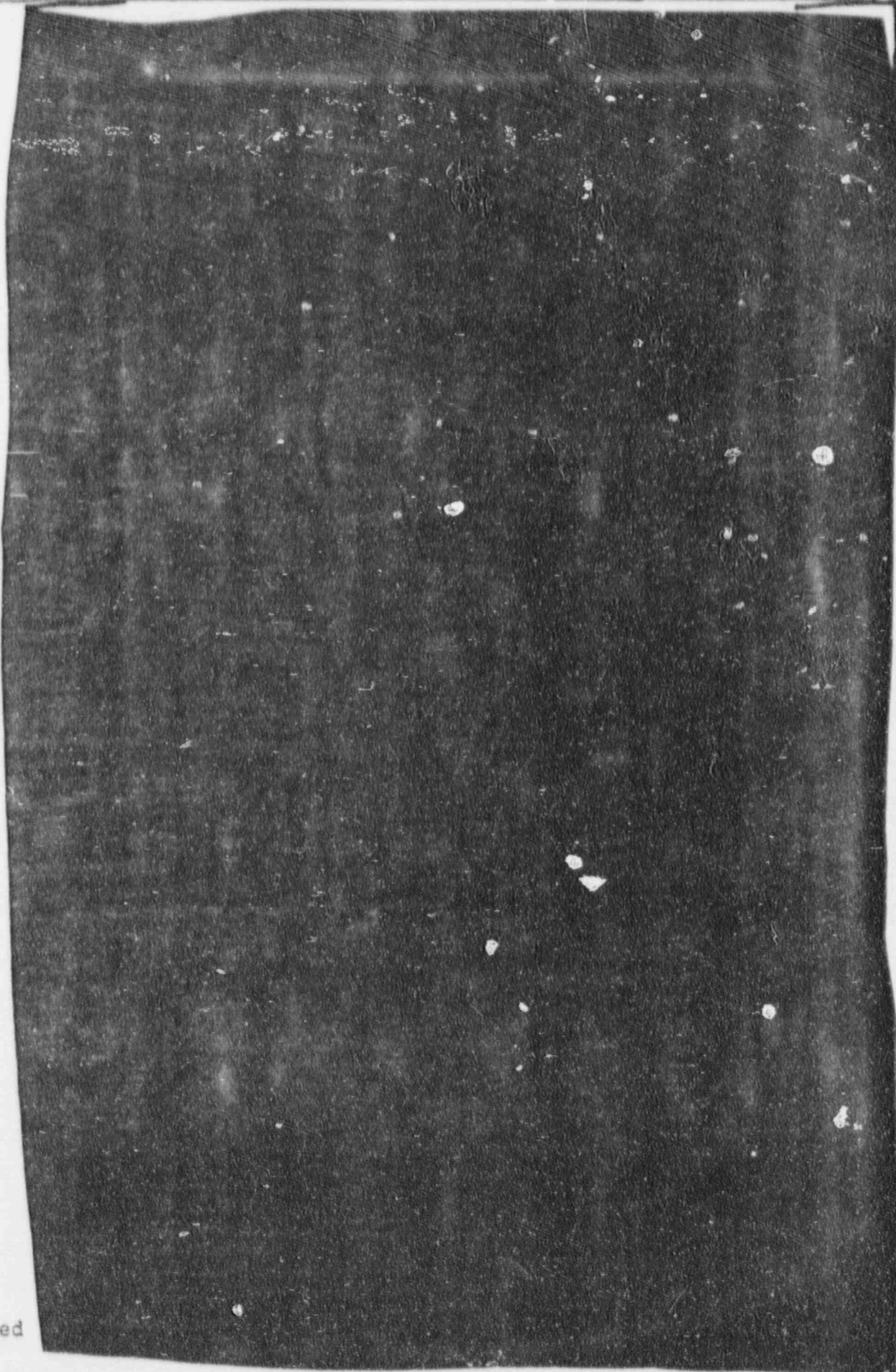
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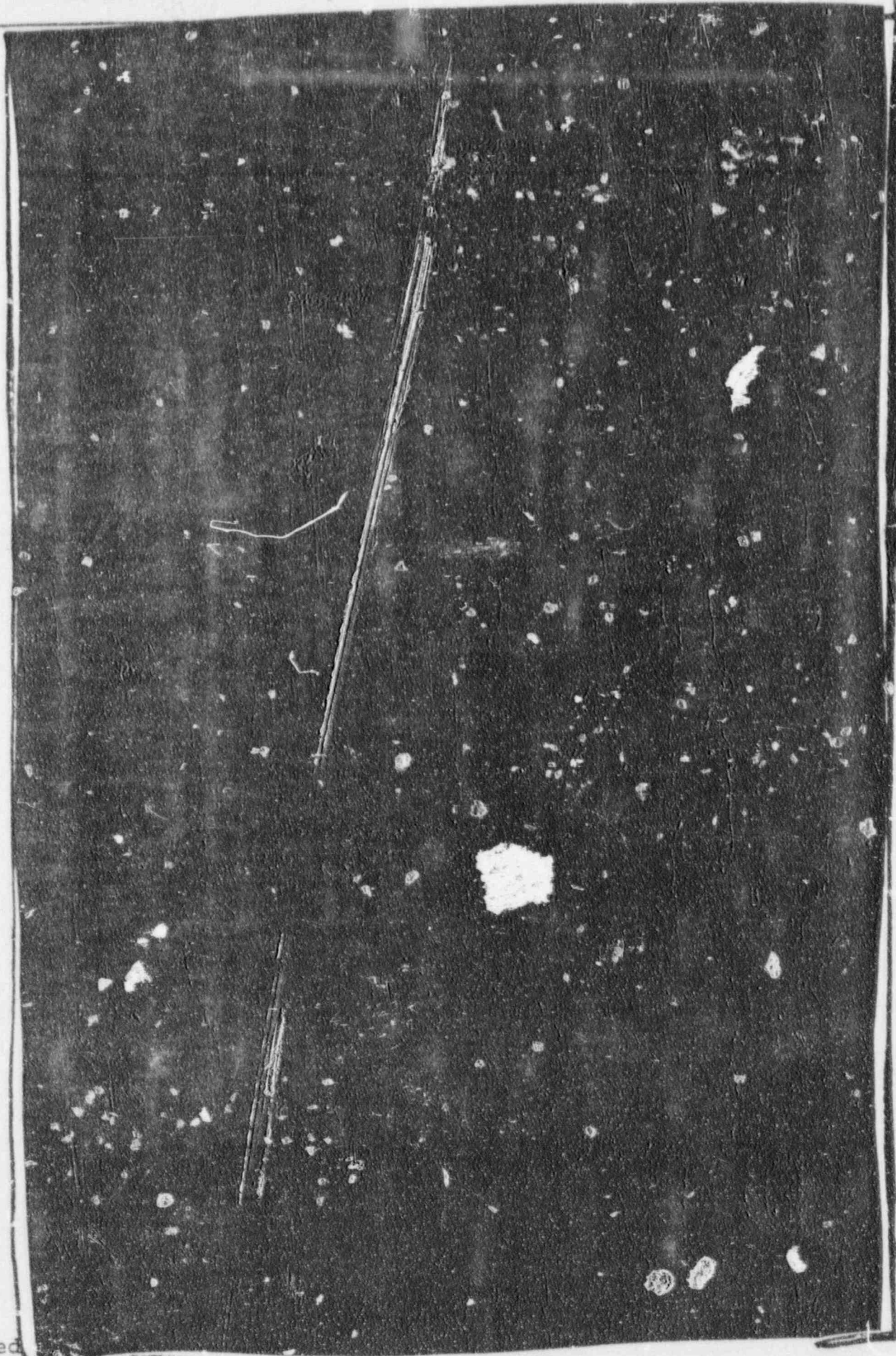
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APPENDIX A  
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(EXHIBIT II)

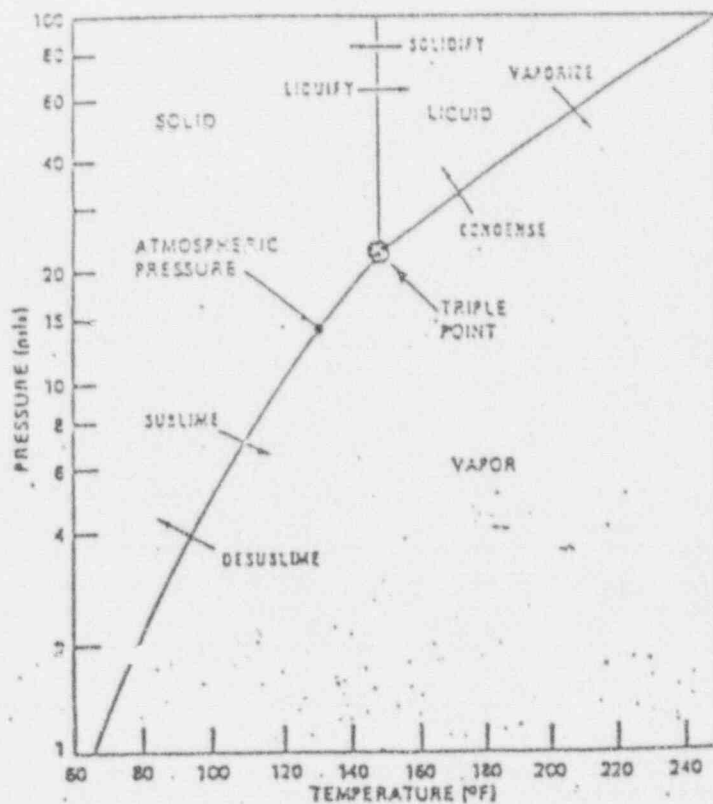
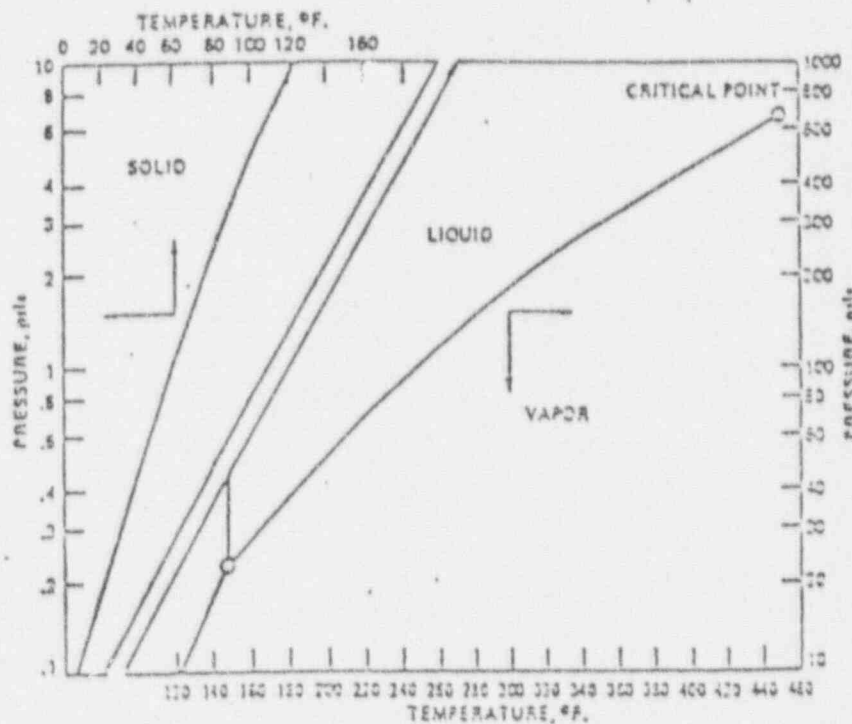
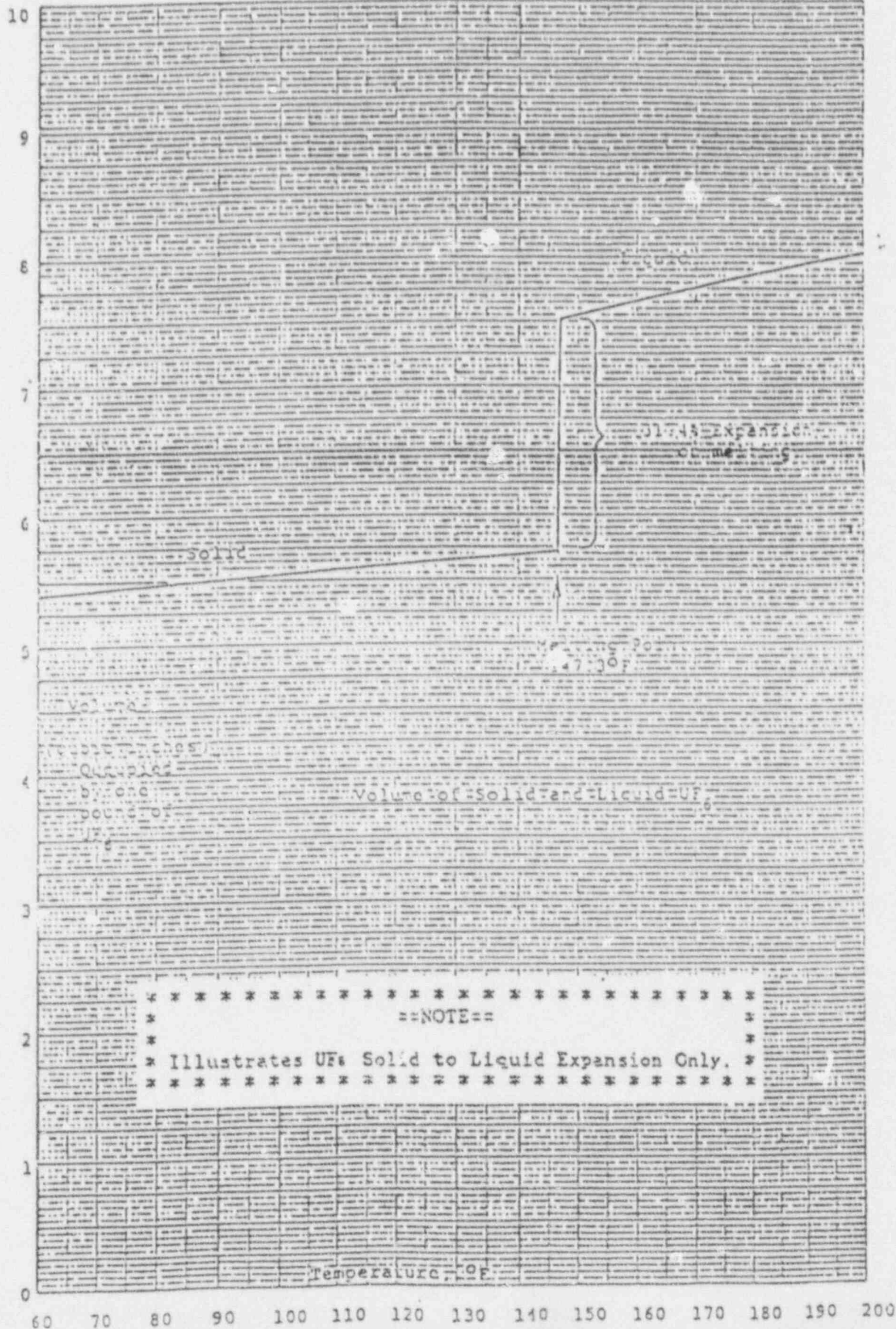


Figure A-3

PHASE DIAGRAM OF  $UF_6$

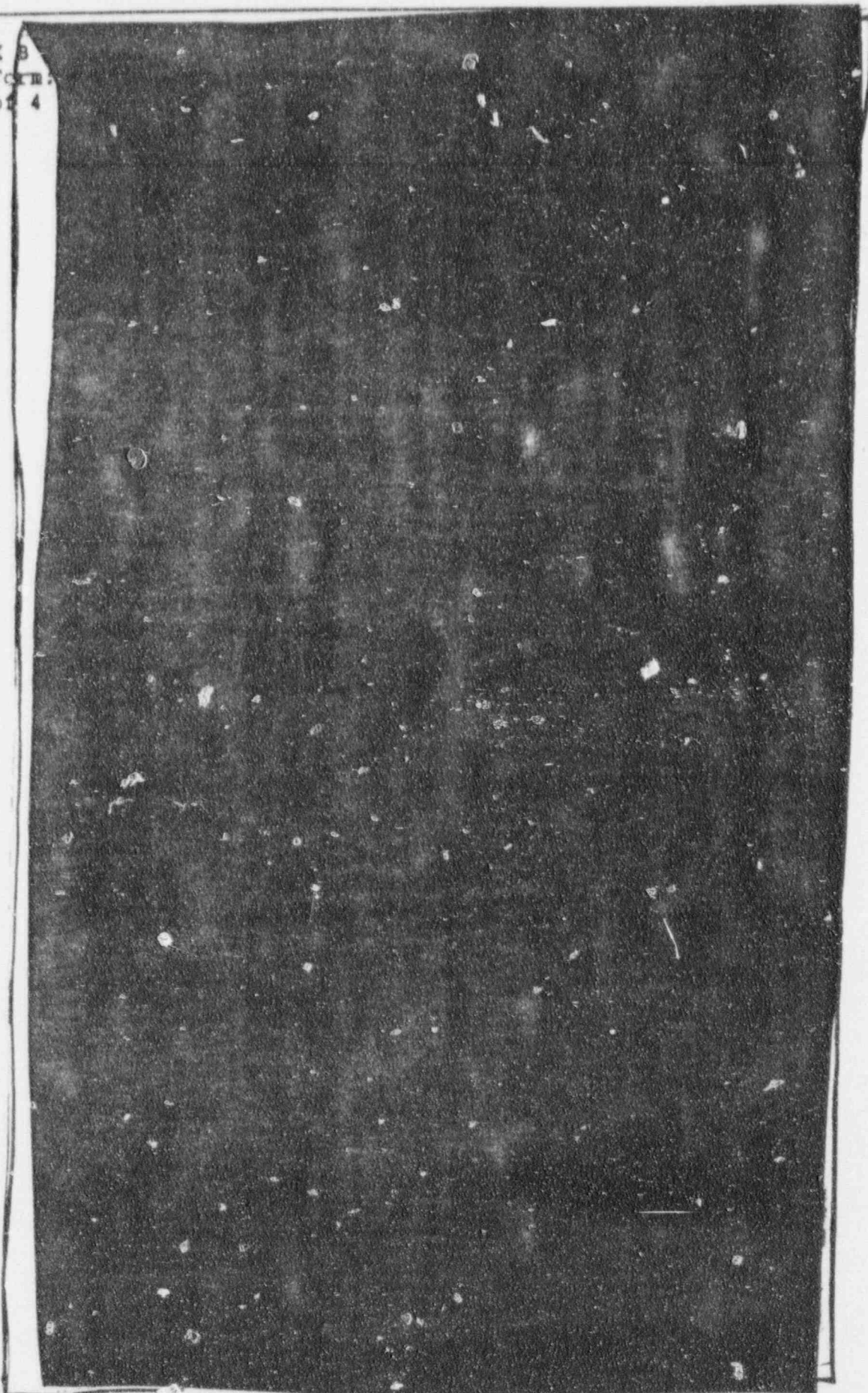
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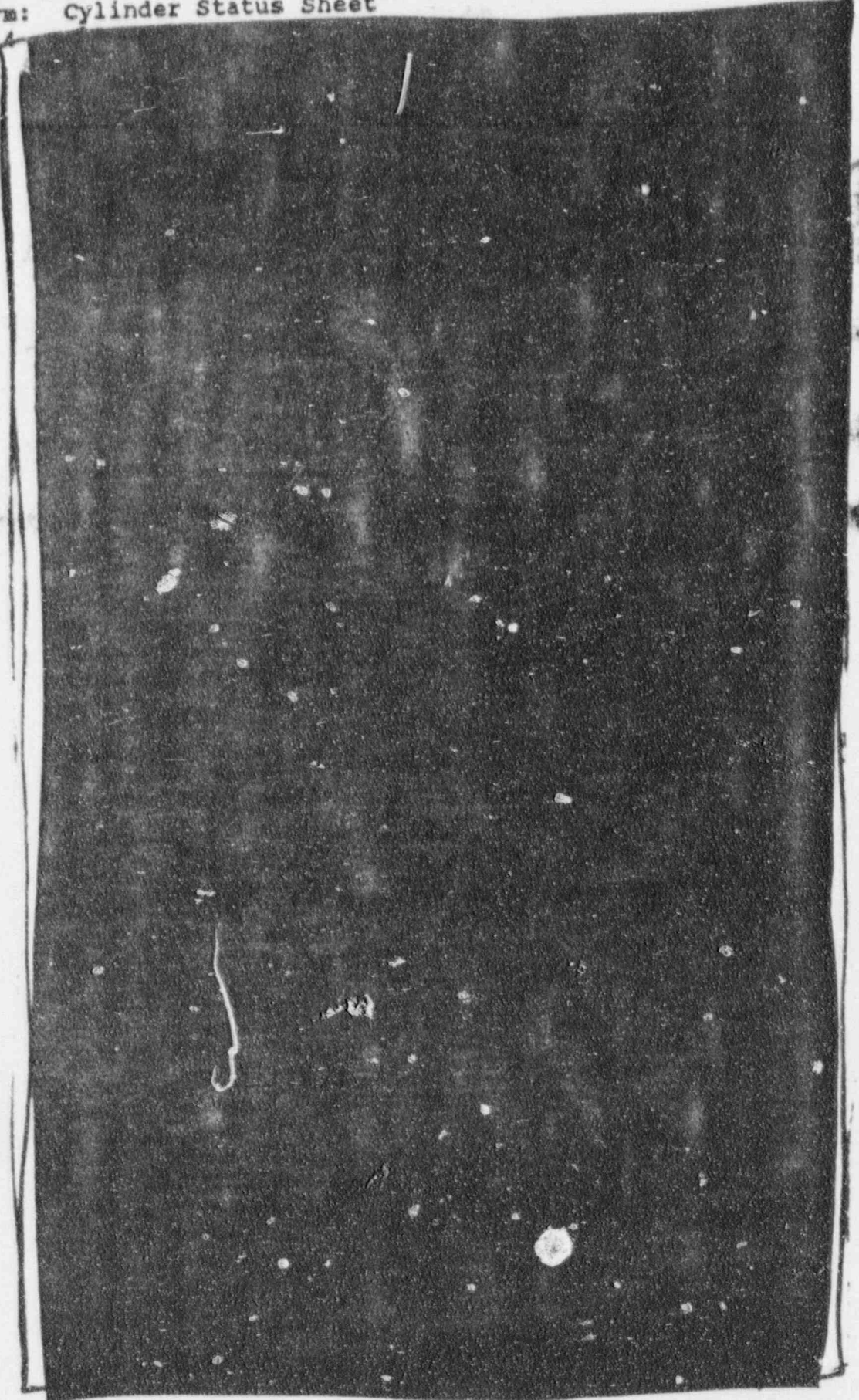
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APPENDIX B  
Sample Form  
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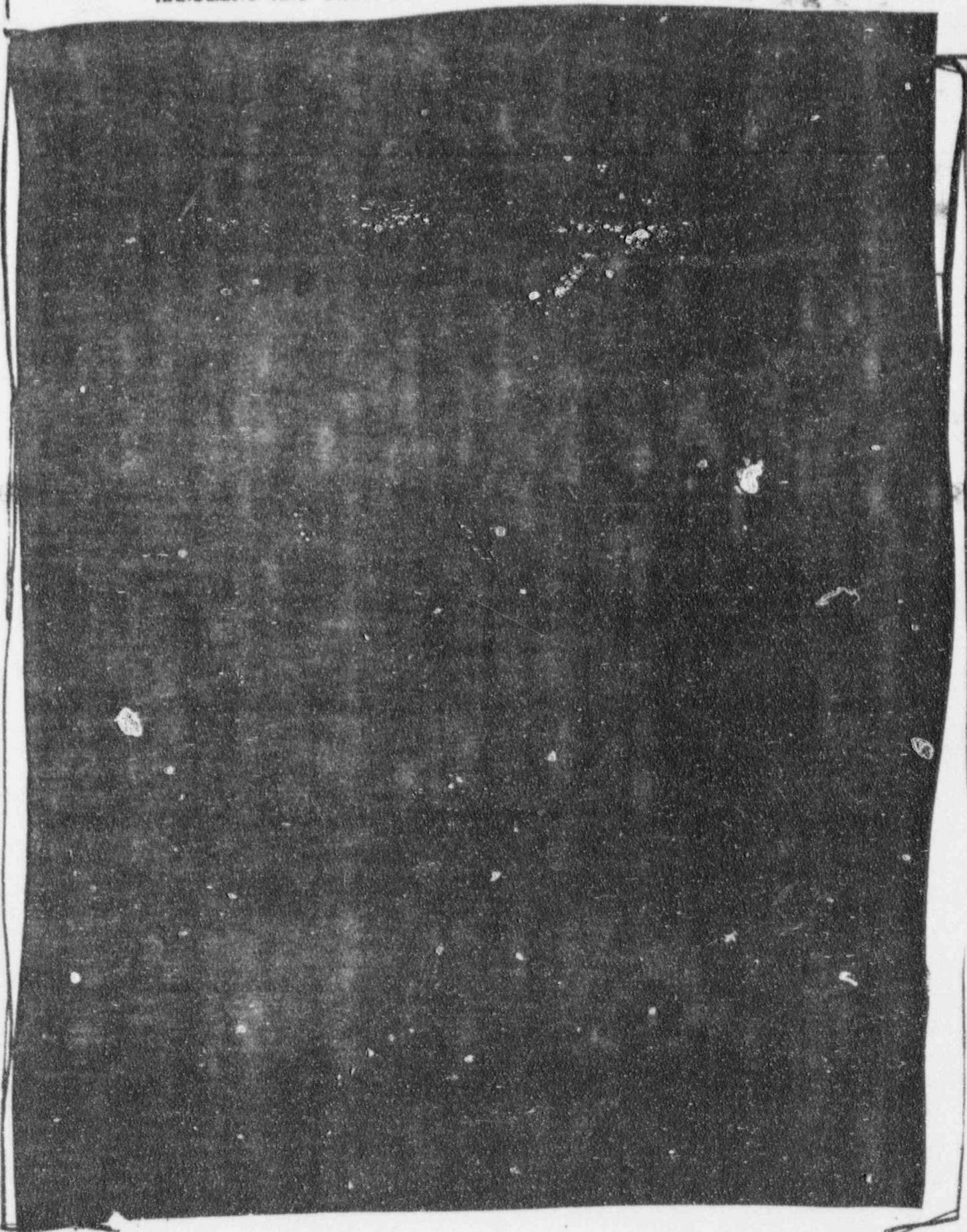




APPENDIX B (Continued)  
Sample Form: Cylinder Status Sheet  
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APPENDIX B (Continued)  
Sample Form: Cold Trap Data Sheet  
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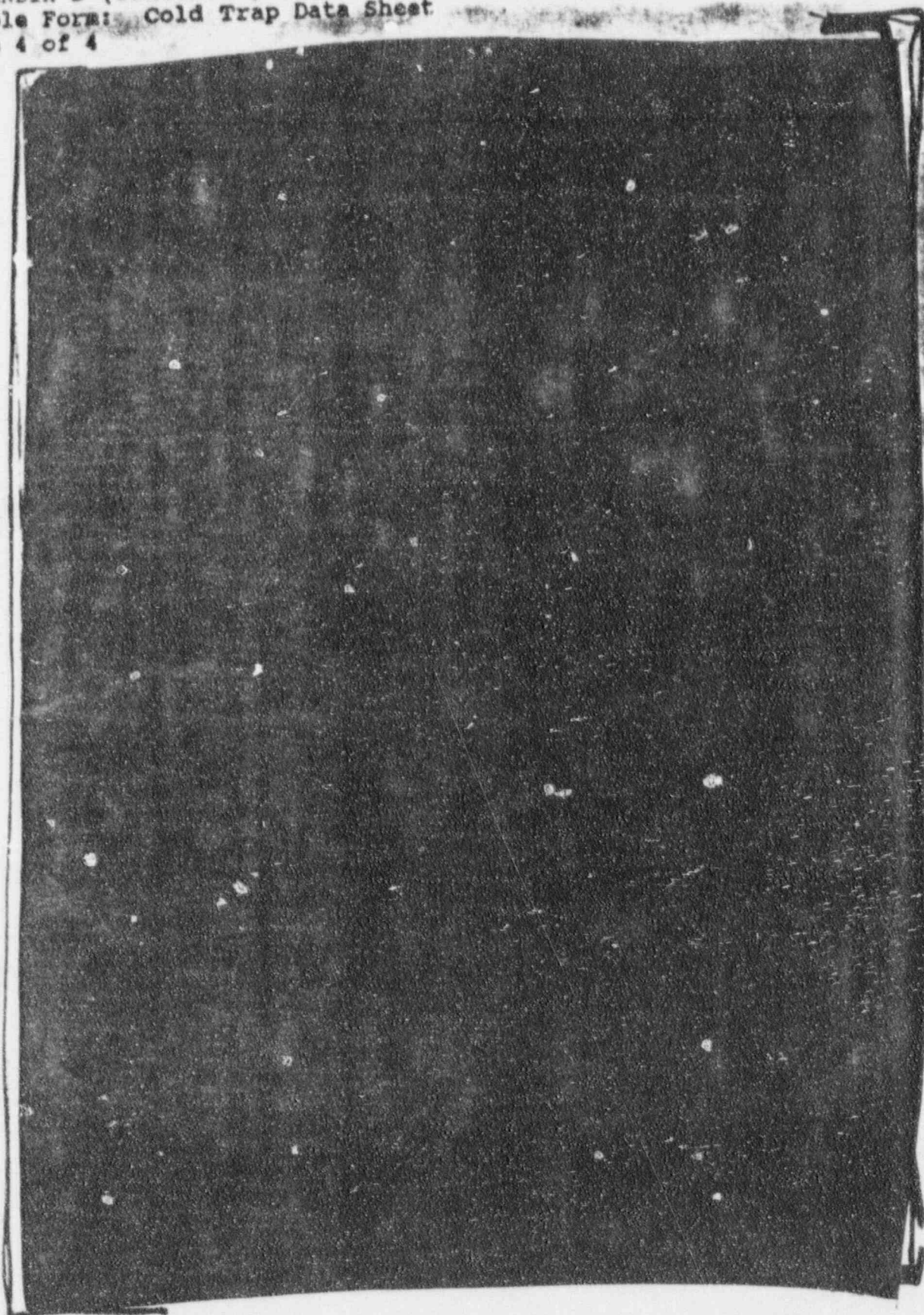
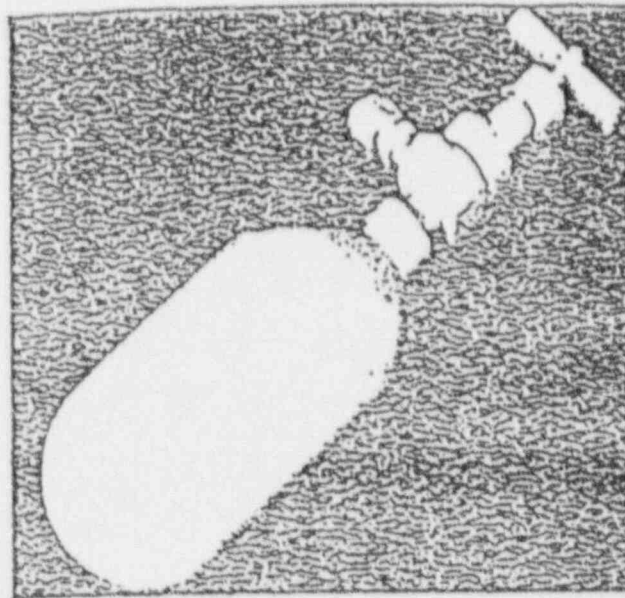




FIGURE 2

UF<sub>6</sub> CYLINDER MODEL 2S

## GENERAL DATA

Other Descriptive Terminology Used - Harshaw Type

ENGINEERING DRAWING  
REFERENCEGOODYEAR ATOMIC CORPORATION  
DRAWING CX-761-M2010

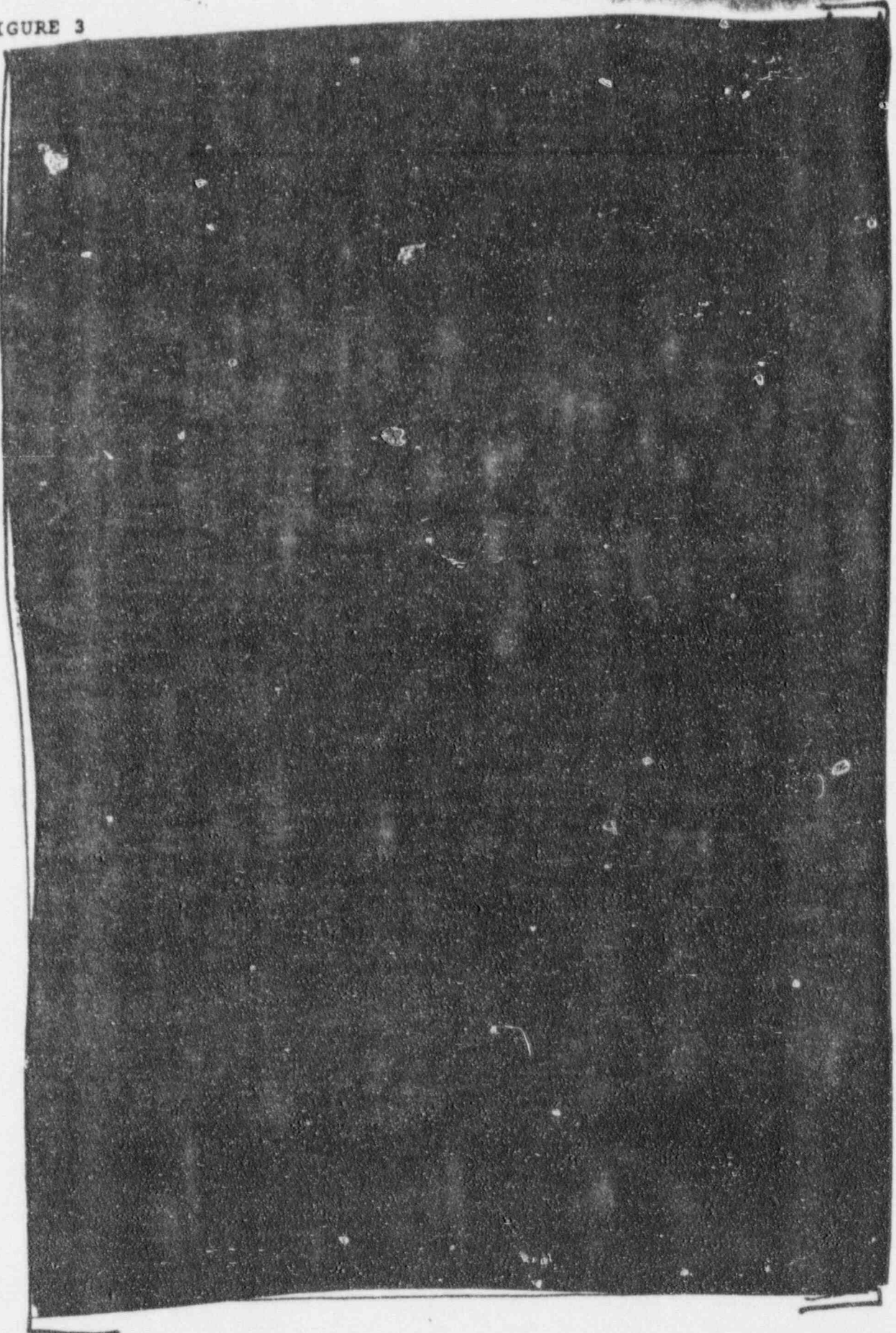
Nominal Diameter	3-1/2 in.
Nominal Length	11-1/2 in.
Wall Thickness	0.112 in. (min)
Nominal Tare Weight	4.2 lb <sup>1</sup> (1.91 kg)
Maximum Net Weight	4.9 lb (2.22 kg)
Nominal Gross Weight	9.1 lb (4.13 kg)
Minimum Volume	0.026 ft <sup>3</sup> (736 cm <sup>3</sup> )
Basic Material of Construction	Nickel
Service Pressure	200 psig
Hydrostatic Test Pressure	400 psig
Isotopic Content Limit	100% U-235 max.

Valve Used - Hoke No. 2422L64M2, or equal.

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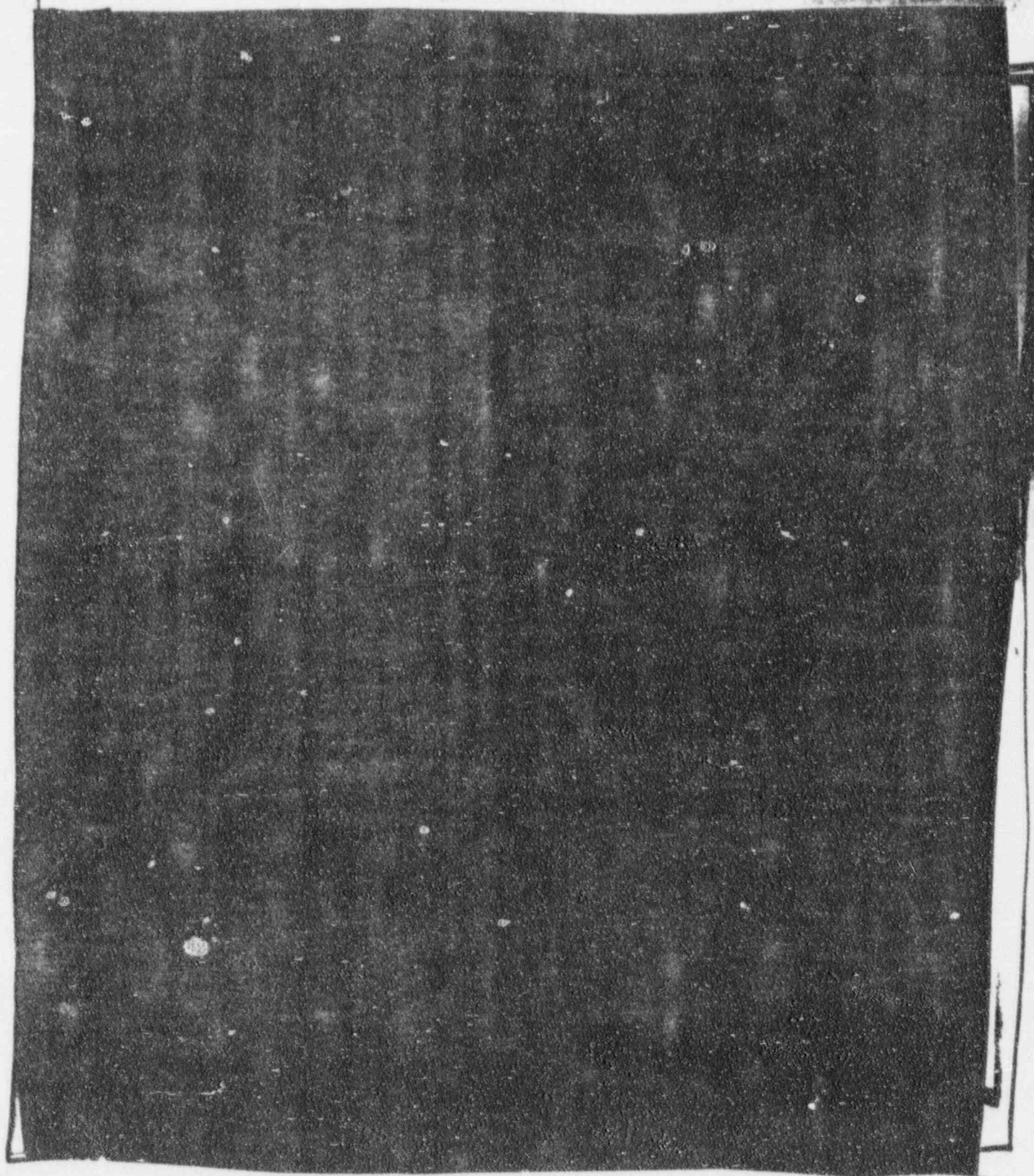
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FIGURE 3



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PROCESS PARAMETER SHEET



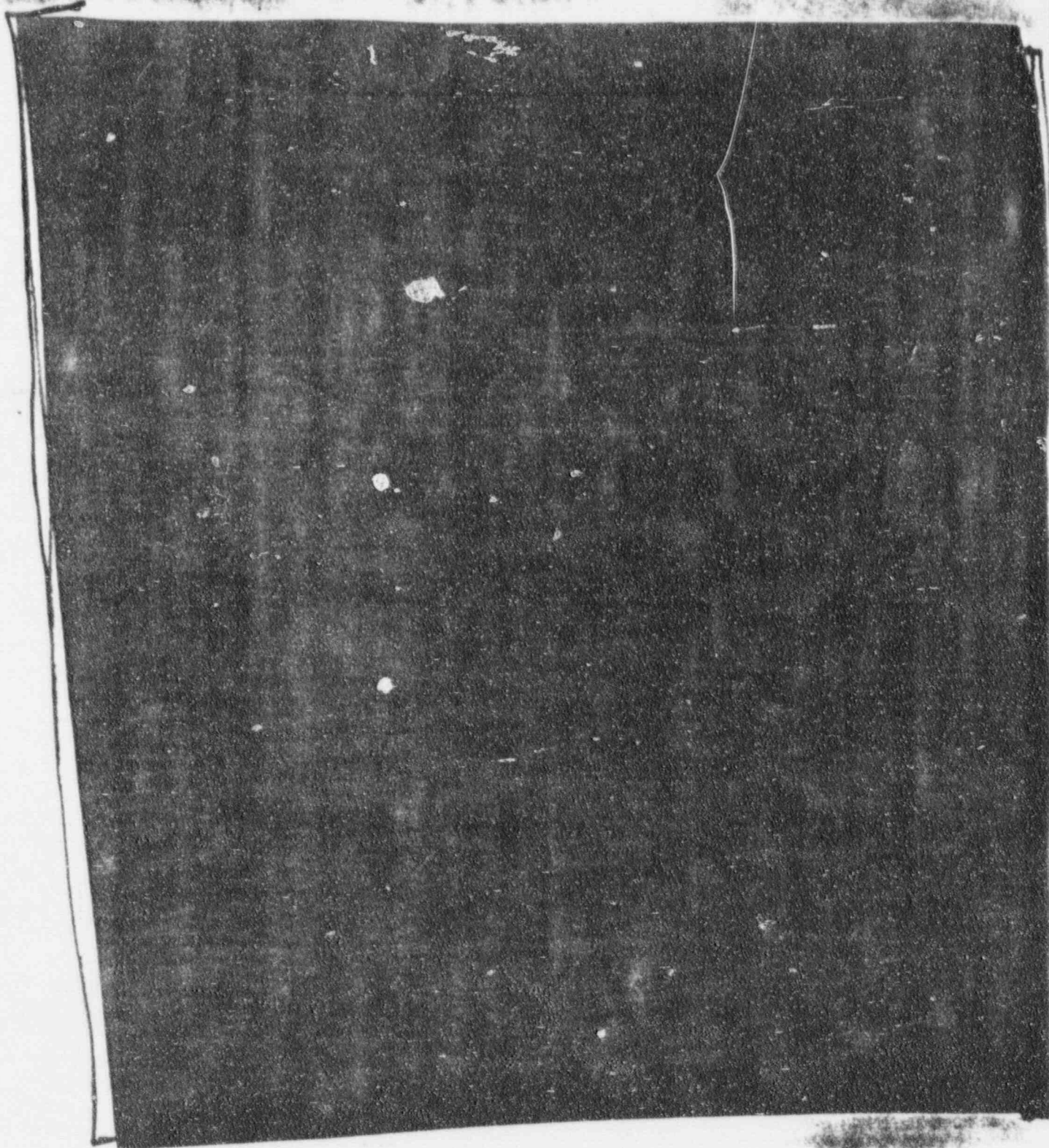
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PROCESS PARAMETER SHEET



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## REVIEWED AND APPROVED BY:

Manager,  
Engineering

*SR Fayer*

Manager,  
Laboratory

*Don R. Kline*

Manager,  
Maintenance

*Richard A. Tucker*

Manager,  
Operations

*J H Mestrey*

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Safety Officer/  
Manager  
Health & Safety

*Mr. J. L. L.*

PORC Chairman/  
Manager,  
Procedures  
& Training

*J. Santos*

*5-4-89*

Date

## APPROVED BY:

General Manager  
(Vice President  
Administration)

*J H Mestrey for SPK*

*5-4-89*

Date

This procedure is effective 5/19/89

## TRAINING/IMPLEMENTATION TABLE

The following implementation action is required:

Department	Action Level				
	0	1	2	3	4
Engineering	✓				
Laboratory	✓				
Maintenance	✓				
Operations		✓	<i>UF, Q, IRD + Supervision</i>		
Health & Safety	✓				
Security	✓				
Administration	✓				
Other					