Issue Resolution Documentation Form

DATE 4.28.2009 IR# 907846-11 (Tracking #) Decision Maker: H. Ray

A technical pre-job brief was performed in accordance with HU-AA-1212 for the production of this document. The risk rank of this task was determined to be 3. Independent reviews have been performed by Corporate SMEs.

OTDM Issue:	Water with Tritium levels of greater than 2,000pCi/l was identified in a concrete cable vault. The water was found during the replacement of cables for the Emergency Service Water (ESW) pumps. The suspected source of the water is from buried piping in the Condensate and Condensate Transfer systems.
Team Members:	T. McLean, R. Gayley, J. Hallenbeck
System/Component:	Condensate / Condensate Transfer
Key Stake Holders:	Plant Manager, Operations, Engineering
Decision To Be Made:	Does the condition of the Condensate and Condensate Transfer piping support restart and operation of the reactor?
Decision Made:	The condition of the Condensate Storage Tank, Condensate and Condensate Transfer piping does support restart and operation of the reactor.
Why is This Decision good with current conditions:	A FMCT was developed (See Attachment C) that considered all potential tritiated water leakage sources from the Condensate Storage Tank (CST) to the ground. Sixteen failure modes were identified. As a result of completing validation and action steps, seven pipe runs were identified as possible leakage sources. The findings and resultant actions performed to support this decision are as follows: 1. **6" Condensate transfer discharge aluminum piping (operating pressure 150 psig)** This piping was replaced in 1994. The coating inspection results indicate that the coating has not aged significantly since installation in 1994 and remains in good condition. No evidence of OD corrosion was identified. UT inspection found minor ID wall loss (8%). With the exception of four feet of pipe east of the Condensate Transfer Pump-House, the length of pipe from the Turbine Building to the condensate transfer Pump-House is visible. The four feet of pipe is covered by about two inches of loosely packed dirt. There was no observed leakage from this pipe section The pipe has remained pressurized through the inspection period and leakage would be visible if present. Excavation and inspection efforts have been in progress since Saturday, April 25, 2009, and no signs of leakage have been identified. Coatings and wrappings shall be restored to design condition. The initial failure analysis on the 8" line concluded the failure was due to a coating breakdown causing OD to ID corrosion. There is no significant active damage mechanism occurring in this pipe. See Attachments D and F for details of the inspection of this line. 2. **10" diameter Hotwell Level Control to Hotwell carbon steel pipe (operating pressure 40 psig)** During restoration of the Condensate system this line was pressurized and a leak developed in a portion of pipe. The buried pipe will be replaced from near the Turbine Building wall to the above ground area in the Condensate Transfer pump house. The pipe between the Turbine Building wall and the new pipe will be inspected to ensure that no degradation exists in this short section of pipe. Coatings and wrap will be restored to design conditions.

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	3. **8" diameter Hotwell Level Control to Hotwell (Carbon Steel) pipe (operating pressure 40 psig)** During inspection, a leak was identified in this pipe. The buried pipe will be replaced from near the Turbine Building wall to the above ground area in the Condensate Transfer Pump-House. The pipe between the turbine building wall and the new pipe will be inspected to ensure that no degradation exists in this short section. Coatings and wrap will be restored to design conditions. 4. **1" condensate transfer to condensate to Hotwell (Carbon Steel), (operating pressure 40 psig)** Pressure testing of this line confirmed its integrity. This line is presently leak tight but will be isolated when not in service to minimize any risk for future leakage. This line will be re-routed or replaced with material not susceptible to corrosion. The line can be isolated while the unit is on-line to support maintenance. 5. **1" CRD minimum flow bypass pipe to CST (Stainless Steel, operating pressure 100 psig)** There is no evidence that this line is leaking. The line is stainless steel, which is less susceptible to corrosion. This line has not been inspected at this time due to excavation restrictions caused by the excavation adjacent to the condensate transfer pump house. The line can be worked while the unit is on line. 6. **4" Condensate Transfer Bldg Drain pipe (Carbon Steel)** A temporary plug will be installed prior to startup to prevent leakage from the building. With the plug installed, the potential for leakage from this path is eliminated. The Condensate Transfer Building Drain Line runs below grade and ties into the CST and Demin Tank Overflow Line. This is a 12-inch line which runs about seven feet below grade and then enters the Turbine Building West Wall and terminates (open ended) just above the Turbine Building floor about 20 feet below grade (ref. BR 2193 and BR 2180). In order for water to backup up into the 4-inch line from the 12-inch line, the line would require significant flow (over 2000 gpm) to create enough of a backpressure in the 12-inch line to overcome the approximate 20 foot elevation difference between the Turbine Building floor and the Condensate Transfer Building floor. These flow rates are not likely to occur. Removal of this drain does increase the probability of a potential spill from a leak in the pump house. If a leak of sufficient magnitude develops it could overflow the existing sump and mote area. The sump is equipped with a high level alarm. Increased attention to this potential is warranted. Line replacement will be performed, in the near term, as determined by the Buried Pipe program. A project has been initiated to improve the overall containment and management of the system within the Condensate Transfer Building (IR 914427) 7. **Condensate Storage Tank (CST) (Aluminum)** – A walkdown of the area surrounding the tank does not indicate any leakage from the tank wall. Tank water level is being evaluated to determine if water level changes are proportional to operational condition requirements. CST inspections are scheduled to determine the condition of the floor of the tank for long-term operation. The divers are scheduled for 5/4/09. Divers will perform full visual internal inspection of the tank bottom. Sixty random spots on the floor of the tank will be ultrasonically inspected. An ACMP is in place to monitor leakage to ensure that additional sources of active leakage do not exist. The inspections, piping replacements and repairs provide a high level of confidence that the piping, and the CST, will maintain its pressure boundary.
Compensatory Measures Contingency Required:	➢ Increased groundwater sampling and monitoring for Tritium will be performed in accordance with The Adverse Condition Monitoring Plan (Attachment E).

Plant Limitations:	➢ None
Communications Plan:	➢ Briefs, NER, Notifications and Inside Nuclear

How will this OTDM be closed?

This OTDM will be closed following inspection, isolation and repair where required of leaking or below minimum wall piping.

Future Actions Required For Closure Of This OTDM: (Y)/ N

If No, Basis For Closure N/A

If Yes, Expected Closure: The OTDM will be closed following corrective maintenance as indicted in the table below.

Action Required	Closure Date	Tracking Mechanism (AR, WO, EC, CA#):	Responsible Individual
Inspect CST – Diver visual and UT inspections to be performed following startup. An ACMP is in place to identify and monitor for leakage from the CST. (Not required for start-up)	**5/15/09**	**R2119514**	**Pratt**
Condensate Drain Plug Installation (Required for start-up)	**Complete**	C2021150-A02	
6" Re-Coat/Re-Insulate (Not required for start-up)	**5/10/09**	C2021075-A31/A32	**Vaccaro**
8" Replacement/Re-Coat/Re-Insulate (Replacement required for start-up)	**5/10/09**	C2021105-A21/A30	**Vaccaro**
10" Replacement/Re-Coat/Re-Insulate (Replacement required for start-up)	**5/10/09**	C2021108-A04/A19	**Vaccaro**
Pressure Test 1" Condensate Transfer Seal Line (Required for start-up)	**Complete**	C2021104- A19	**Vaccaro**
Inspect or mitigate 1" CRD minimum flow bypass pipe to CST - The current excavation does not allow rework on this line at this time. There is no evidence that this line is leaking and the line can be worked with the unit on line. (Not required for start-up)	**5/15/09**	C2021104	**True**

IR# 907846 WR# A2222268 EC# _____ SO#_____

Independent Review Required: Y Review was performed by R. Gesior, and G.Lupia

Authorizing Signatures (Key Stake Holders):

[redacted]

Engineering Directo[redacted] (DATE) 5/1/2009

Operations Director [redacted] (DATE) 5-1-09

Decision Maker [redacted] (Date) 5/1/2009

Plant Manager [redacted] (Date) 5/1/2009

☐ **This OTDM is Closed (no longer required)**

Basis for Closure: _____

_____

☐ Completed copies of the OTDM forward to the SOS (Operations)

DECISION TAKEN

The Oyster Creek Senior Management Team has accepted decision #1: **"The condition of the Condensate and Condensate Transfer piping supports restart and operation of the reactor."**

The decision was based upon consideration of the arguments presented in this document and particularly the following issues:

1 The 8" diameter Hotwell Level Control to Hotwell carbon steel pipe will be replaced from near the turbine building wall to the above ground area in the Condensate Transfer pump house before startup.

2 The Condensate Transfer building drain line will be plugged before startup.

3 Inspections have determined that the 6" Condensate Transfer discharge pipe coatings are in excellent condition with no indication of leaks from this source. This pipe is relatively new, having been replaced in 1994.

4 The 10" Hotwell Level Control to Hotwell carbon steel pipe will be replaced from near the turbine building wall to the above ground area in the Condensate Transfer pump house before startup.

5 The 1" Condensate Transfer to condensate hotwell is presently leak tight as demonstrated during pressure testing and will be isolated when not in service to minimize any risk of future leakage. Operations is controlling the isolation of this line through the use of an EST.

6 There is no evidence that the 1" CRD minimum flow bypass stainless steel pipe to the CST is leaking and the line can be worked while the unit is on line.

7 The inspections and repairs provide a high level of confidence that the piping addressed above will maintain its pressure boundary until the next scheduled inspections per the buried piping program.

8 A test and inspection of the Condensate Storage Tank is scheduled to begin on 5/4/09.

9 An Adverse Conditioning Monitoring Plan is in place to monitor for Tritium. (Attachment E)

10 Inspection of the ESW vault, the Intake structure cable manhole, Cable duct D-102 and other cable ducts in the area of the intake structure and condensate storage tank for water leakage/buildup have confirmed that there is no identifiable water leakage.

11 Inspections using the existing excavations are adequate to ensure underground piping in the vicinity of the Condensate Transfer Pump House is sound and repairs of all suspect piping have been completed satisfactorily. A large portion of the potential pipe leak source of tritium for the 6", 8" and 10" subject pipes have been inspected and replaced where necessary.

12 Environmental sampling will continue to confirm that Tritium levels continue to drop in accordance with samples taken prior to this issue.

13 Coatings will be have been restored to design condition, and tested after repair and inspection activities.

14 Efforts are in place to fully remove the associated piping vulnerabilities through modifications targeted for 1R24.

15 The attached summary (Attachment F) provides the details of the condition assessments performed.

System Description Information:

The Condensate and Feedwater System is shown in Drawing BR 2003, the Condensate Transfer System is shown on Drawing BR 2004. The system starts at the Main Condenser hotwell, and terminates at the Reactor Vessel, it is subdivided into the Condensate System which extends from the Main Condenser to the Reactor Feedwater Pumps, the Feedwater System which extends from the Reactor Feedwater Pump Suction to the Reactor Vessel; and the Condensate Transfer System which includes the Condensate Storage Tank, the Condensate Transfer Pumps and piping and valves.

Condensate System

Two lines from each of the three condenser hotwells discharge into a common 30 inch condensate supply header. The header also receives returned condensate from Radwaste processing, the Spent Fuel Pool and the cleanup system. Three one third capacity condensate pumps (Table 10.4-3) take suction from the condensate supply header and discharge into a common 24 inch header which branches to provide cooling flow to the three intercondensers and the three after condensers of the SJAE units. These six condensers are arranged in parallel. Manually operated isolation valves are provided on the suction and discharge lines for each condensate pump, a check valve is provided on each condensate pump discharge line. The three sets of condensers for the SJAE units are provided with motor operated isolation valves at their intake and discharge lines. The flow recombines downstream of the SJAE condensers, passes through the steam packing exhauster and enters the condensate demineralizers. Upstream of the demineralizers, a branch line is provided for demineralizer backwash. Downstream of the demineralizers, one branch line is provided to the Reactor Feedwater Pump Seals, a second branch line is provided to the low pressure turbine exhaust hood sprays, and a branch line to the CRD System. Hotwell level is maintained automatically by a level control system. Makeup water is added to the hotwell directly from the Condensate Storage tank through control valves when hotwell level begins to drop below the level setting. If level continues to drop, increasing makeup water is added until level recovers or the control valves reach their full flow position. Conversely, water is rejected from the hotwell through control valves when level rises above the level setting. If level continues to rise, water is rejected at an increasing rate until level recovers or the control valves reach their full flow position. Water from the hotwell is rejected from the Condensate system downstream of the Condensate Demineralizers.

Ex. 4

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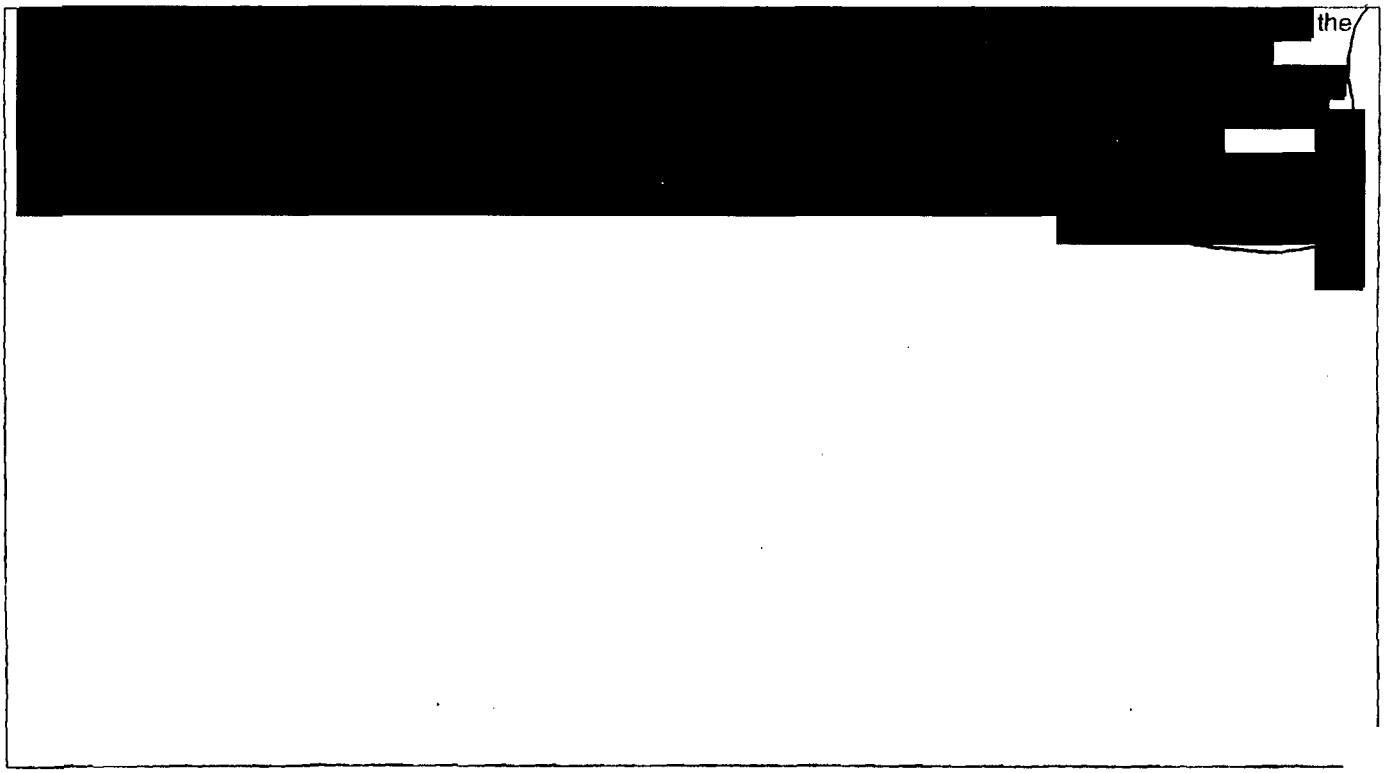
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Potential Decision #1: The condition of the Condensate and Condensate Transfer piping supports restart and operation of the reactor.

Decision Risk (See Below)	Consequence (what's the worst that can go wrong?)	Decision Benefit
Extent of Condition: Several potential sources of the elevated levels of tritium have been identified. Suspect piping has been inspected, mitigated or tested. Defective piping has been identified and repairs have been made. **Regulatory Impact:** Following repairs to the impacted piping environmental sampling will continue to monitor tritium levels in accordance with the ACMP (attachment E). **Relevant OE:** **NER CL-09-004** – TBCCW contaminated with Tritium (01/02/09) - A Tritium value of 21,492 pCi/L was detected. The source of the contamination was identified as the replacement of a leaking heat exchanger from a Feedwater Sample Panel. IR#862428 **Reduction in design/operating margins:** Water leakage at the current rate does not impact the design and operating margins. The structural integrity of the pipe remains adequate and the systems inventory were never challenged by the leak. **Vendor Input:** None **Probabilistic Safety Analyses** **Probability of continued tritium releases in excess of NJ reporting limits:** Low – Piping inspections and repairs, along with environmental	Potential worst case is deterioration of the piping resulting in increased leakage and/or ongoing tritiated water releases. The probability is low based on the results of piping inspections and replacement. Potential impact on regulatory margin and public perception. Leakage would require re-excavation at a later point in time. It is better to do the exams now while the pipe is nearly exposed.	All known potential causes of the leak have been identified and corrected. Excavations completed in the current area support the conclusion that the plant can return to operation following repairs with a low risk of additional leaks developing based on the findings from the inspections performed in 1F20.

monitoring results will continue to confirm that the tritiated water source has been identified and eliminated. **Uncertainties of outcome:** Piping which has been inspected, but not replaced may subsequently leak. The probability of this outcome is low due to UT inspections, coating and pipe replacements on the 6" Condensate Transfer line (majority of coating inspected), the 8" line from the Hotwell Level Control system to the Hotwell (majority replaced – remainder has been inspected sat) and the 10" Hotwell level control to Hotwell line (majority replaced – remainder has been inspected sat) together with isolation of the 1" CRD minimum flow line to CST and determination that the 1" Hotwell level control system to the Condensate Pump Seals is leak tight during pressure testing have adequately addressed leak sources. **Contingencies or mitigating actions:** Groundwater environmental monitoring will continue in accordance with the Adverse Condition Monitoring Plan (Attachment E). **Aggregate impact of decision with current plant issues:** Potential worst case is deterioration of the piping resulting in increased leakage and ongoing tritiated water releases. This impact can be quickly identified through the sampling wells.		

Potential Decision #2: The as-left condition of the Condensate and Condensate Transfer piping **does not** support restart and operation of the reactor.

Decision Risk (See Below)	Consequence (what's the worst that can go wrong?)	Decision Benefit
Extent of Condition: All potential sources of the elevated levels of tritium (beyond sources identified in the FMCT) may not have been identified. Suspect piping has been inspected, but not all defective piping may have been identified. Also repairs have not been made to all suspect piping. The Condensate Storage Tank and its base have not been inspected. The plant shall remain shutdown until the cause(s) have been identified and all impacted piping has been replaced. **Regulatory Impact:** None **Relevant OE:** **Quad Cities NER** - October 12, 2007, Quad Cities informed the resident inspectors and the NRC's Region III Office that elevated levels of tritium had been found in newly installed onsite ground water monitoring wells. **Reduction in design/operating margins:** Not Applicable **Vendor Input:** None **PSA's** **Probability of continued tritium releases in excess of NJ reporting limits:** Low – Piping inspections and replacement, along with environmental monitoring results have confirmed that the tritiated water source has been identified and eliminated. However not all sections of piping have	Extended plant shutdown while the extent of condition is identified and repairs are designed and implemented. This does not guarantee that some other mechanism or failure would cause another tritium leak. Potential issues with additional excavation. Ambiguous results from additional inspections	Replacing all suspected sections of piping will minimize the risk that tritium leaks continue following plant startup. Additional inspection results and confidence in integrity of pipe to reduce risk of leakage

been replaced beyond the excavated area and the Condensate Storage tank has not been inspected. **Uncertainties of outcome:** Time required to fully determine all potential piping, cut out and replace all potentially affected sections of piping is not known. Do not know challenges with continued excavation. Do not know quality of additional inspections until the pipe is exposed. **Contingencies or mitigating actions:** Groundwater environmental monitoring will continue in accordance with the Adverse Condition Monitoring Plan (Attachment E).		

Attachment A
OTDM Decision Details

DOCUMENT inputs and assumptions used in the decision analysis:

a. Tritiated levels are less than NJ DEP reporting levels
b. Adequate inspections have been performed to provide a reasonable degree of assuredness that potential leakage sources were identified.

IDENTIFY alternatives considered during the decision making process:

1. The condition of the Condensate and Condensate Transfer piping supports restart and operation of the reactor.

2. The condition of the Condensate and Condensate Transfer piping does not support restart and operation of the reactor.

IDENTIFY triggers to **Re-Evaluate** an open decision if conditions change:

Ground water sampling identifies continuing elevated levels of tritiated water.

Continuing water leakage into the ESW vault, the intake structure cable manhole, Cable duct D-102, and other cable ducts in the area of the intake structure that contains tritium.

Review Attachment B steps 1 through 6 (INPO's principles for effective decision making) as necessary. **IDENTIFY** REASONS any attachments were NOT used for this decision:

1. Recognize Conditions	Complete – see analysis above
2. Establish Roles and Responsibilities	Complete – see analysis above
3. Define Consequences	Complete – see analysis above
4. Understand Risks	Complete – see analysis above
5. Develop Plans	Complete – see analysis above
6. Evaluate Decisions	Complete – see analysis above

IDENTIFY who performed an independent review of the OTDM (if one was required):

OTDM review comments	Resolution (or basis for not incorporating)

Attachment C

Attachment C

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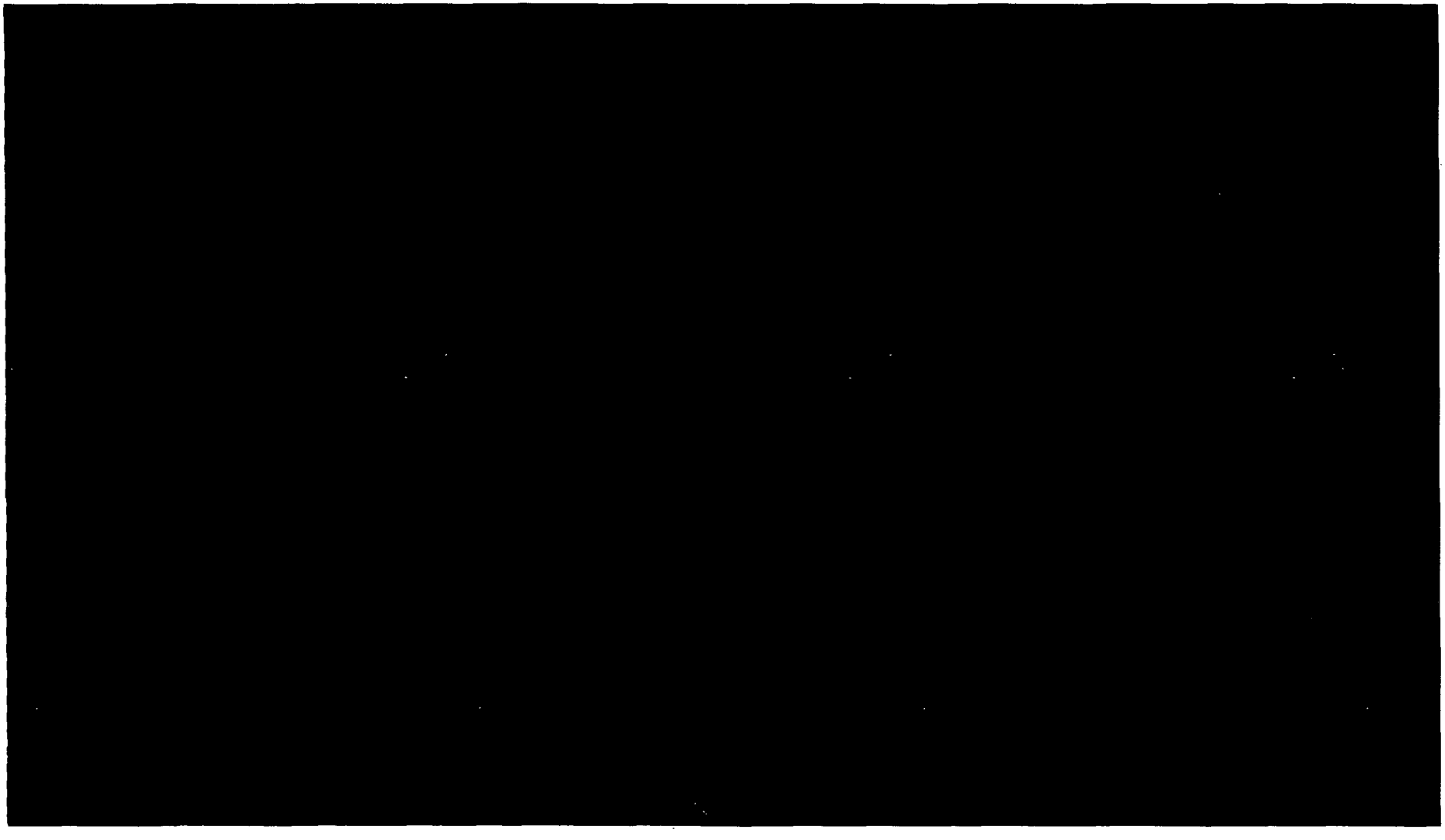

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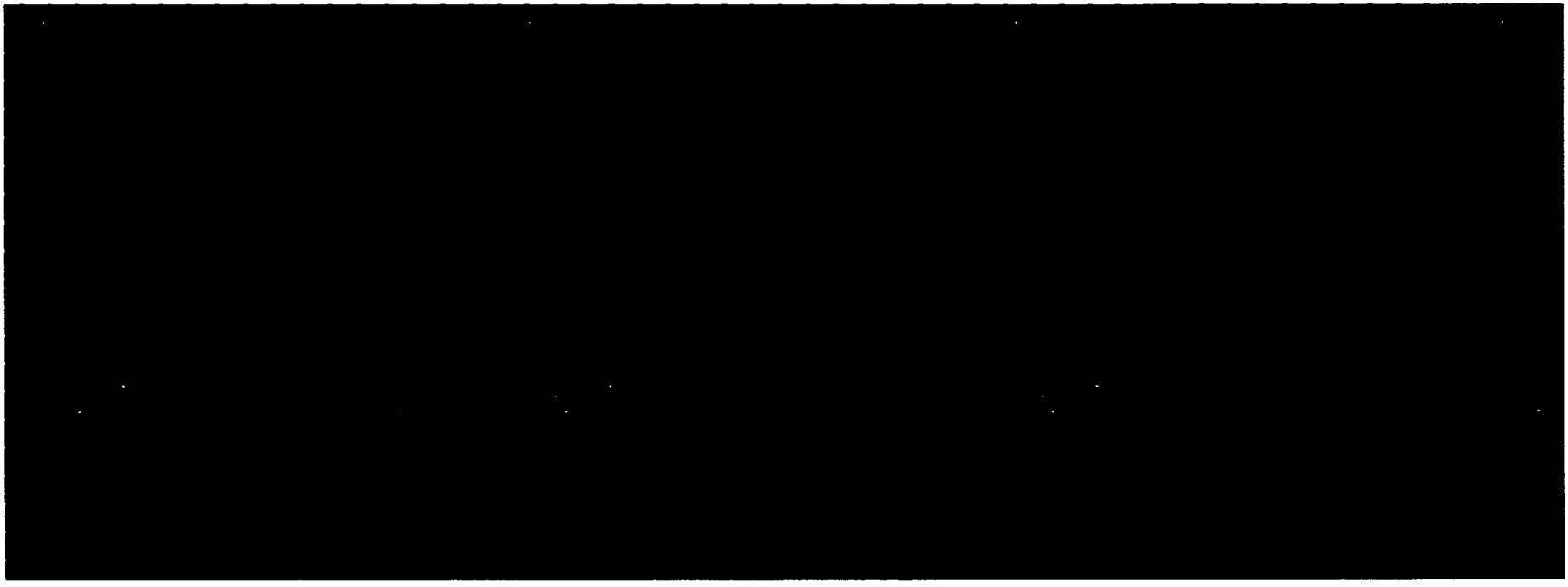

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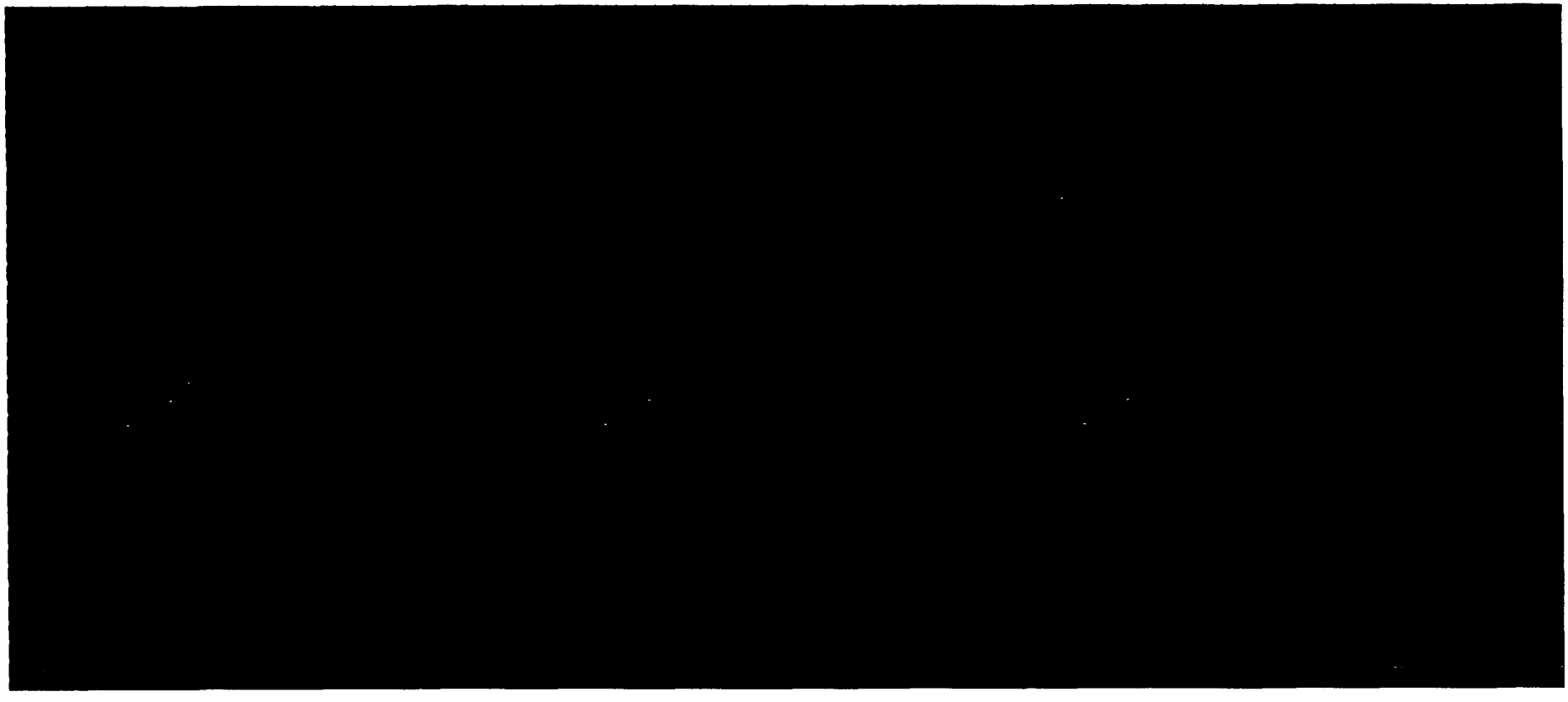

Attachment C

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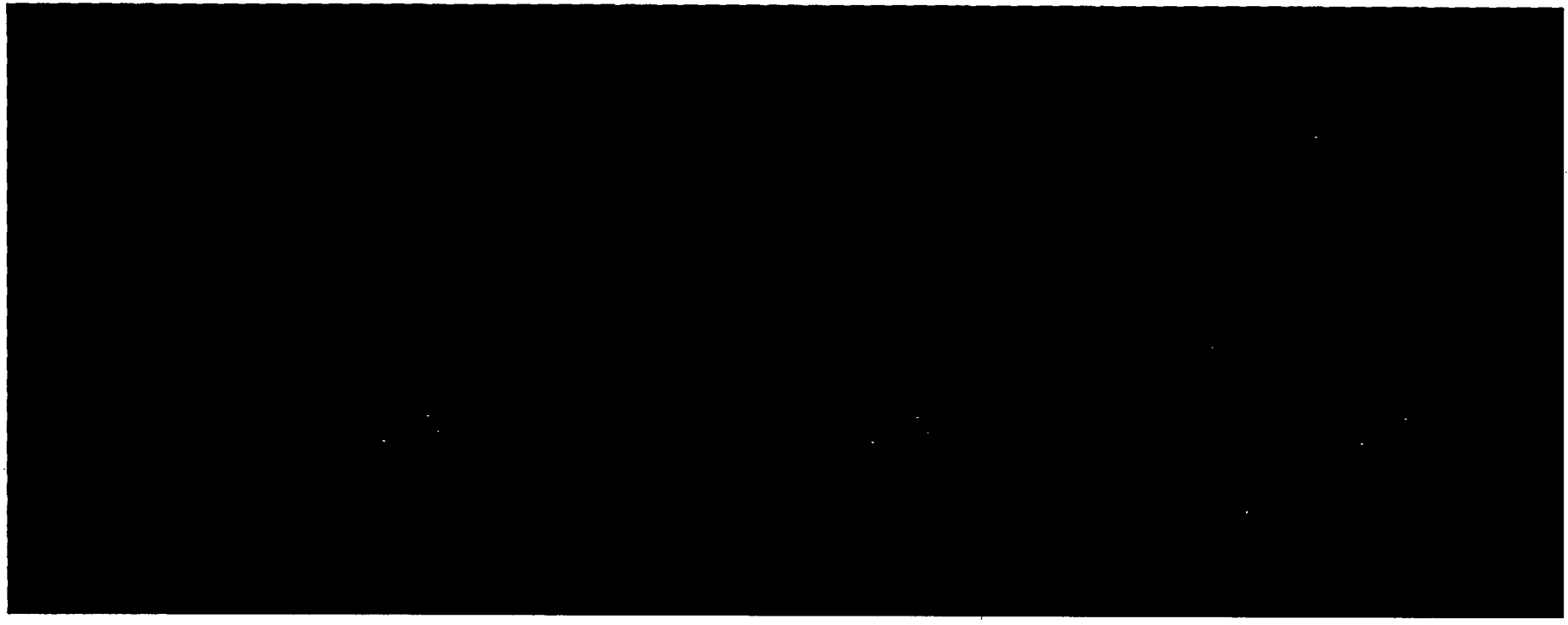

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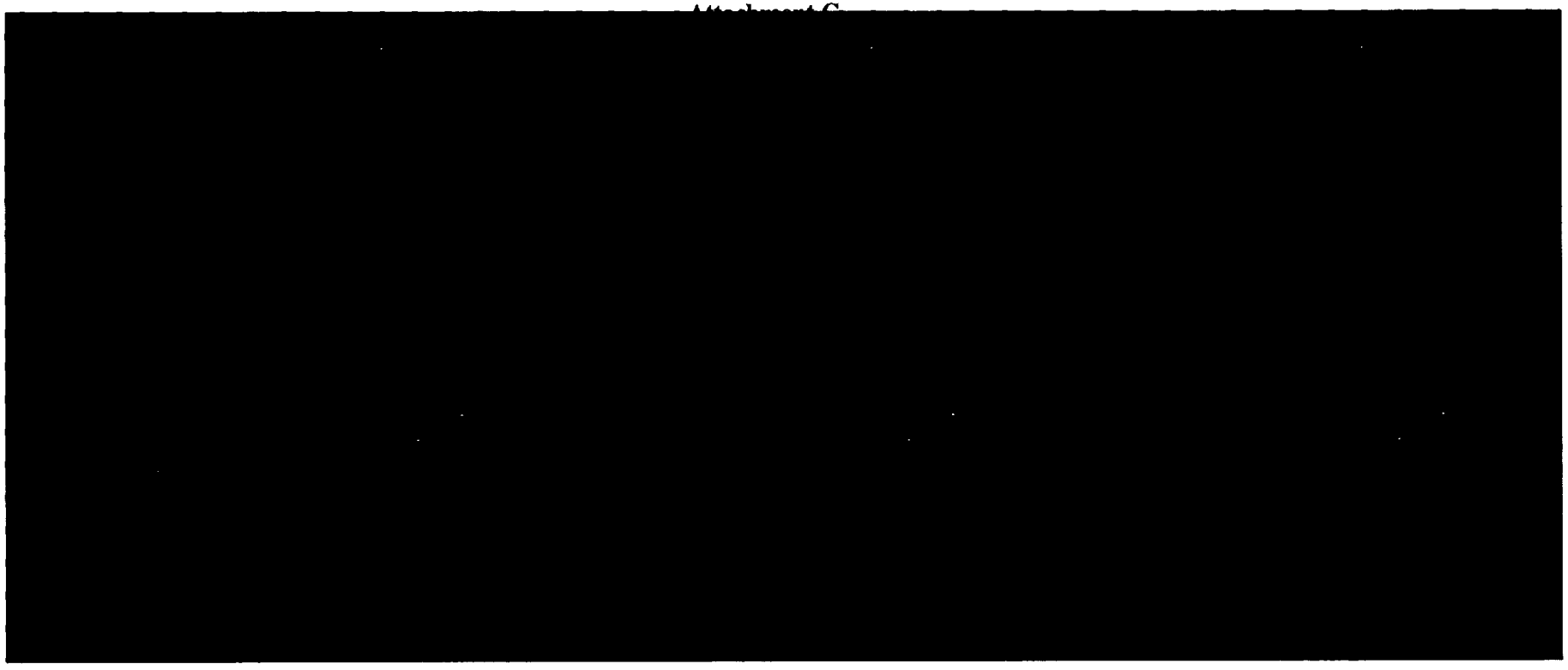
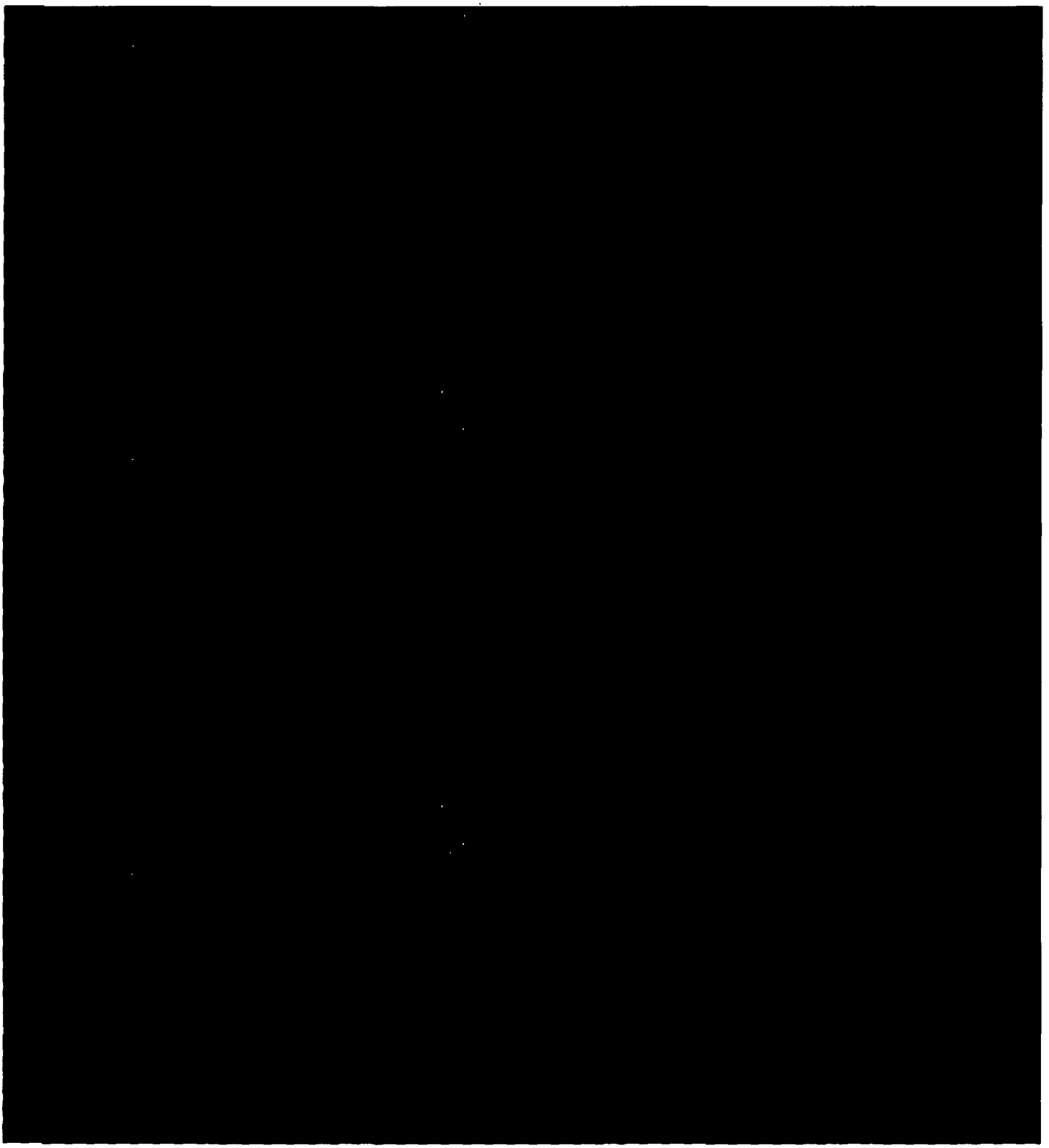


EX. 4

Attachment C

Attachment D



Attachment E

Adverse Condition Monitoring And Contingency Plan
Page 1 of 1

Elevated Tritium Concentration Detected Onsite
Plan Title

Date: 04/23/09 (Rev 1 on 04/26/09)

Unit: 1

Parameter: Elevated Tritium Concentration Detected Onsite

Condition Statement: On 04/15/09 tritium activity was detected in an outside vault. In preparation for work inside the Emergency Service Water vault, water found inside the vault was pumped into drums and sampled for gamma emitters, tritium, and pH. There were no gamma emitters identified, pH was 7.62 and tritium was 102,000 pCi/l. The reporting threshold to the New Jersey DEP for tritium is 2,000 pCi/l.

IR#: 907846 WR#: N/A OP EVAL#: N/A

Indicator(s): Tritium levels greater than 2,000 pCi/l were identified in water pumped out of a concrete vault containing Emergency Service Water (ESW) cables, which were being replaced. Later other well samples were also found to have tritium levels greater than 2,000 pCi/l.

Enhanced Monitoring Frequency: Applicable work groups to obtain samples and perform inspections per table below.

Plotting Chart attached – No (Data Sheet Attached)

Contingency actions: This ACMP is for monitoring of conditions. If elevations in results are seen without understanding of the tritium source then an elevated action plan for source determination should be made at that time.

Attachment E

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Attachment E

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Attachment E

All samples are to be taken in as follows (5– 500 mL samples and 1 – 125 mL sample) with the exception of samples being sent to LGS need an additional 500 mLs.

Sample #1 for onsite analysis (500 mLs for gamma and 125 mLs for tritium)

Sample #2 for Teledyne Brown (500 mLs)

Sample #3 for State of NJ (3 -500 mLs)
Eberline Services, requires three (3) 500 mL containers for the following sample locations for each sample:
1. Wells W-50 through W-54, MW-15K-1A
2. Surface Waters intake, Rte 9 bridge and Condenser Discharge

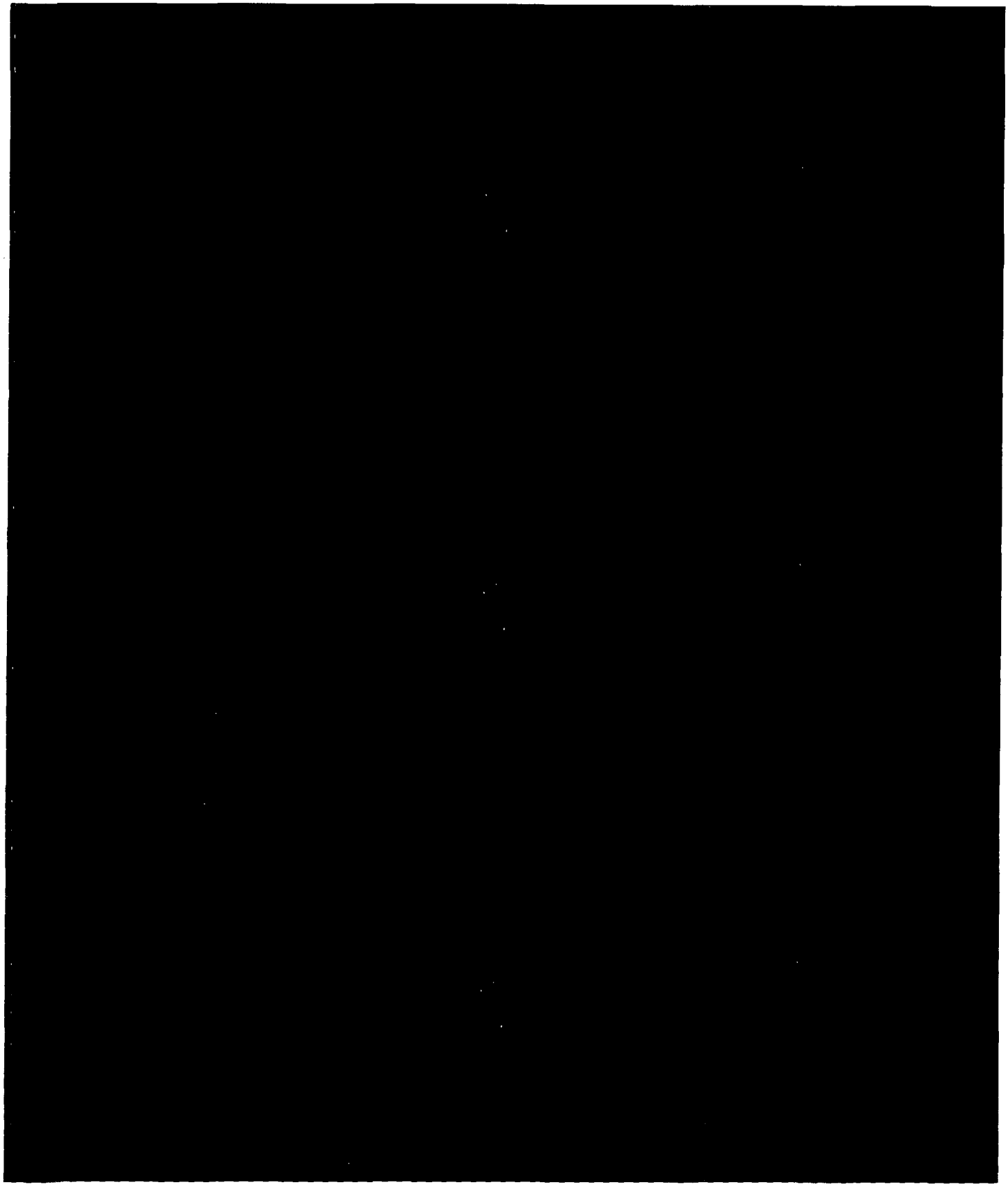
Sample #4 for LGS (500 mLs) for Main Condenser Discharge, Route 9 Bridge, and Intake only. Ex. 4

[redacted]

Removal Criteria: At the discretion of the Chemistry Manager.
Prepared: [redacted] 04/26/09 Ex. 6 6
Reviewed: Shift Manager _____
Approved: SOS/OPS Director _____
Forwarded to Plant Manager/Station Duty Manager/Site VP (check) ☐
Identified on Morning Plant Status Template (check) ☐

Termination Criteria Met, Plan Closed: Shift Manager _____ _____(Date)

Attachment F



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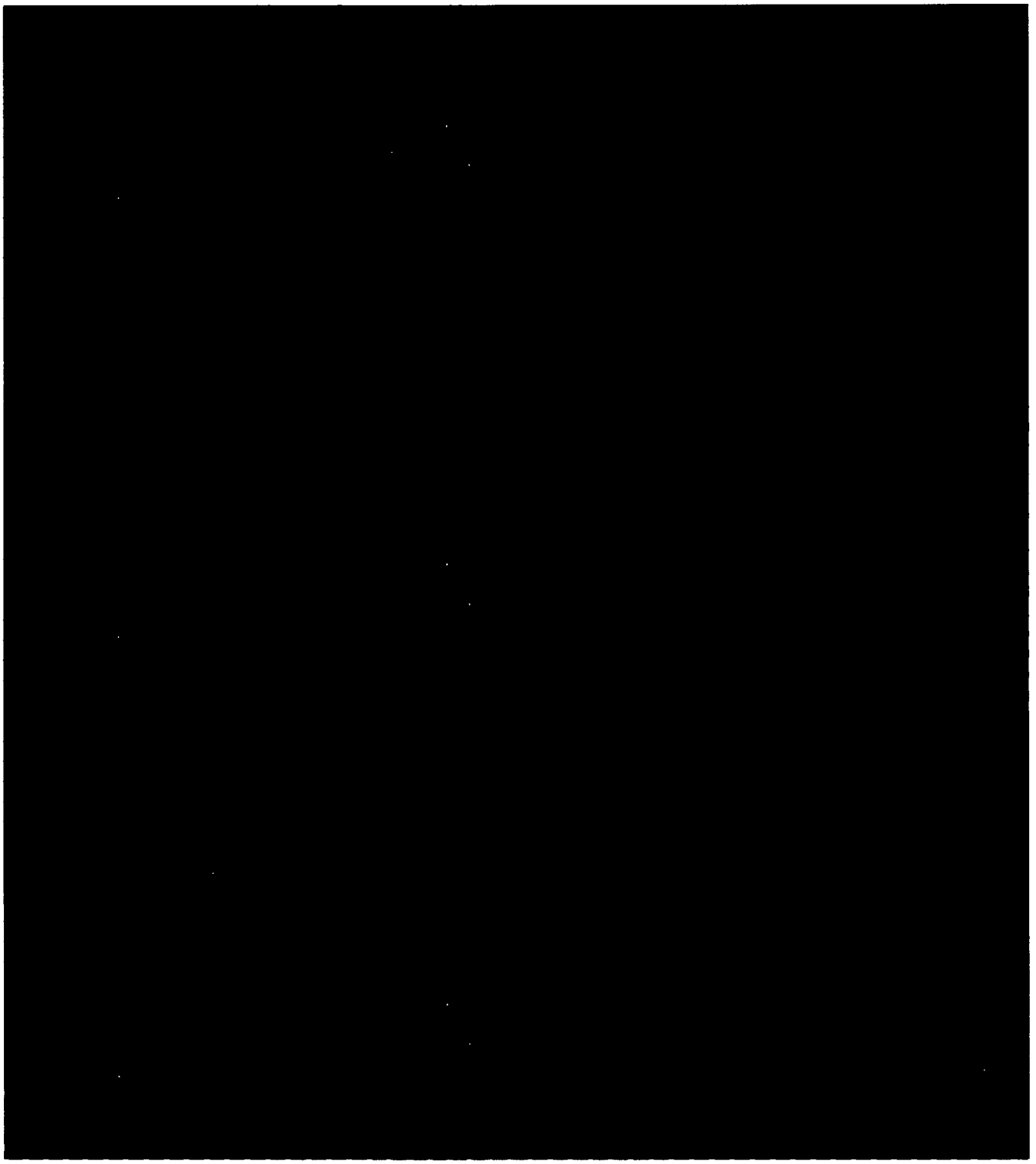

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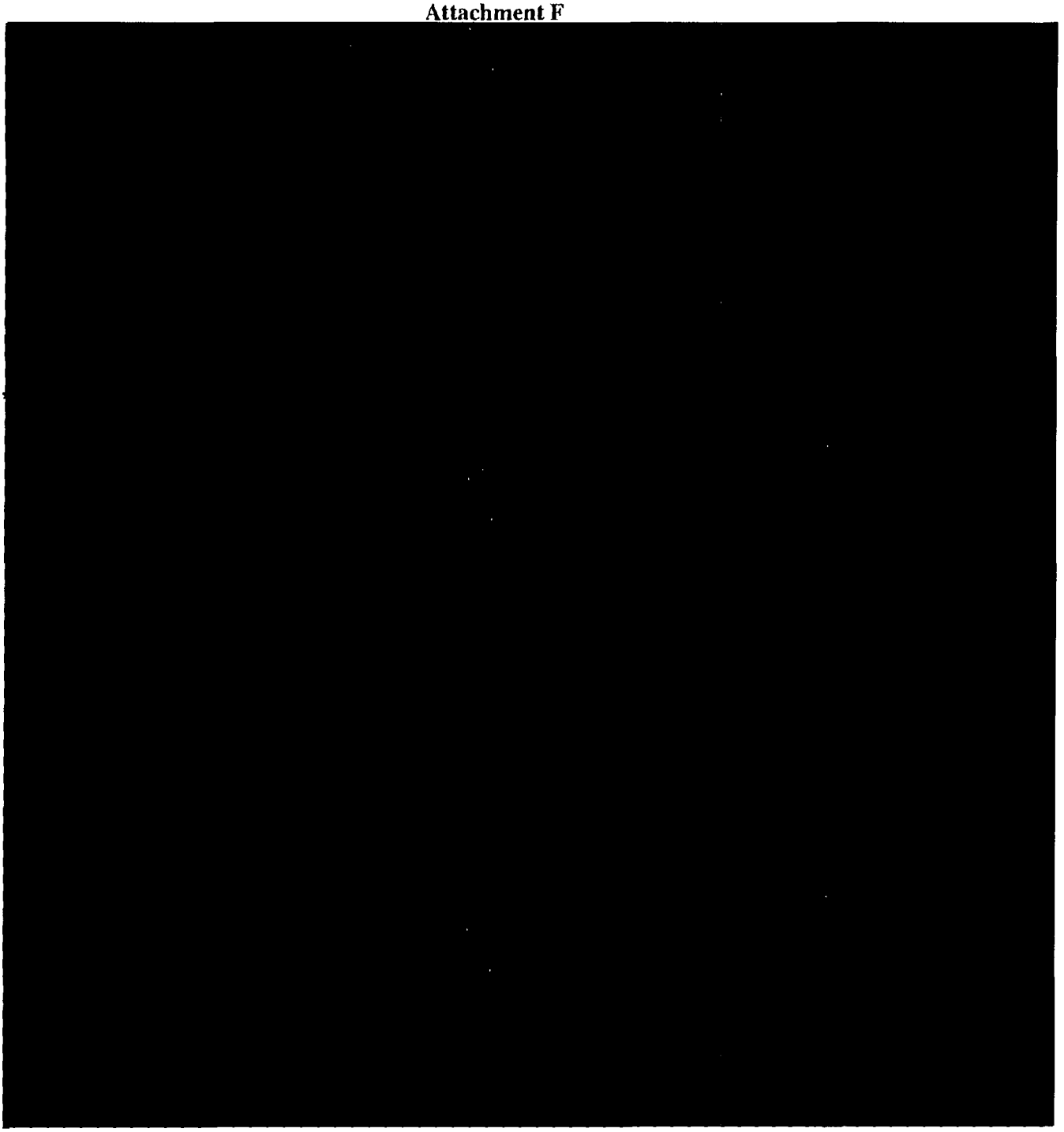

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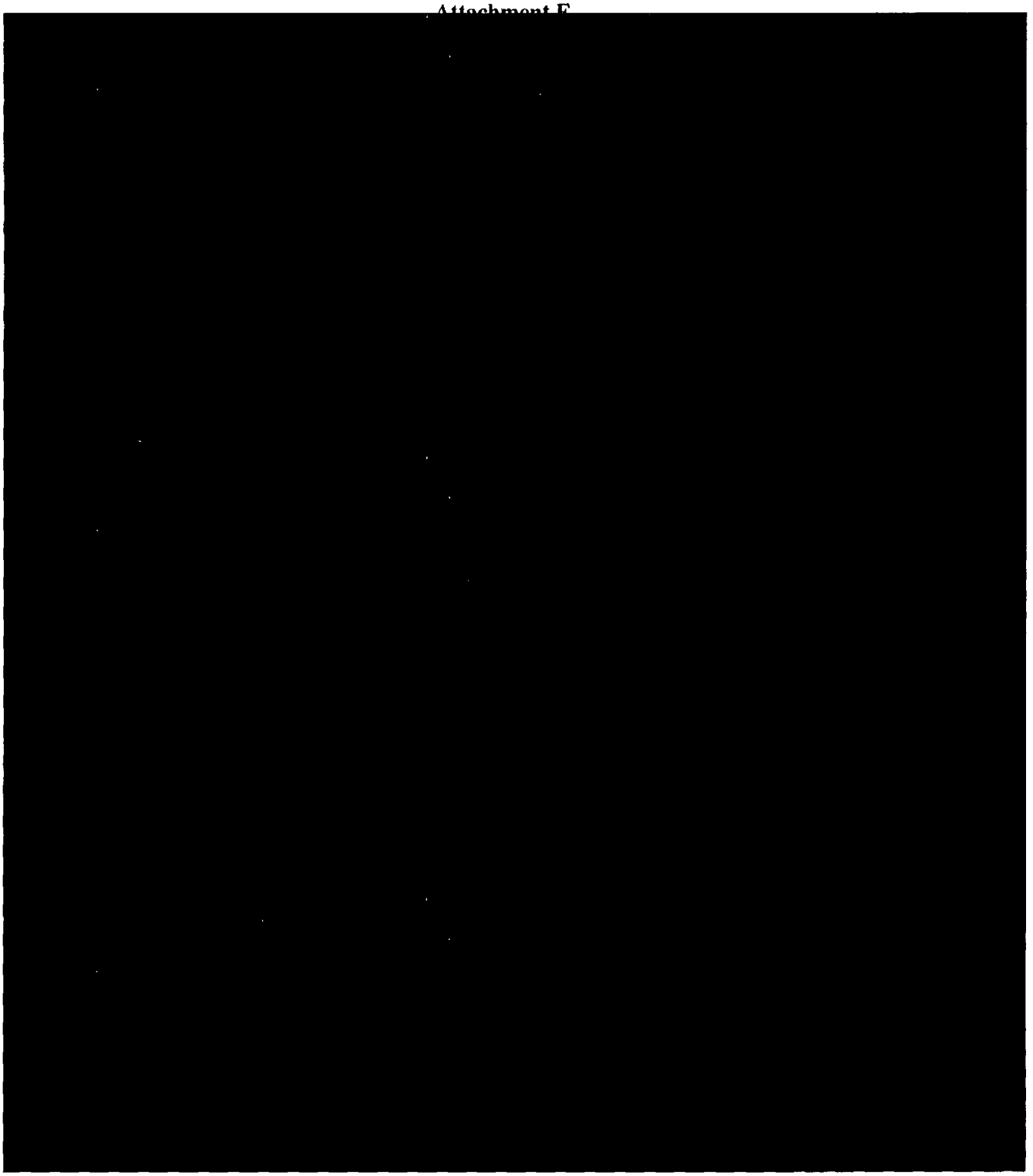

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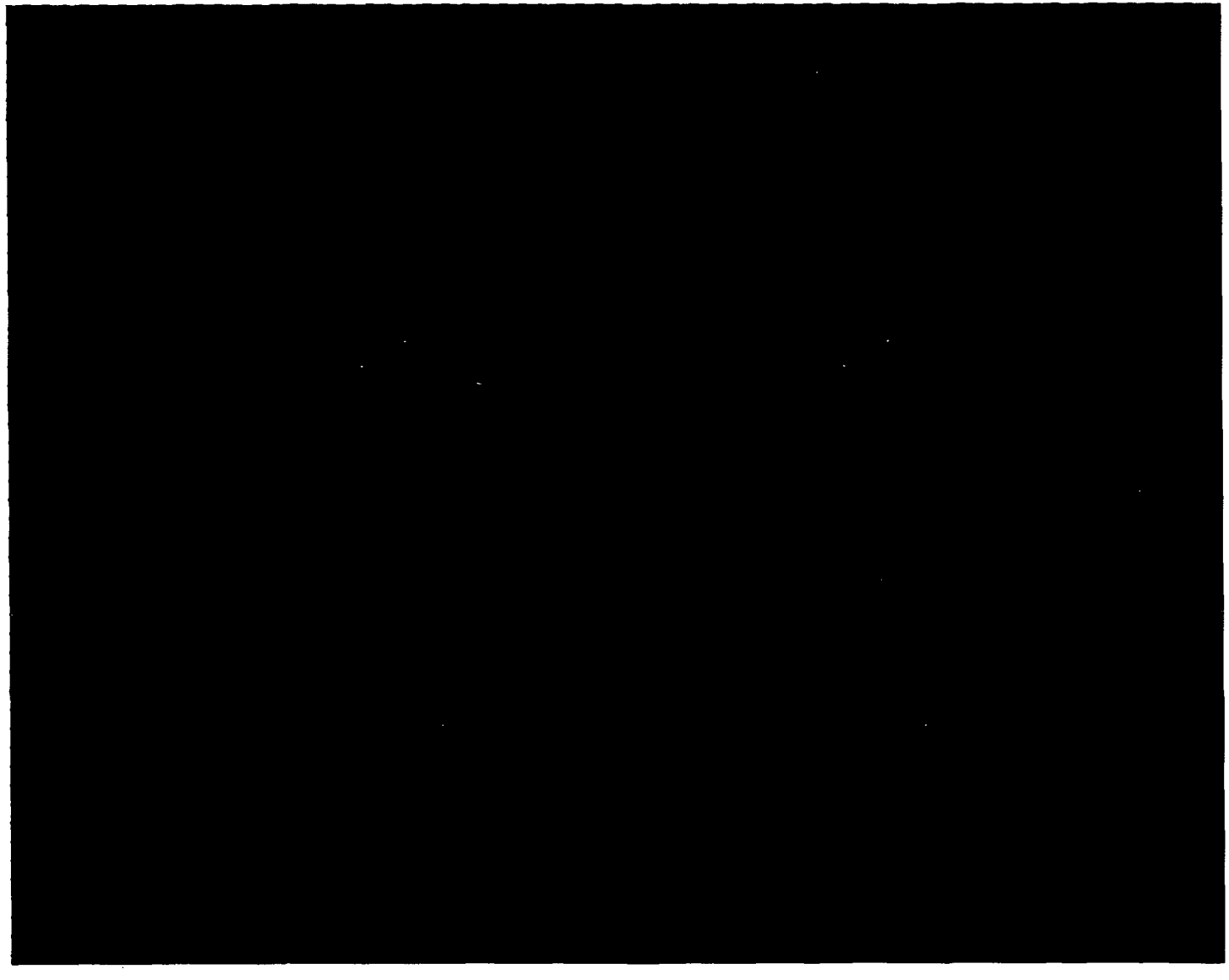

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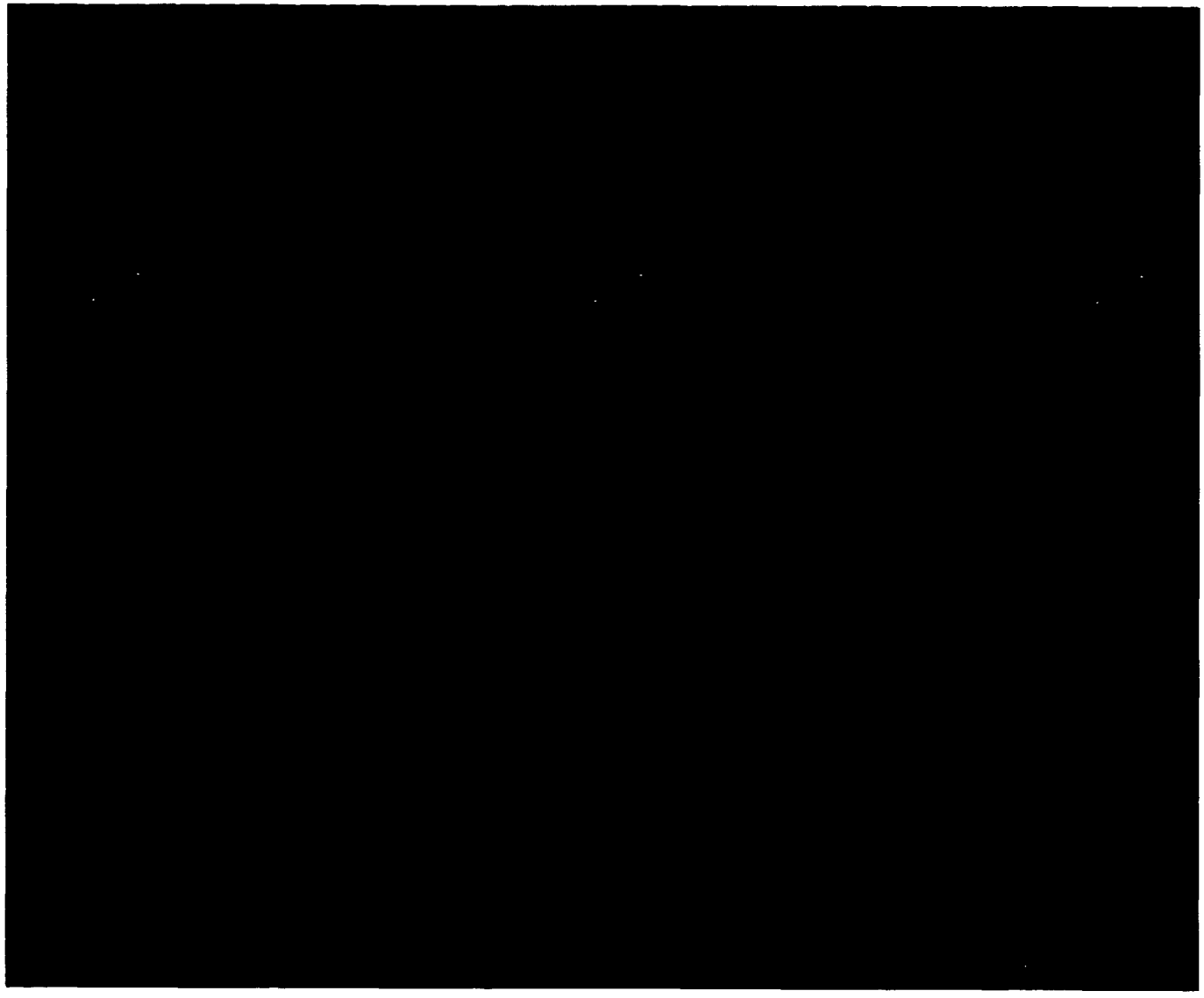

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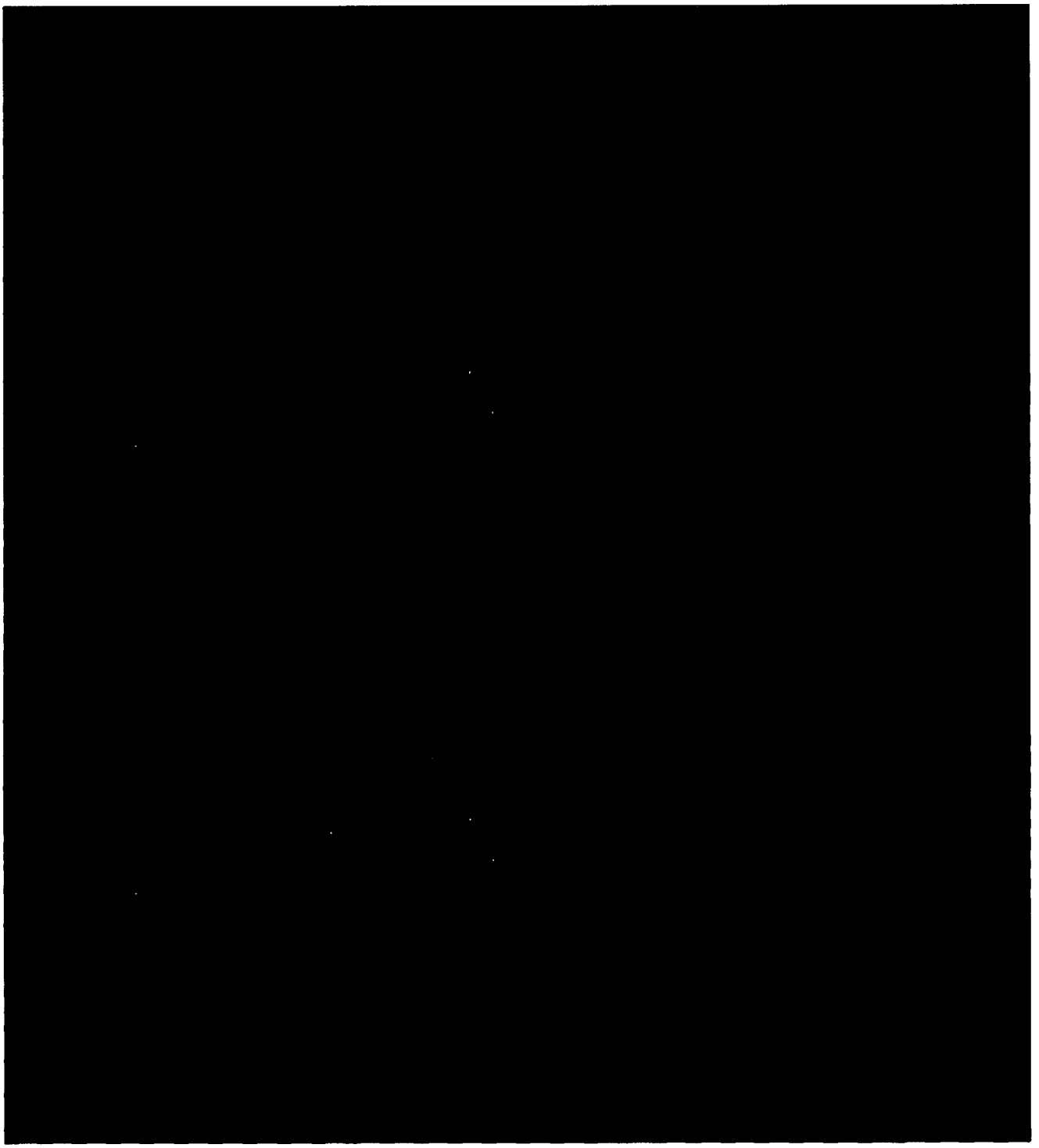

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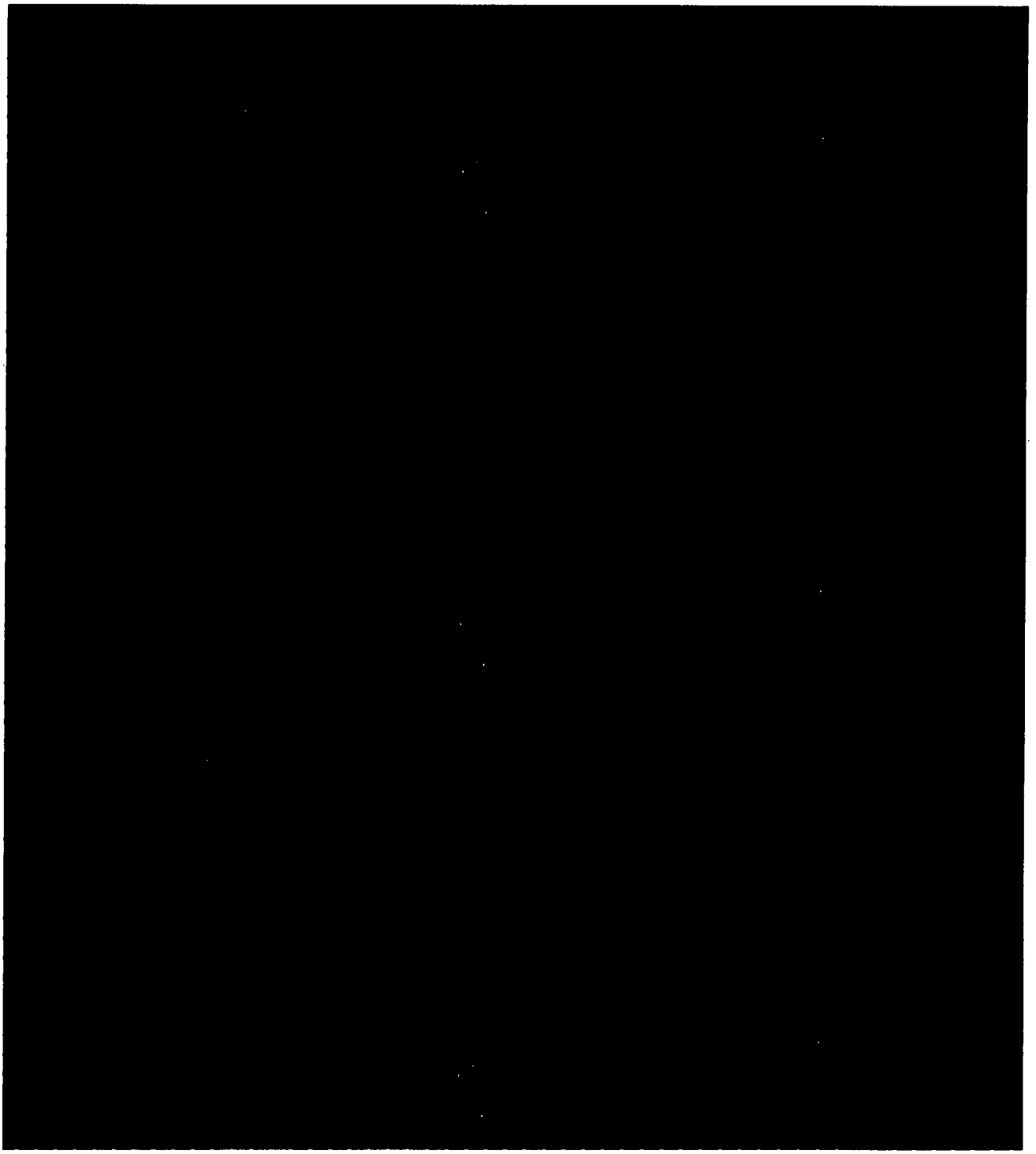

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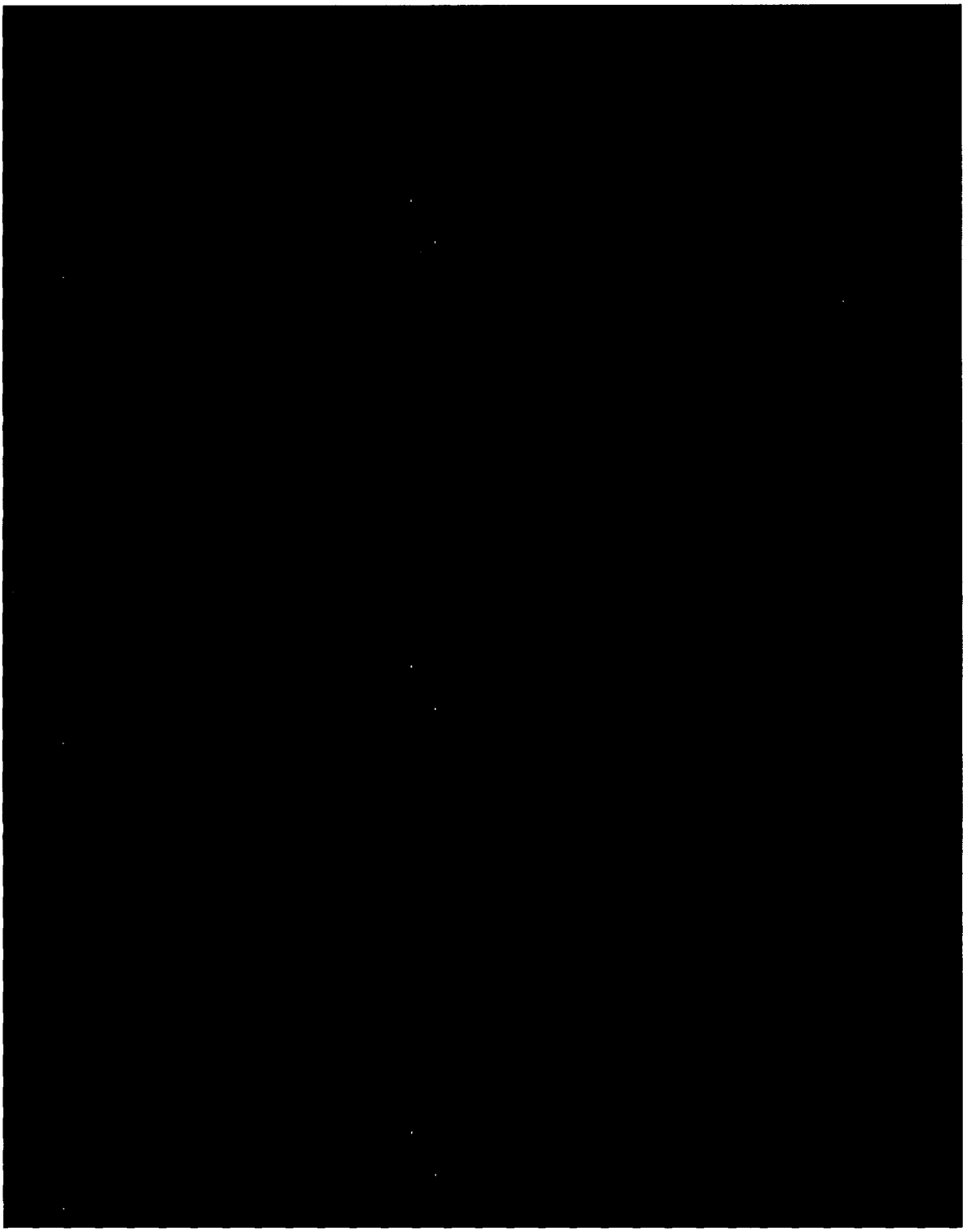

Ex. 21

Attachment F