



MINISTRY OF DEFENCE

Defence Equipment & Support  
Nuclear Weapons IPT

UK ENRICHED URANIUM (EU) CAPABILITY  
INVESTMENT APPRAISAL



NW IPT



ISO 9001:2000  
FS 40333

Issue: 1 – Dated: 05/04/07

DPA/NW/PGL/101/319/01/IA

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[REDACTED SECTION]

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[REDACTED]

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[REDACTED]

NO LONGER APPLICABLE

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**OBJECTIVES OF THE INVESTMENT**

1. The objective of this investment is part of the overall objectives of the Nuclear Warhead Capability Sustainment Programme (NWCSP). The particular objective is to retrieve and restore an enduring capability to fulfil the requirements below, in respect of Enriched Uranium.

**EXPLANATION OF THE REQUIREMENT**

2. The requirements below are traceable to the MoD Nuclear Weapons Integrated Project Team (NW IPT) System Requirements Document (SRD) ref NWIPT/04/35/01 Issue 2 March 2006, which in turn is traceable back to the Nuclear Warhead Programme User Requirements Document (URD) version 5.1, October 2005.

**Material Ageing, Life Prediction and Surveillance**

3. The URD articulates the need to underwrite the safety and performance of the warhead.

[REDACTED]

S24

**Component Manufacture (Inc. Research and development)**

[REDACTED]

S24

[REDACTED]

S24

**Storage of Special Nuclear Material (SNM)**

6. The URD has a continuing requirement for the safe and secure storage of the Enriched Uranium inventory. Suitable and sufficient storage arrangements compatible with projected programme throughputs and stock levels will be an enduring requirement of the EU capability.

**BACKGROUND**

[REDACTED]

S24

[REDACTED]

S24

[REDACTED]

S24

[REDACTED]

S24

**SPECIALIST ADVICE**

10. Several sources of specialist advice have been utilised in the compilation of this Investment Appraisal. AWE has provided technical information and costings of the options. Pricing and Forecasting Group (PFG) have validated the cost and schedule models and the scrutineer community in general have given feedback and guidance throughout this phase of the approvals process.

**POSSIBLE OPTIONS**

[REDACTED]

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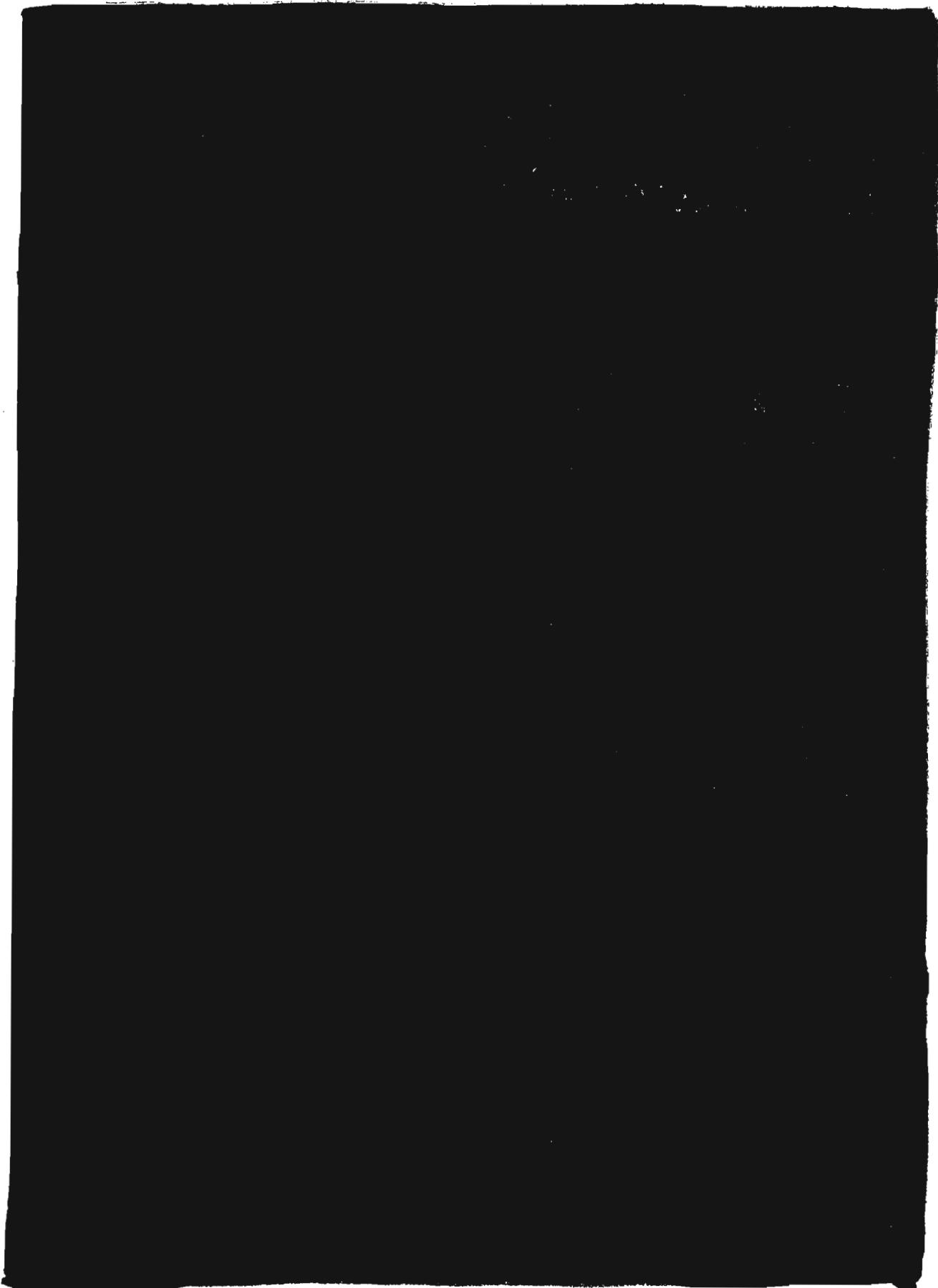
**SCOPE OF OPTIONS**

[REDACTED]

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[REDACTED]

NO LONGER APPLICABLE



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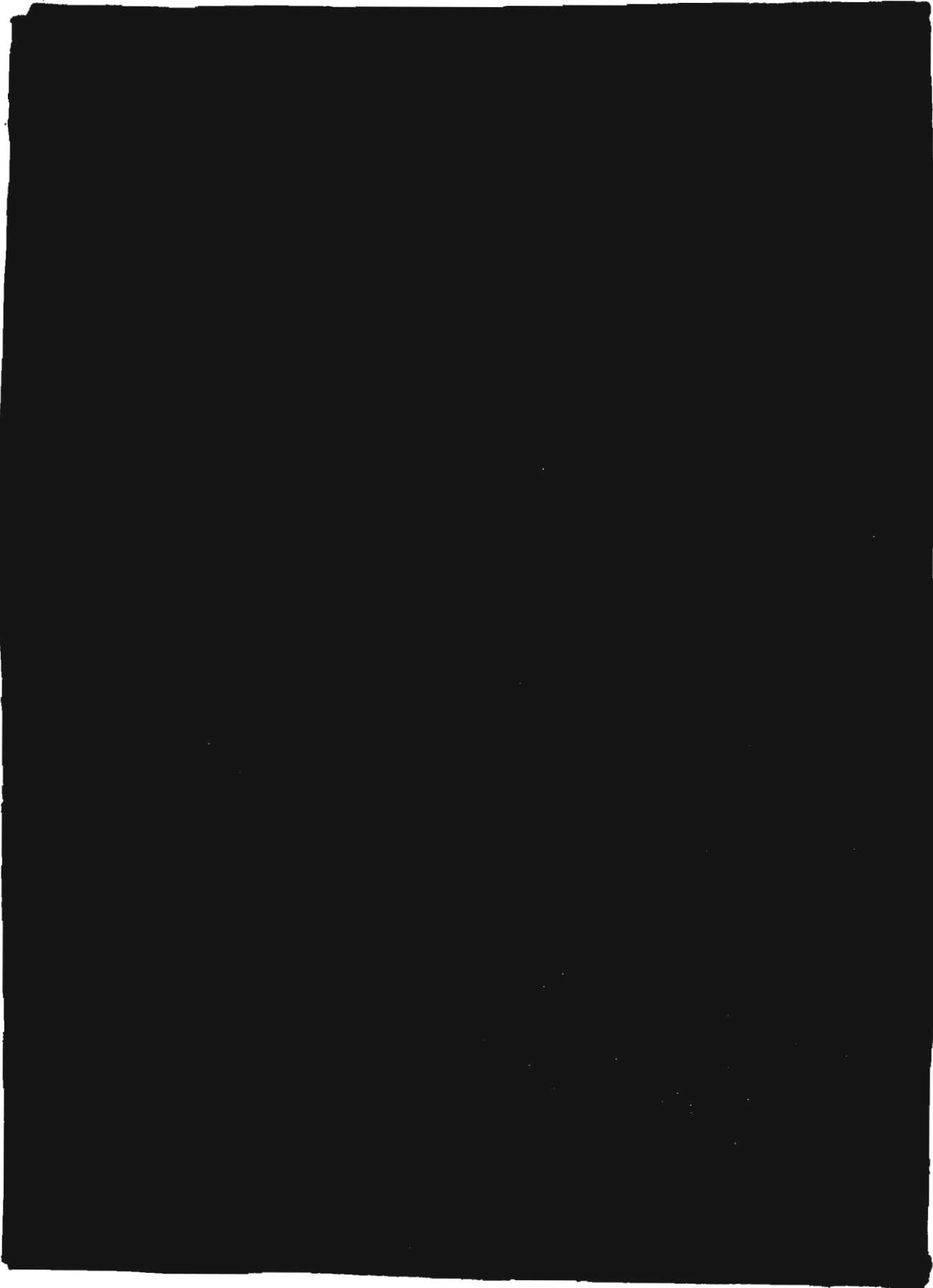
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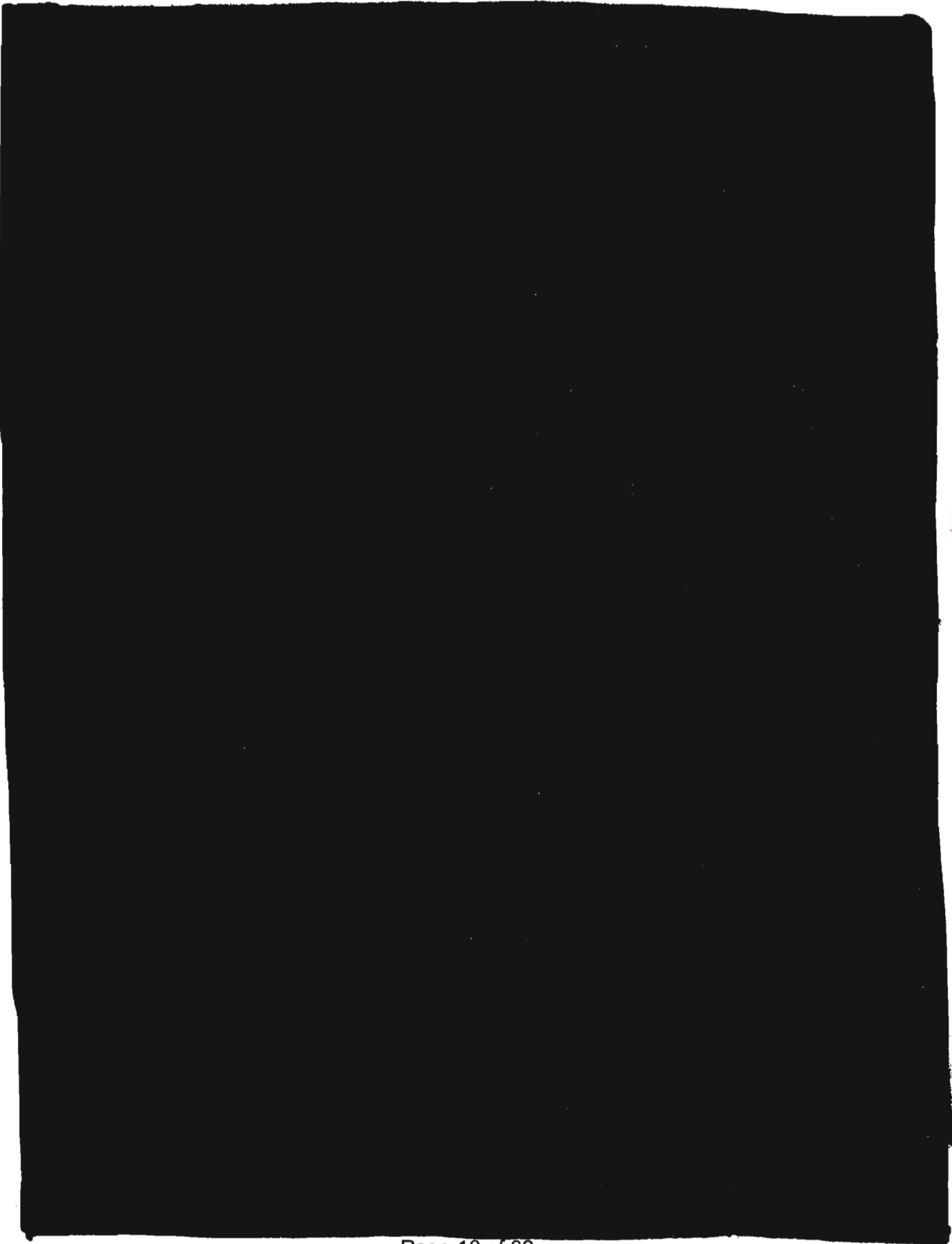
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[REDACTED]

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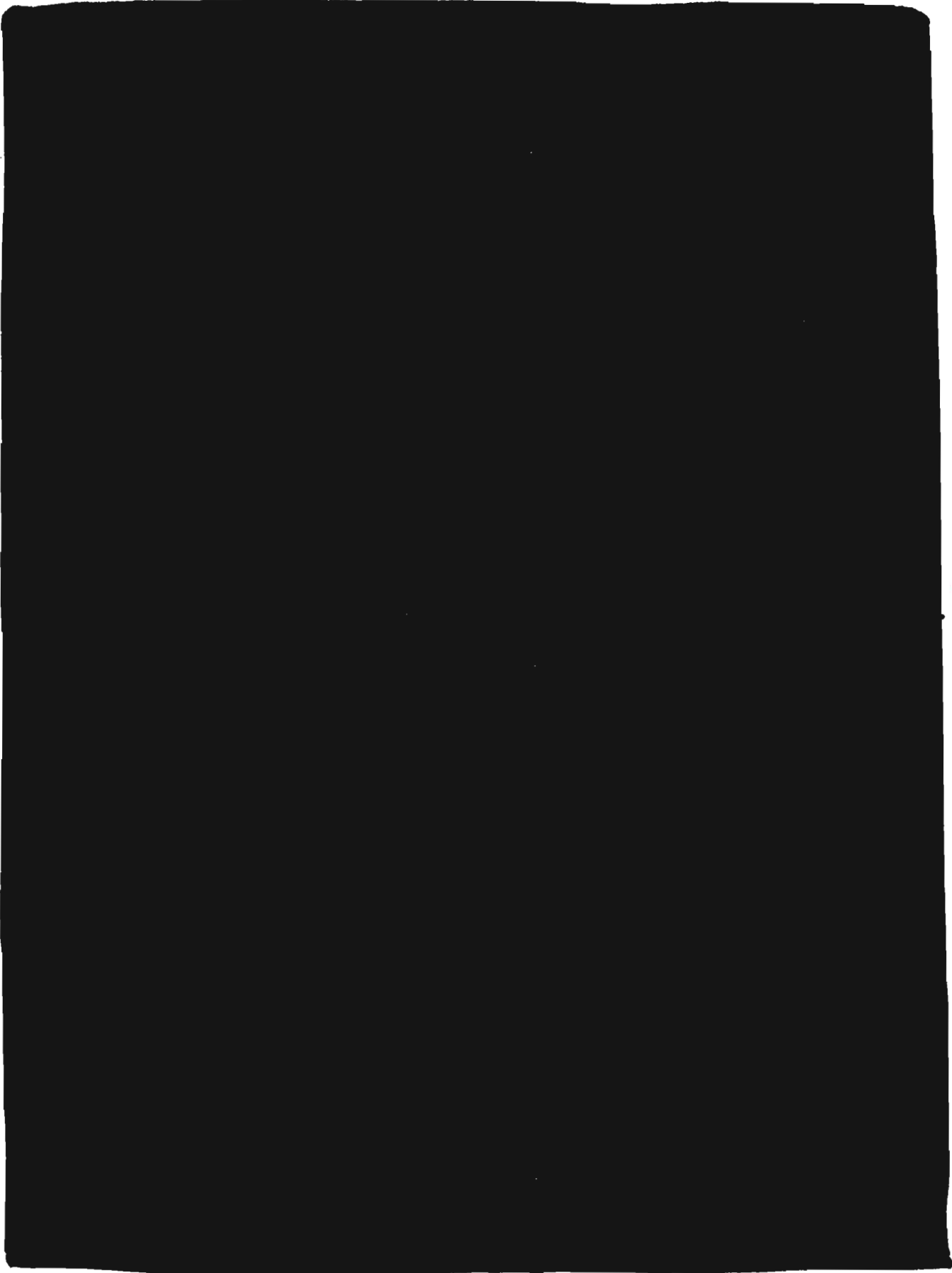
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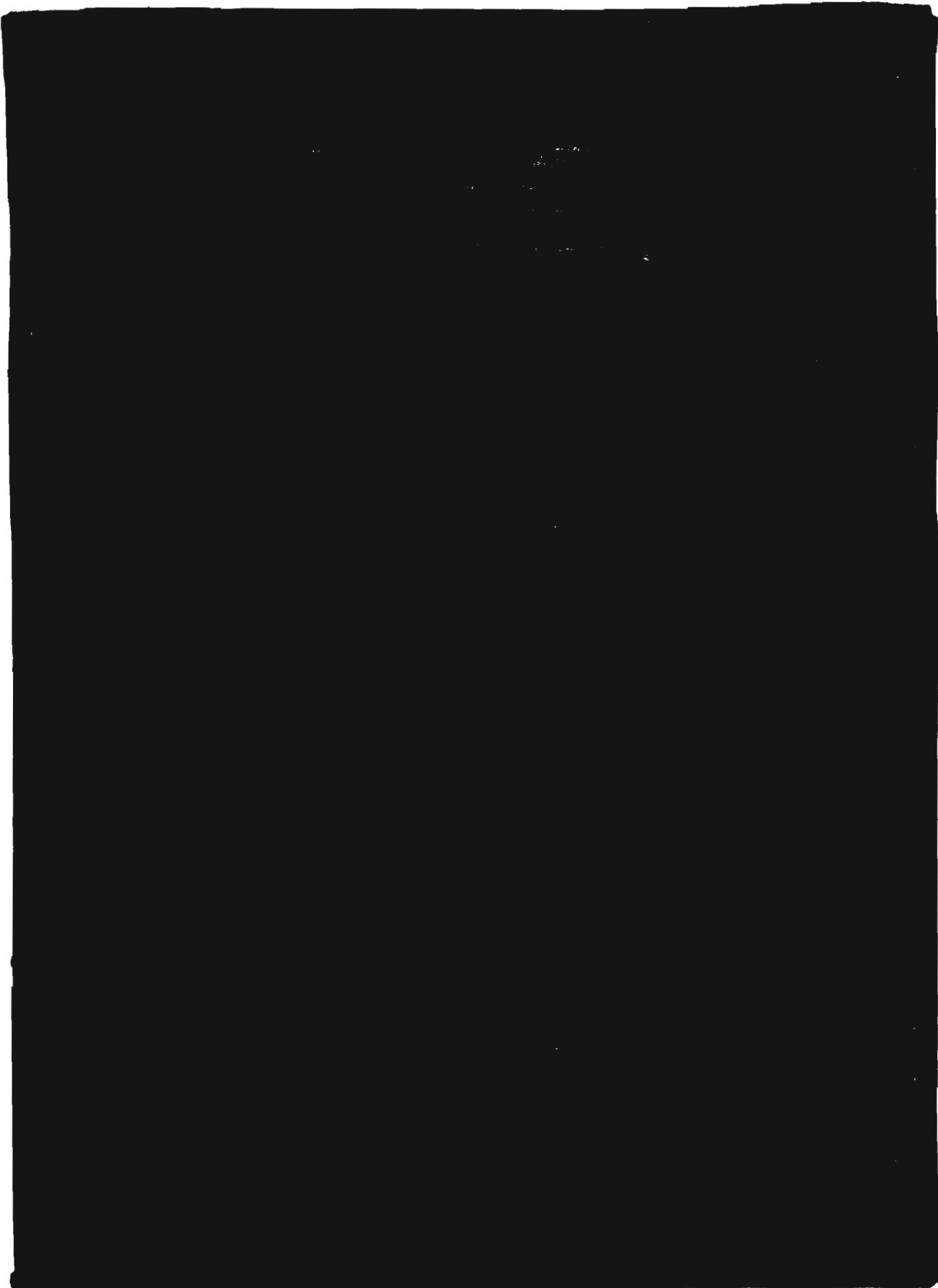
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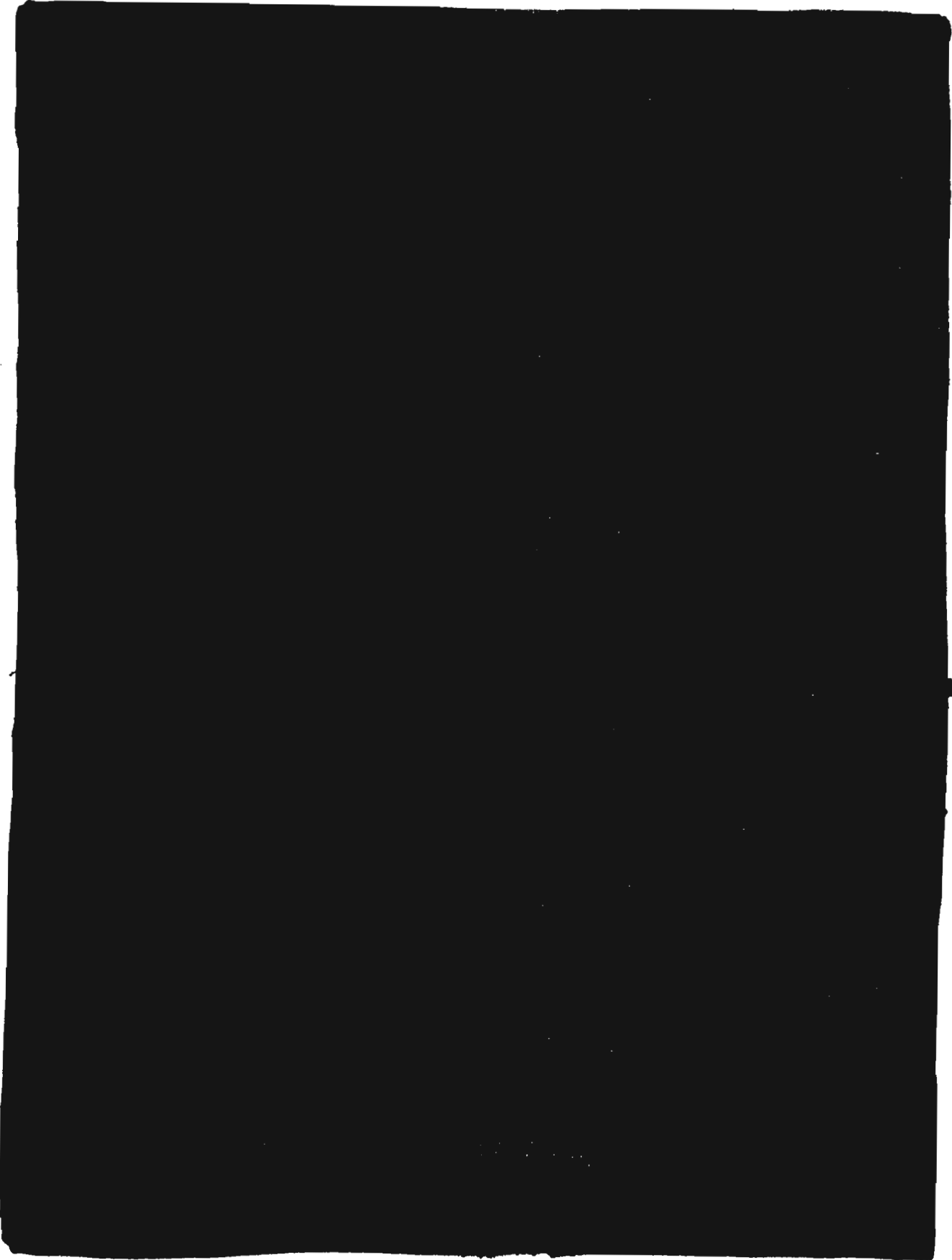
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[REDACTED]

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[REDACTED]

NO LONGER APPLICABLE



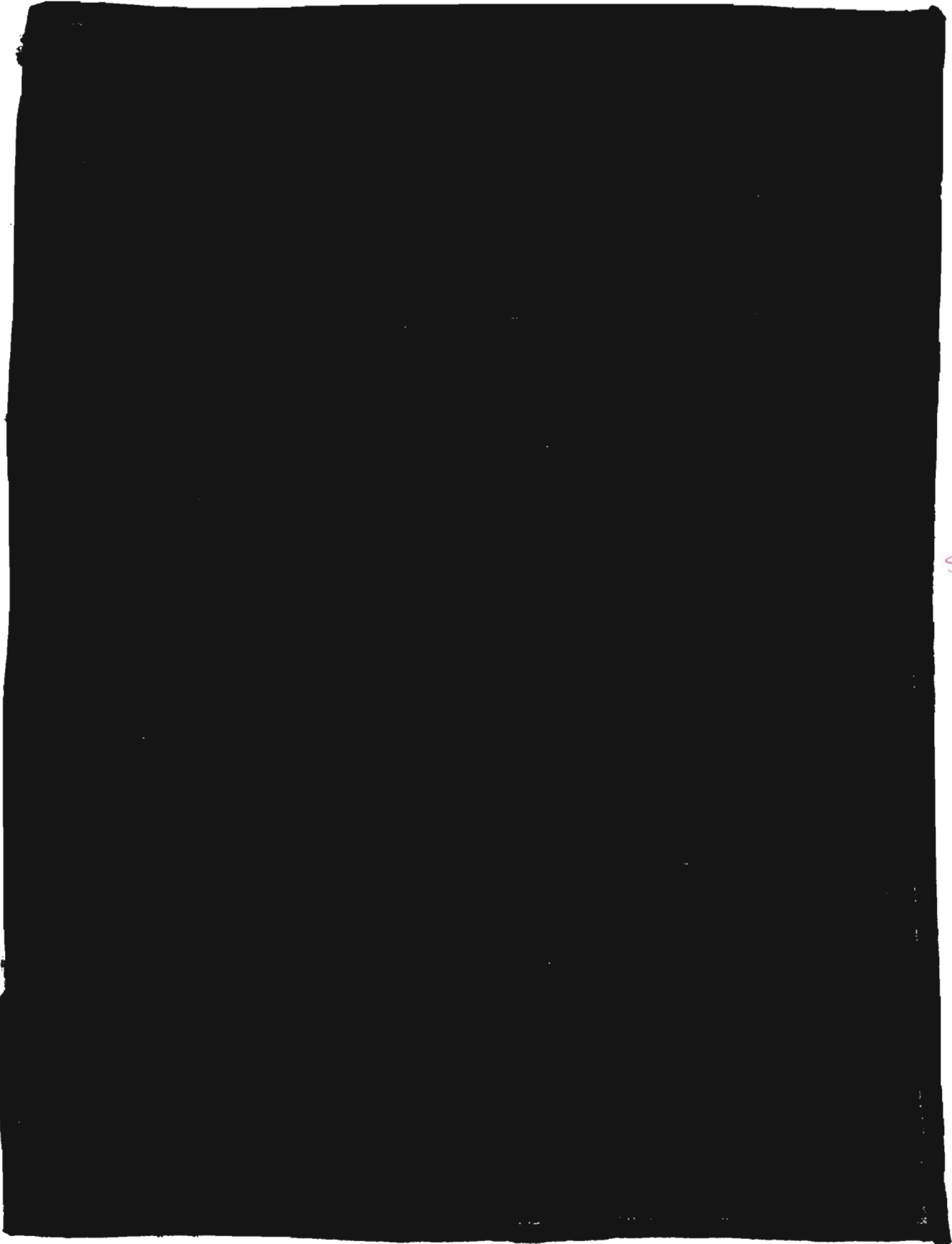
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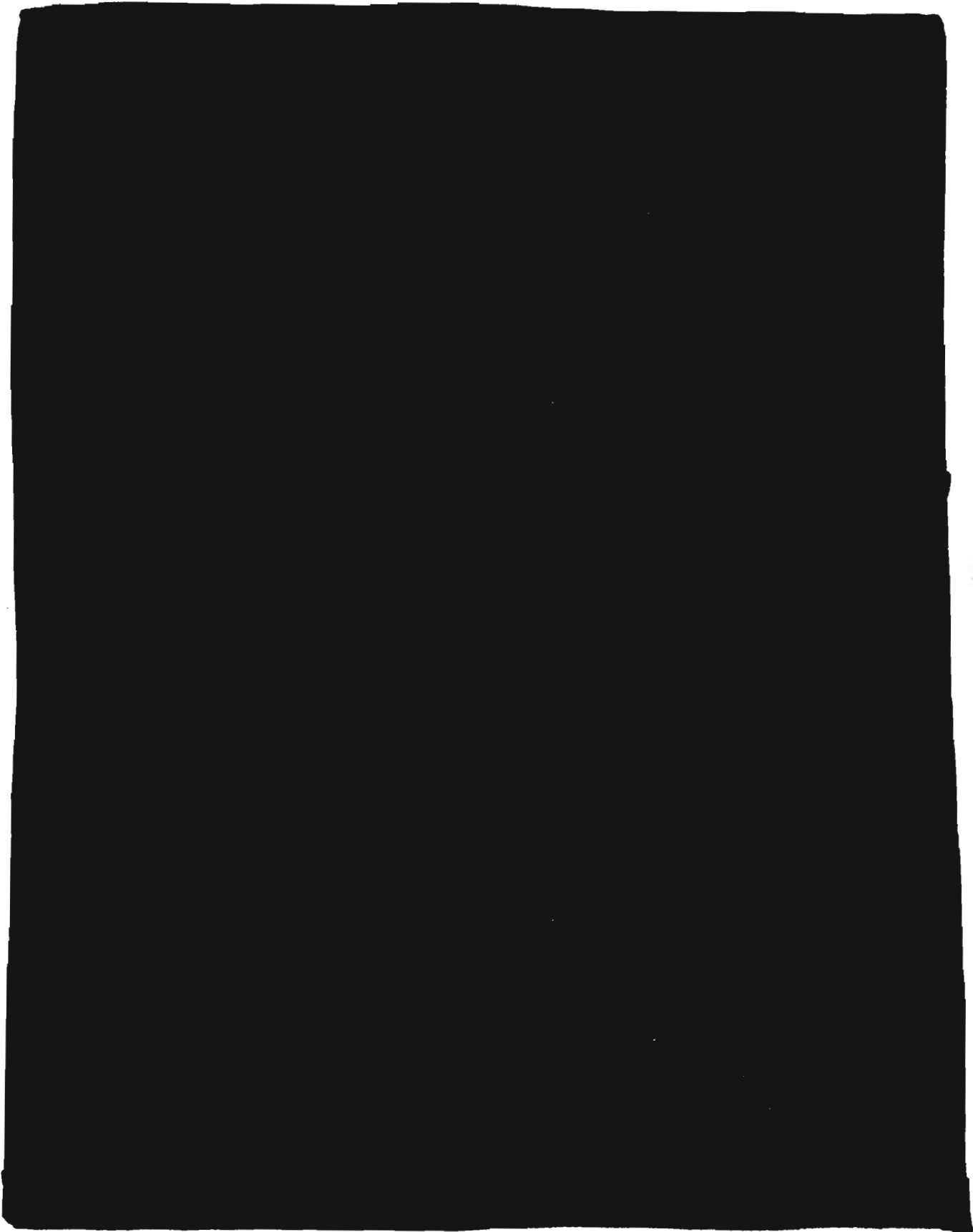
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[REDACTED]

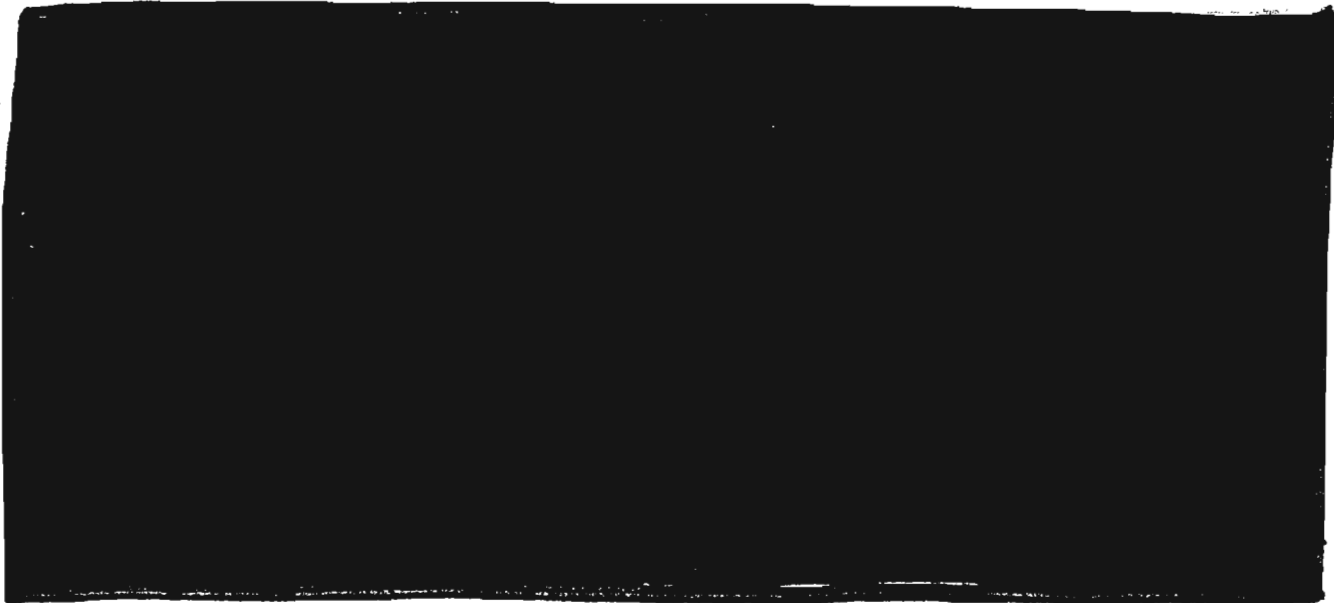
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57. A full and comprehensive analysis of the options above is provided in the Options Analysis Document ref DPA/NW/PGL/101/319/01 dated 20/11/06. This document concluded that Option C, New Build is the recommended option, however the core of this analysis is repeated in this document for completeness.

58. This Investment Appraisal will provide detailed costs associated with options A1, A2, A3, B and C. Confidence Modelling for Option C has been carried out and the results recorded in this document. The costs for Option D are based on the costs for Option C. An assumption has been made that the difference between these options is that a reduced manufacturing capability would be required within the facility for Option D. The cost of Option D has therefore been estimated as being 98% of the cost of Option C. However, the cost of procurement of the products inherent in Option D can only be estimated and is shown in square brackets in the table. As this results in a rough order of magnitude cost for Option D, net present value has not been calculated

59. Option E and F have not been costed in this Investment Appraisal. The Option Analysis document has fully explored these options and discounted them.

### SUMMARY OF COSTS



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### WHOLE LIFE COSTS (OPTION C)

61. Whole life costs for Option C are tabulated at Annex C

### OPTIMISM BIAS

62. An Optimism Bias check has been conducted by Pricing and Forecasting Group (PFG) on capital cost and schedule date estimates to In Service Date (ISD). To obtain a single deterministic figure without risk, the indicative risk allowance of [redacted] contained within the facility build base estimate has been removed. Using responses from the NW

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IPT EU project team the confidence figures pass the Optimism Bias check for both time and schedule indicating that the estimates include an appropriate provision for risk and uncertainty. It should be noted that the Optimism Bias exercise has been carried out against the Equipment Model due to the nature of the process equipment and building design. This is a more stringent assessment than the Non-Standard Building assessment model. The results generated are shown in the tables below.

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**Optimism Bias check results - Cost**

	Single Deterministic Figure + OB Factor	90% Confidence Value
Anticipated Business Case status at submission stage	[REDACTED]	[REDACTED]

S43

S43

**Optimism Bias check results - Schedule**

	Single Deterministic Figure + OB Factor	90% Confidence Value
Anticipated Business Case status at submission stage	[REDACTED]	[REDACTED]

S43

S43

**SENSITIVITY ANALYSIS**

63. The Option Analysis Document ref DPA/NW/PGL/101/319/01 dated 20/11/06 has detailed the merits and demerits of each option and has concluded the only feasible option to be [REDACTED]. On that basis Sensitivity Analysis would not produce meaningful results and has not been carried out.

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**RISK**

64. Risk registers have been produced by for options A, B and C, and are detailed in document ref DMP/EUP/LL/19098944 version 9.

**PROCUREMENT STRATEGY**

[REDACTED]

S43

[REDACTED]

NO LONGER APPLICABLE



S43

**CONFIDENCE MODELLING OF OPTION C**

70. The risks identified were applied to the project schedule and assigned to the appropriate activities. Confidence modelling was carried out using the Predict software tool. The following results were produced for the cost and schedule as affected before risk mitigation actions have been taken and post risk mitigation actions. This exercise was carried out for the Assessment phase of the project (i.e. Initial Gate to Main Gate) and for the overall project. The costs below are as recorded in the Initial Gate Business Case and include the AWE fee [REDACTED] S43

**Cost confidence model (Option C Assessment phase)**

	10% confidence	50% confidence	90% confidence
Post mitigating action	[REDACTED]	[REDACTED]	[REDACTED]
	S43	S43	S43

**Schedule Confidence Model (Option C Assessment phase)**

	10% confidence	50% confidence	90% confidence
Post mitigating action	[REDACTED]	[REDACTED]	[REDACTED]
	S43	S43	S43

**Cost Confidence Model (Option C Whole project)**

	10% confidence	50% confidence	90% confidence
Post mitigating action	[REDACTED]	[REDACTED]	[REDACTED]
	S43	S43	S43

[REDACTED]

NO LONGER APPLICABLE

**Schedule Confidence Model (Option C Whole project)**

	10% confidence	50% confidence	90% confidence
Post mitigating action	[REDACTED]	[REDACTED]	[REDACTED]

**AFFORDABILITY**

S43

S43

S43

[REDACTED]

S43

**PLAN FOR POST PROJECT EVALUATION**

72. The project will be subject to a Post Project evaluation in accordance with the requirements of Appraisal and Evaluation in Central Government (Green Book). The content of the evaluation will be in accordance with JSP 507 and the Acquisition Management System.

73. The EU Project will present two principal opportunities for evaluation and for using the experience and understanding to improve future performance, for both the EU Project and for other NW IPT projects at AWE.

74. The Enriched Uranium Project is one of the first major AWE project to go through the Investment Appraisal Board Initial Gate process. As such it will help establish the key features of the process, including the interfaces between NWIPT AWE and PFG. The experience of this process will be given to other projects through the established DPA Learning from Experience (LFE) process and the AWE Review, Learn and Improve (RLI) process.

75. The IAB Initial Gate process will review aspects of the EU Project over and above those examined by existing AWE review processes. Any issues arising from the Initial Gate review will be analysed and appropriate actions will be taken to maintain efficient project progress. The lessons learned through the Initial Gate process will also be captured and will inform the Main Gate process in due course.

76. A plan for Post Project Review workshops and presentations is included at Annex D.

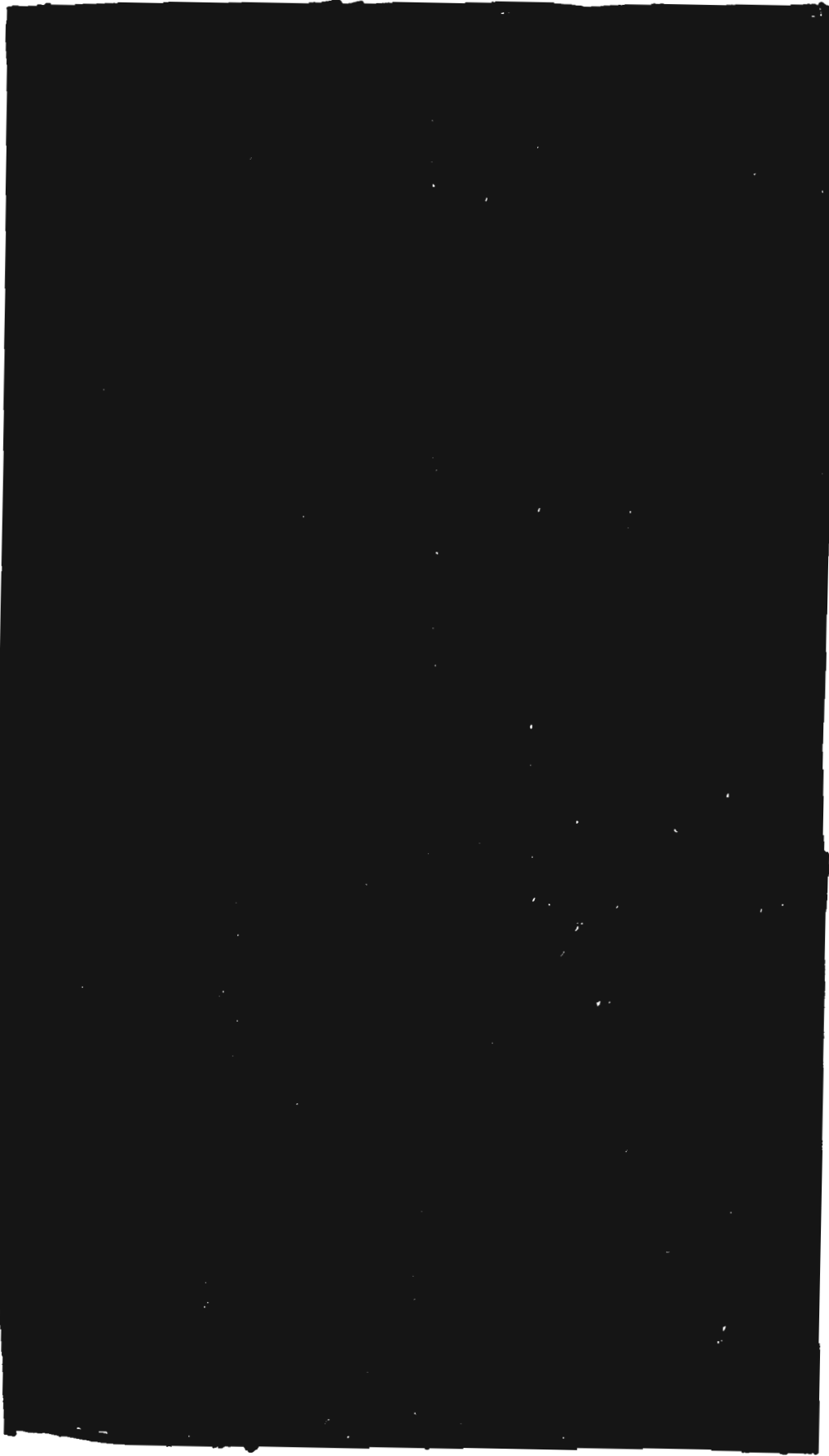
**RECOMMENDATION**

77. This Investment Appraisal supported by the evidence provided by the Option Analysis Document ref DPA/NW/PGL/101/319/01 dated 20/11/06 recommends that Option C, New Build is adopted as the solution to the continuation of the UK Enriched Uranium Capability.

[REDACTED] NO LONGER APPLICABLE

ANNEX A to  
DPA/NW/PGL/101/319/01/IA  
dated 13/02/07

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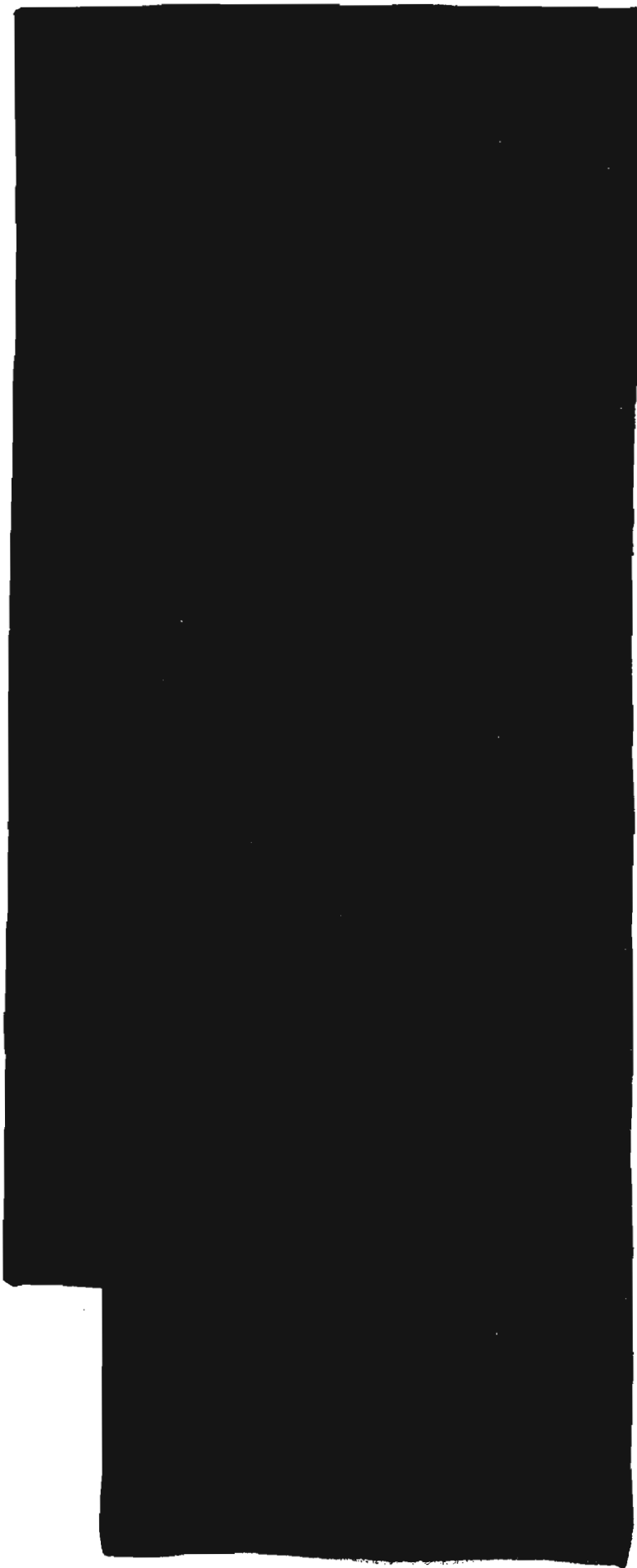
SUMMARY OF COSTS

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ANNEX B to  
DPA/NW/PGL/101/319/01/IA  
dated 26/03/07

WHOLE LIFE COSTS (SUMMARY)



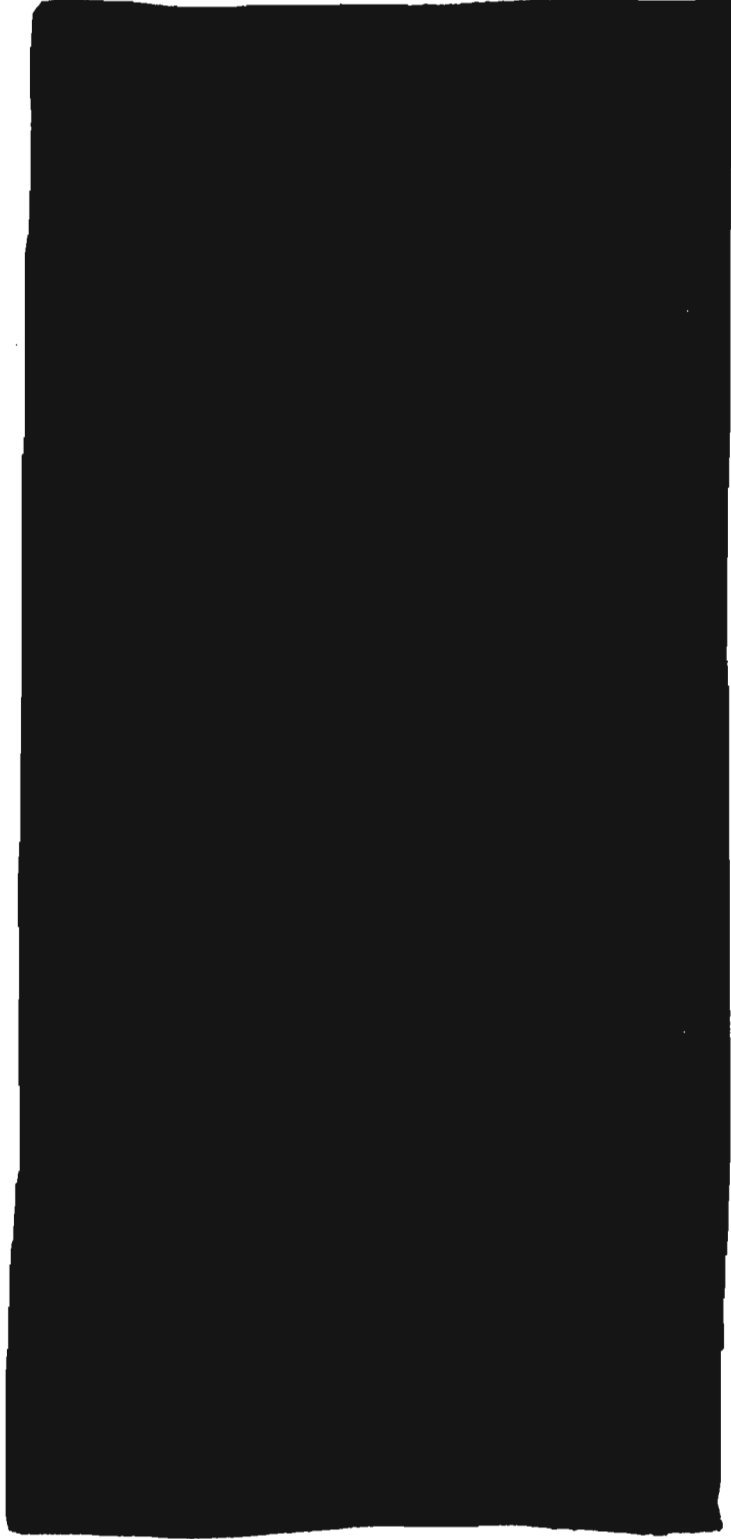
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dated 26/03/07

S43



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**WHOLE LIFE COSTS**

(Excel spreadsheet on separate file)

FORBIDDEN

PLAN FOR POST PROJECT EVALUATION (ASSESSMENT PHASE)

Activity	June 07	Jan 08	June 08	Jan 09	June 09	Jan 10	June 10
NW IPT Workshop	June 07	Jan 08	June 08	Jan 09	June 09	Jan 10	June 10
AWE Project Team Workshop	June 07	Jan 08	June 08	Jan 09	June 09	Jan 10	June 10
Joint Stakeholder Workshop	July 07	Feb 08	July 08	Feb 09	July 09	Feb 10	July 10
AWE Review Learn and Improve Presentation	Aug 07		Aug 08		Aug 09		Aug 10
NW IPT Learn from Experience Presentation	Aug 07		Aug 08		Aug 09		Aug 10



[REDACTED]

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ANNEX E to  
DPA/NW/PGL/101/319/01/IA  
dated 13/02/07



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[REDACTED]

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ANNEX E to  
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dated 13/02/07



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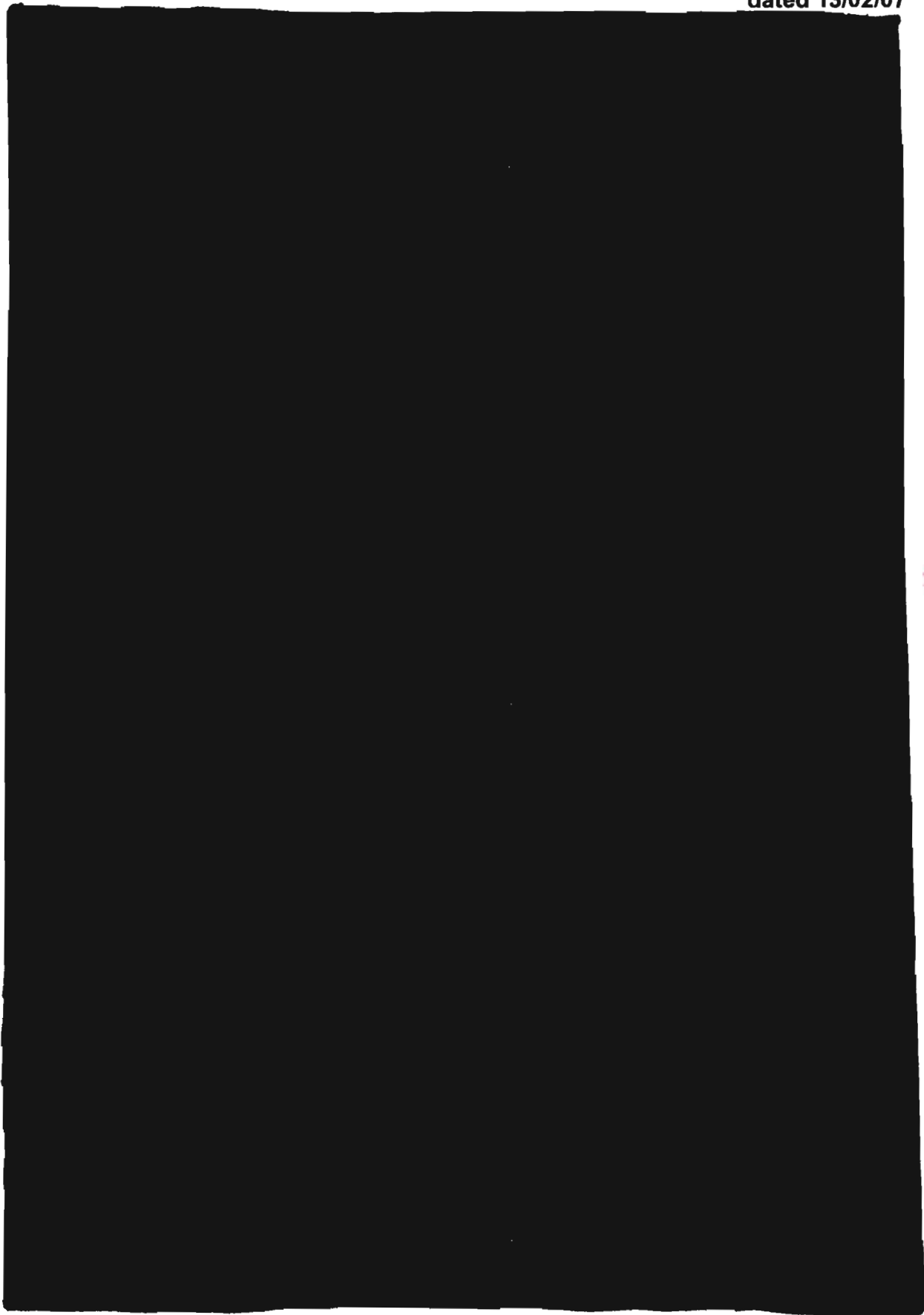
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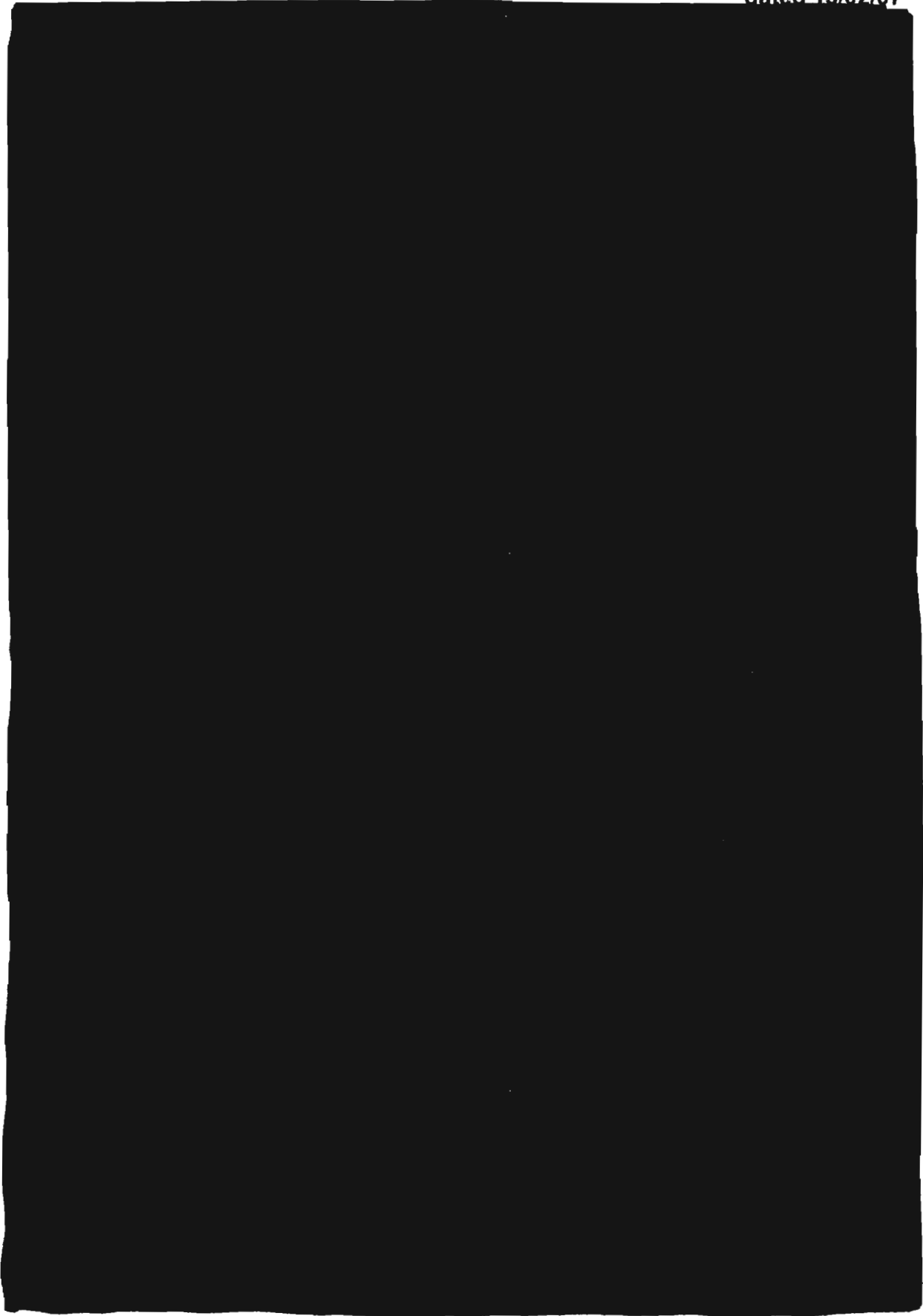
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[REDACTED] NO LONGER APPLICABLE

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dated 13/02/07



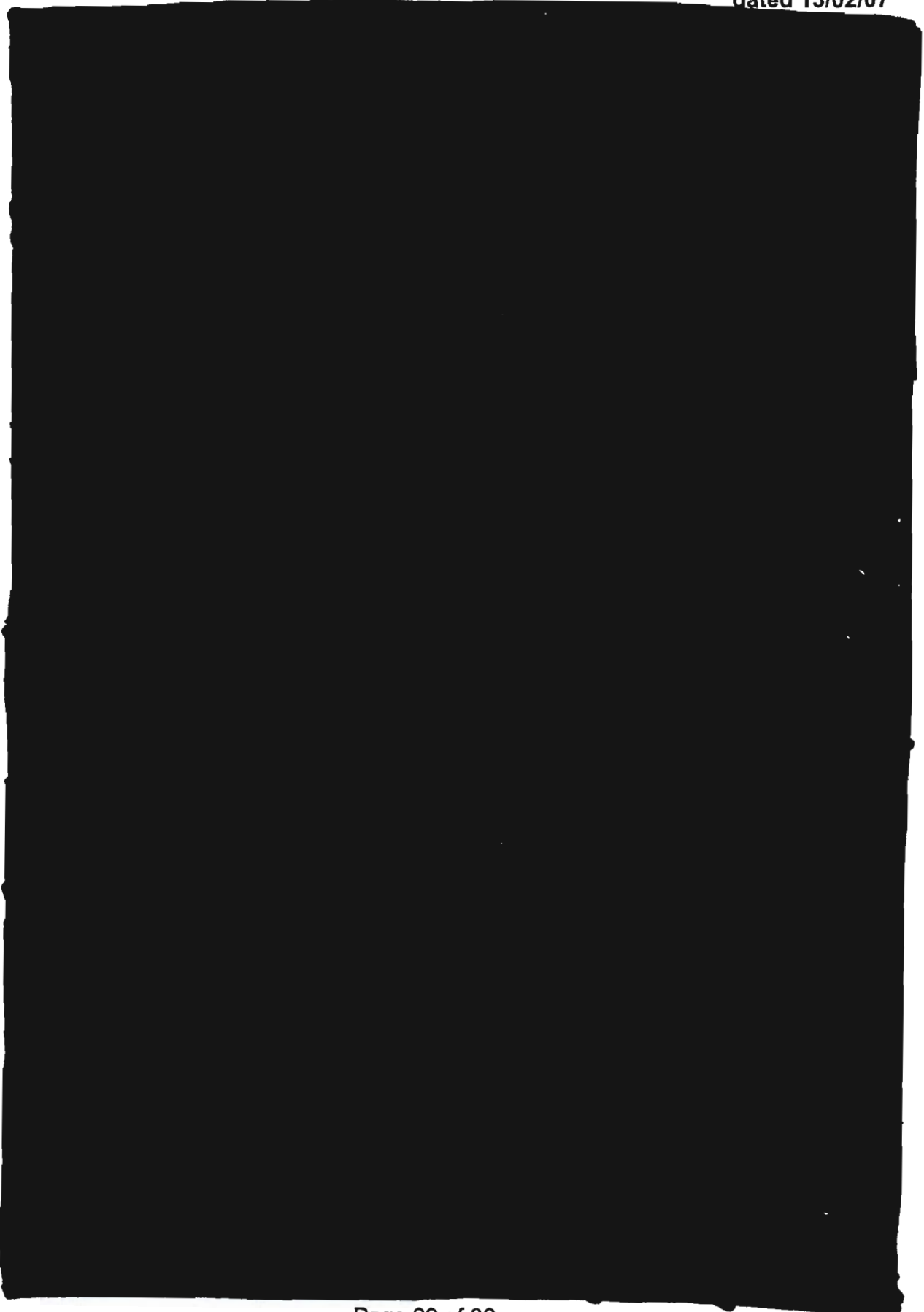
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ANNEX E to  
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dated 13/02/07



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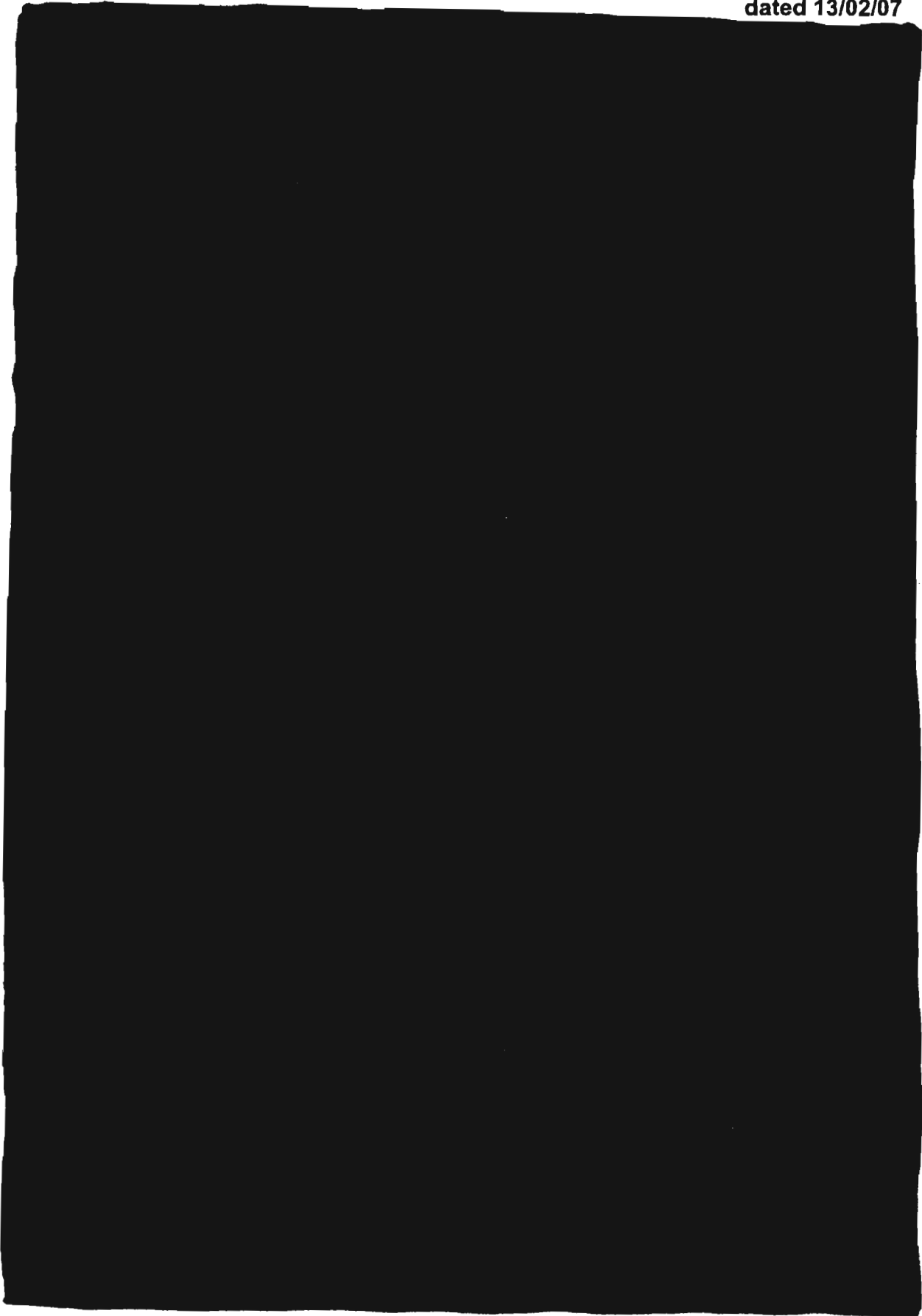
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dated 13/02/07



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[REDACTED]

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[REDACTED]

NO LONGER APPLICABLE

**[REDACTED]** NO LONGER APPLICABLE

**ANNEX E to  
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dated 13/02/07**



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**[REDACTED]** NO LONGER APPLICABLE