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Lawrence Livermore National Laboratory
Nonproliferation, Arms Control, and International Security
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November 1998

Challenges of Advanced Nuclear Weapon Development in India (U)

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Challenges of Advanced Nuclear Weapon Development in India (U)

November 1998

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Proliferation Assessments Section
Z Division
NAI Directorate
Lawrence Livermore National Laboratory

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Challenges of Advanced Nuclear Weapon Development in India (U)

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Executive Summary

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- *(U) The Indian nuclear tests and Pakistan's response in kind are stirring the internal debate on nuclear policy, dominated by the continuing struggle between those urging weaponization and others urging restraint. Any nuclear doctrine that results can only be complicated by the advent of advanced nuclear weapons.*

Introduction

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Indian Weapon Evolution
From 1974 to the Present

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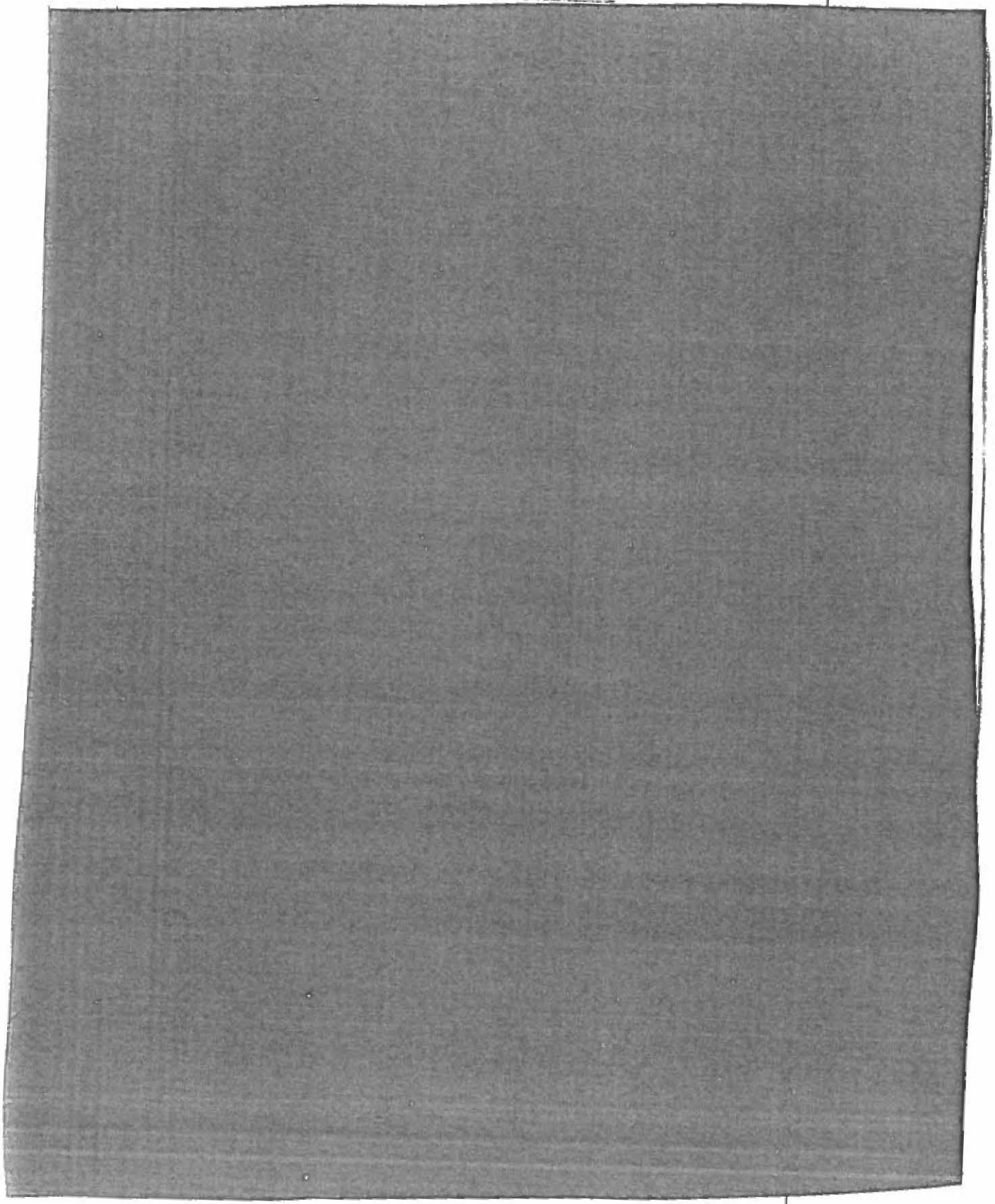

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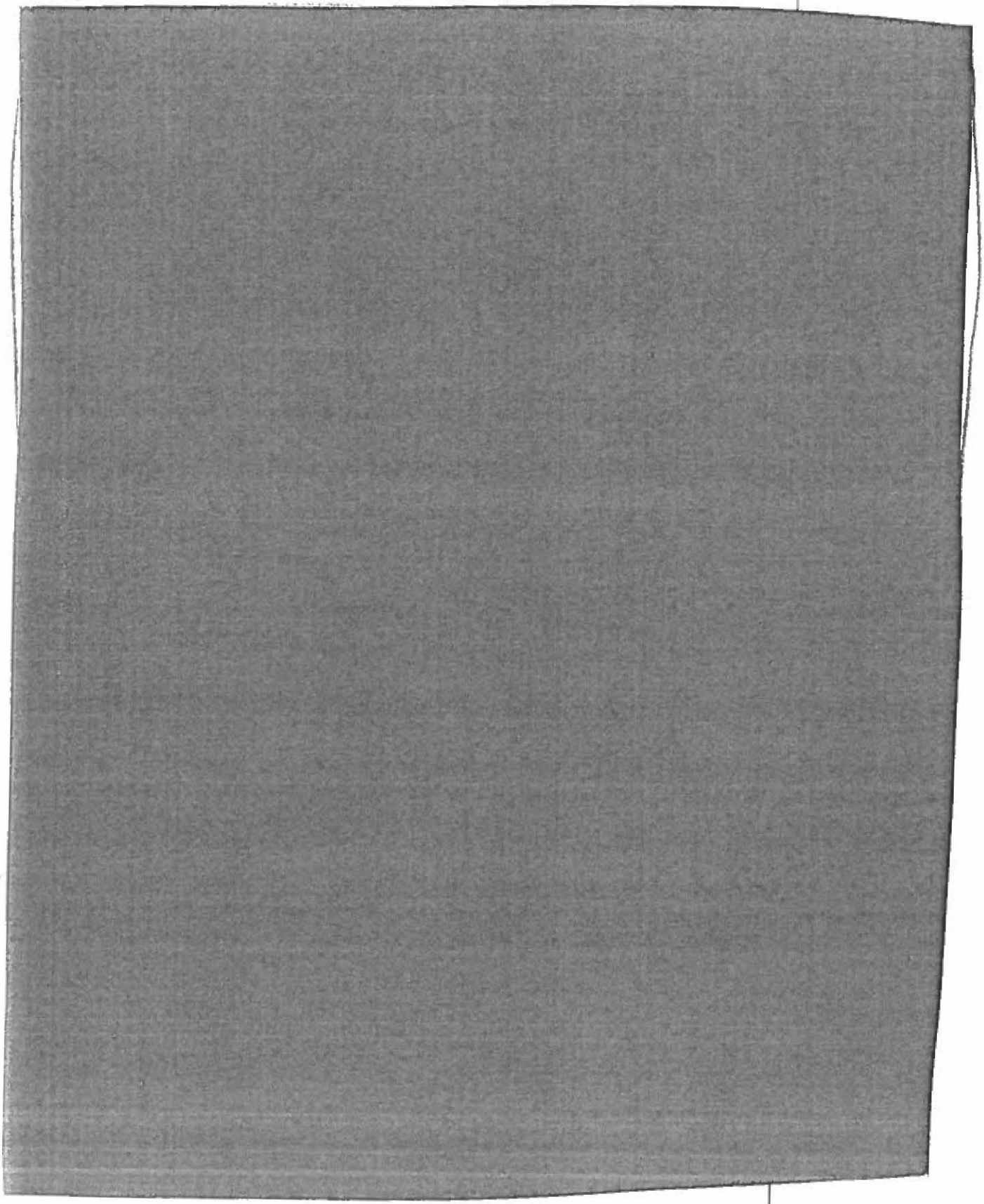

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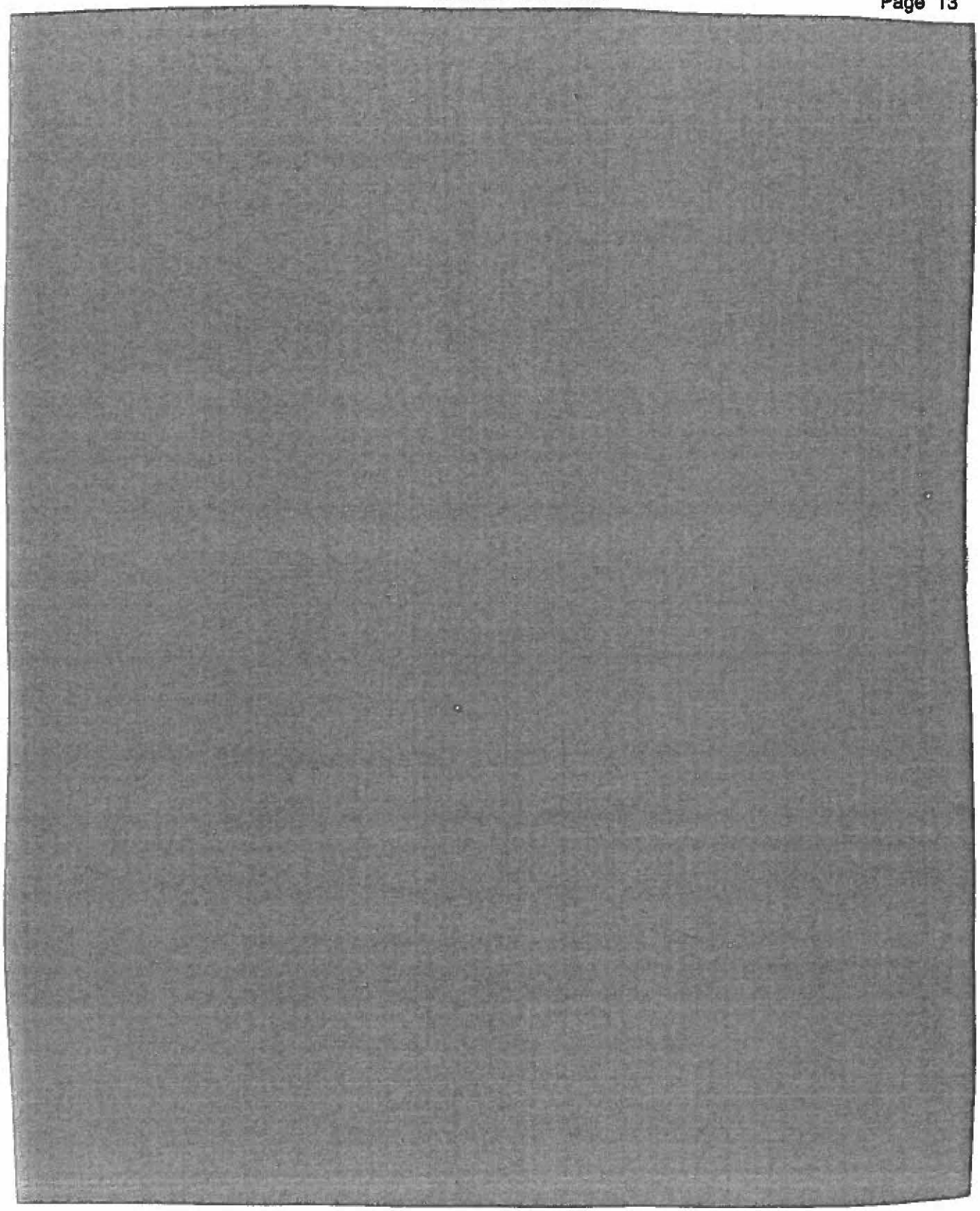

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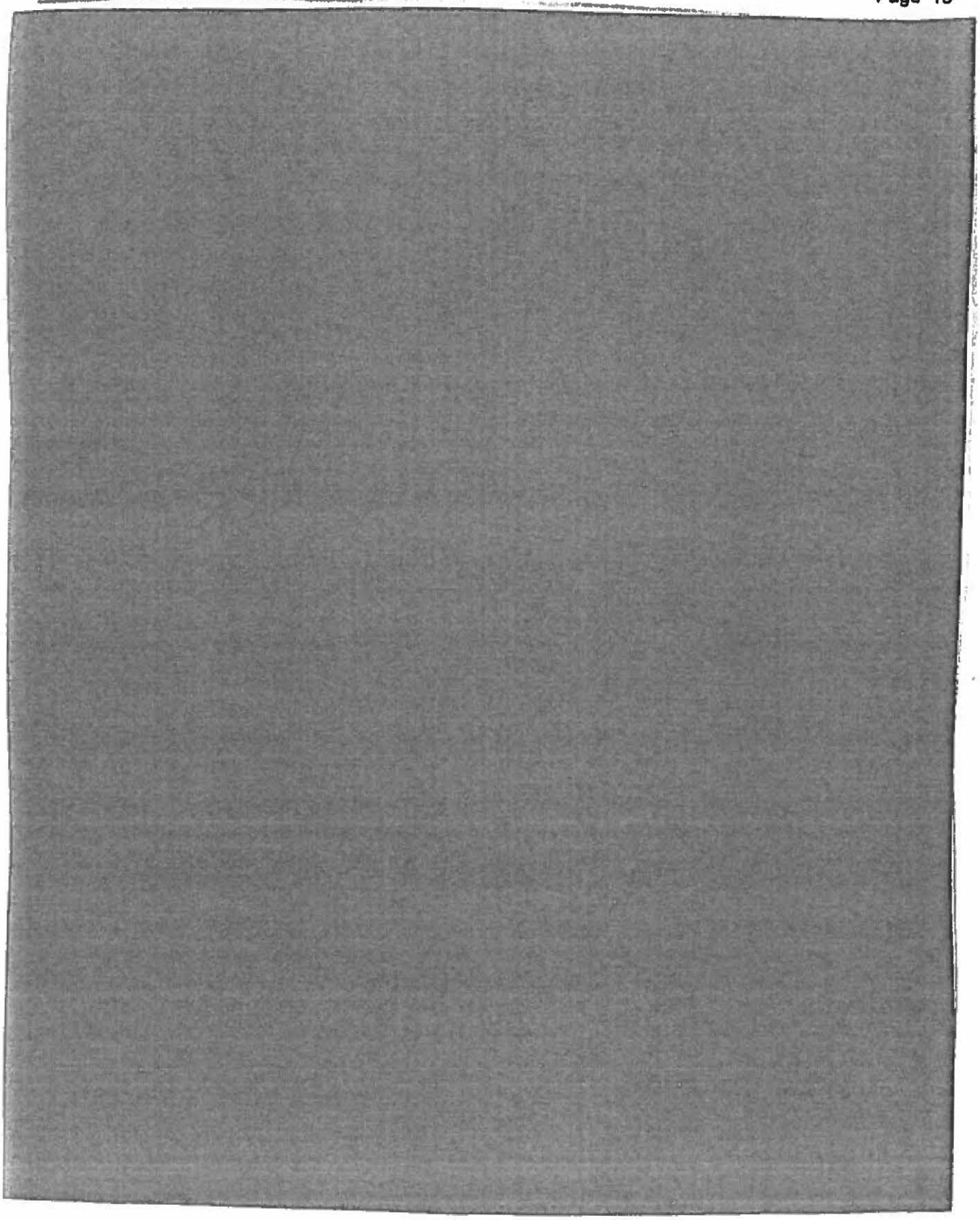

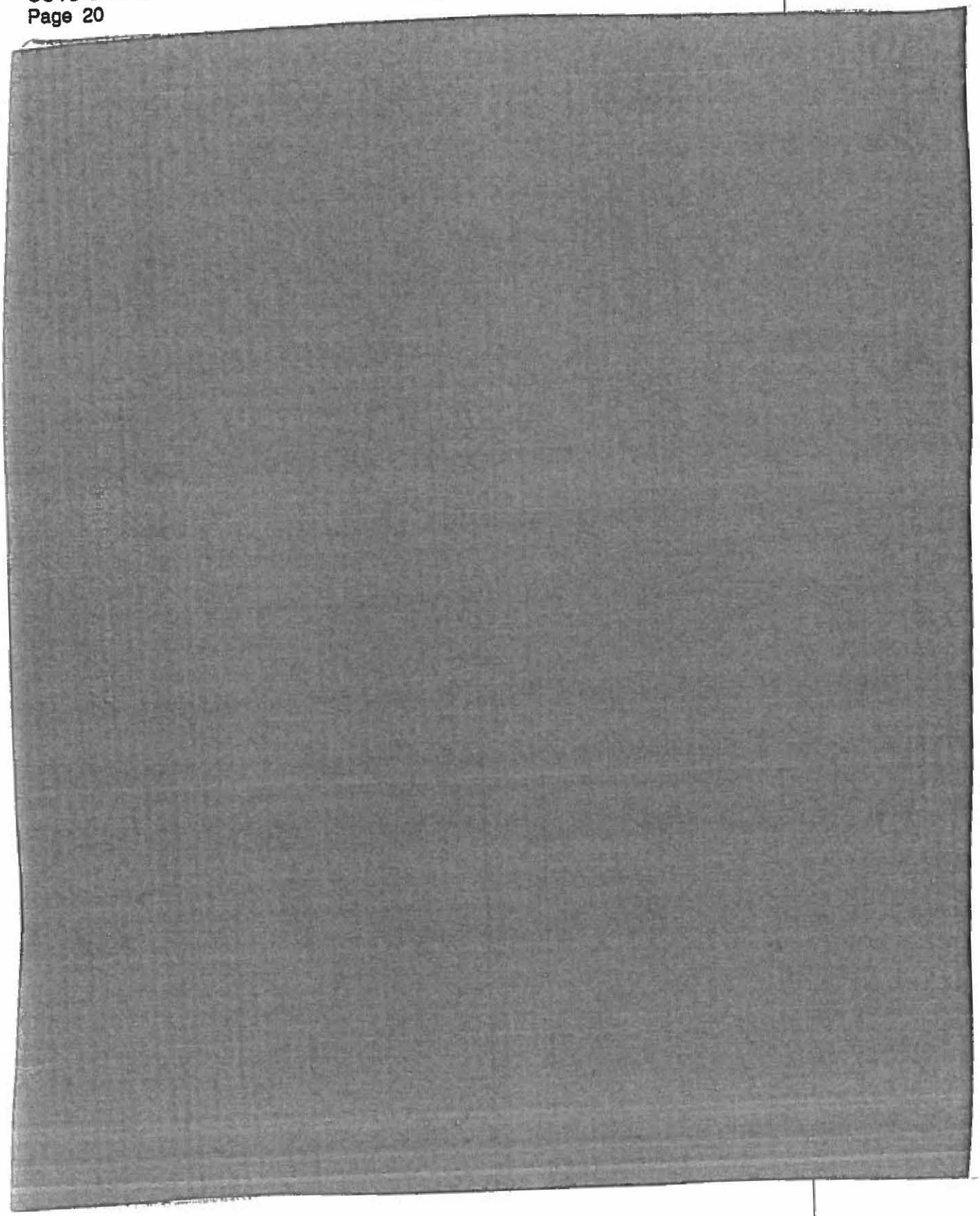

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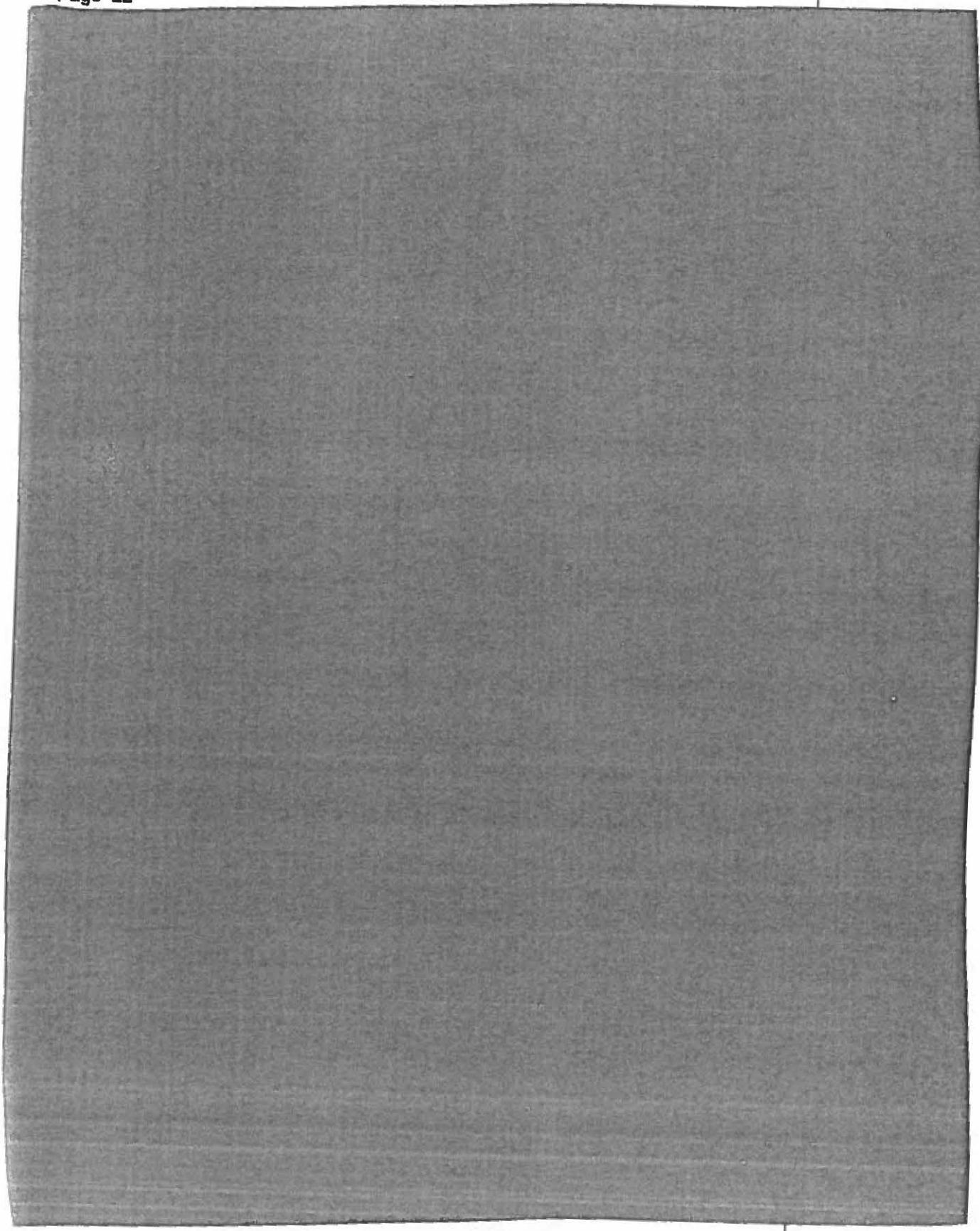

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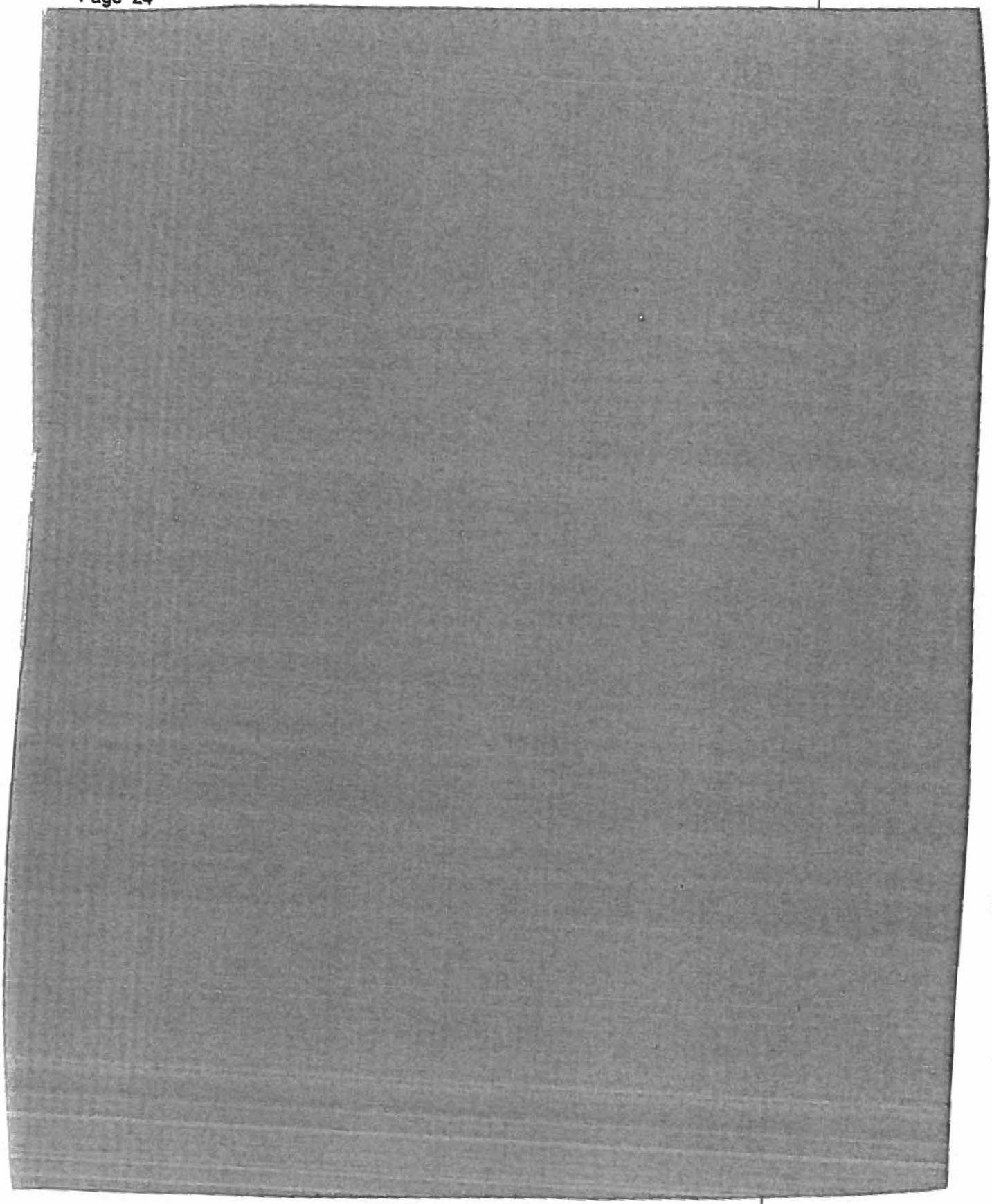

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(U) It may be helpful to review some of the inconsistent statements by Indian nuclear scientists following the prime minister's test announcement. P.K. Iyengar, a former chairman of the AEC and a former director of BARC (and other unnamed BARC scientists), commented in a May 12 Reuters Ltd. article, that "...the thermonuclear test was not a full hydrogen bomb in which energy is developed predominantly by fusing together a type of hydrogen atom....most of the explosion came from the primary and the device contained only traces of the hydrogen variant, tritium, to demonstrate thermonuclear technology."[37] According to the May 14 issue of *Nucleonics Week*, unnamed Indian officials claimed, "A 'thermonuclear device' India said it exploded

on May 11 was a boosted fission device under development by the DAE for as long as two decades..."[38] At a May 17 press conference with other scientists, Dr. Chidambaram insisted that India had tested a thermonuclear device or hydrogen bomb with two stages—a fission trigger and a separate secondary stage with thermonuclear material.[39] He distinguished this from the other type of thermonuclear weapon, a boosted fission device, and stated that although they had developed designs for this type of weapon in the laboratory, they did not test one in May.

(U) In a May 28 interview for an Indian magazine, the director of BARC, Dr. Anil Kakodkar, said the TN device "...had the configuration of a regular thermonuclear device....by altering the dimensions and the quantity (of the fuel) we can take the yield to a much higher value. Our objective was to prove a standard fission device and a TN device....also to prove the capability of our computer codes to predict with accuracy."[40] In a strangely ambiguous interview of the same date, P.K. Iyengar writes, "The third device was described as a thermonuclear device, which means isotopes of hydrogen, namely deuterium and tritium, were used to produce energy from fusion reactions. Information of the actual yield of this device will reveal what type of fusion device it was. An early assessment of the yield from seismic data placed it as around 30 kilotons, which would categorise the weapon as a 'boosted' weapon. Whatever the details, it is clear that India has graduated from the fission club to the fusion club..."[41] In a June magazine, Kakodkar and Chidambaram appear to claim "...the humdinger was the hydrogen bomb....it involved extremely high-pressure physics with precision engineering..."[1] At a post-shot award ceremony in October, Dr. Chidambaram said the first stage was a "fusion-boosted fission device."

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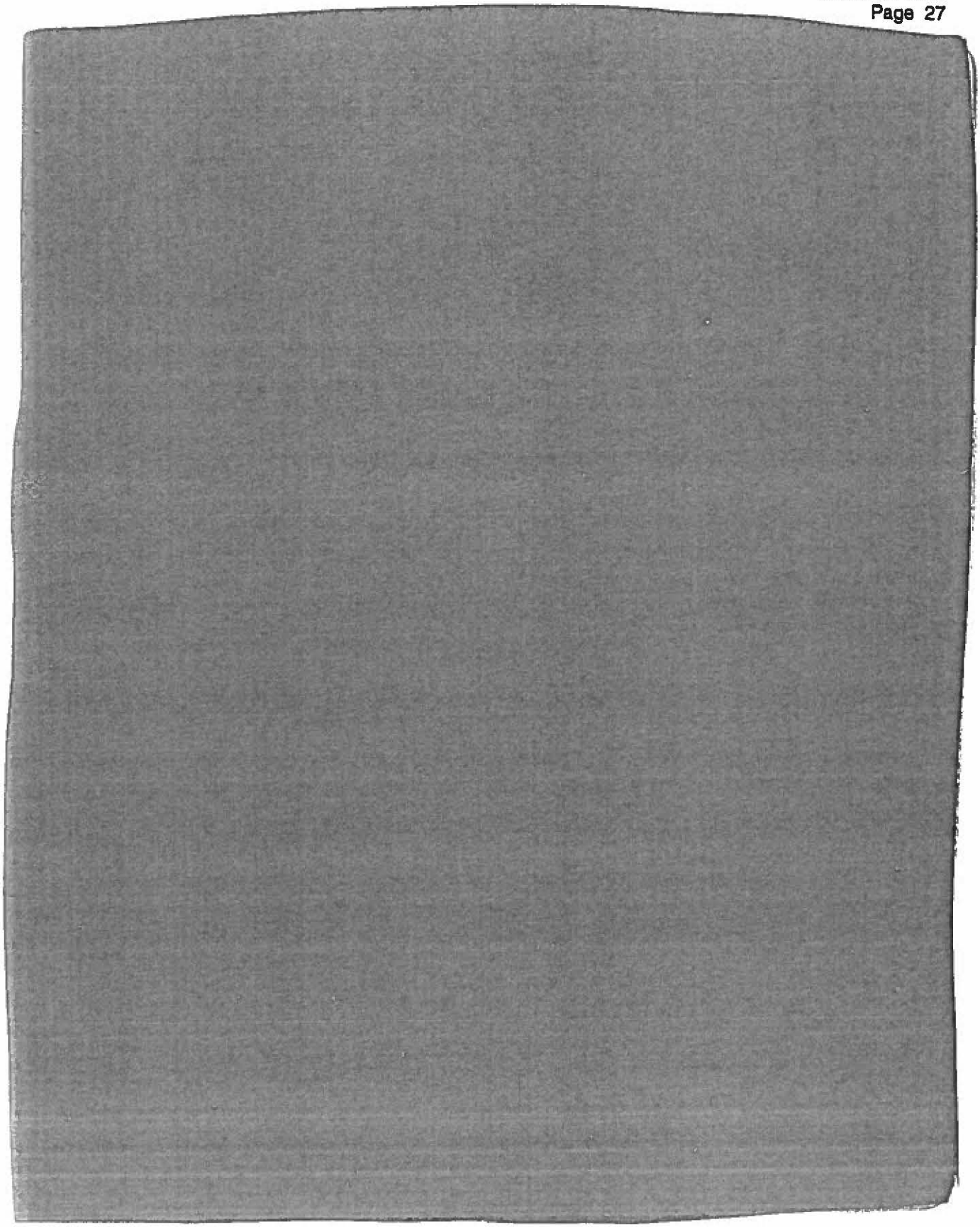

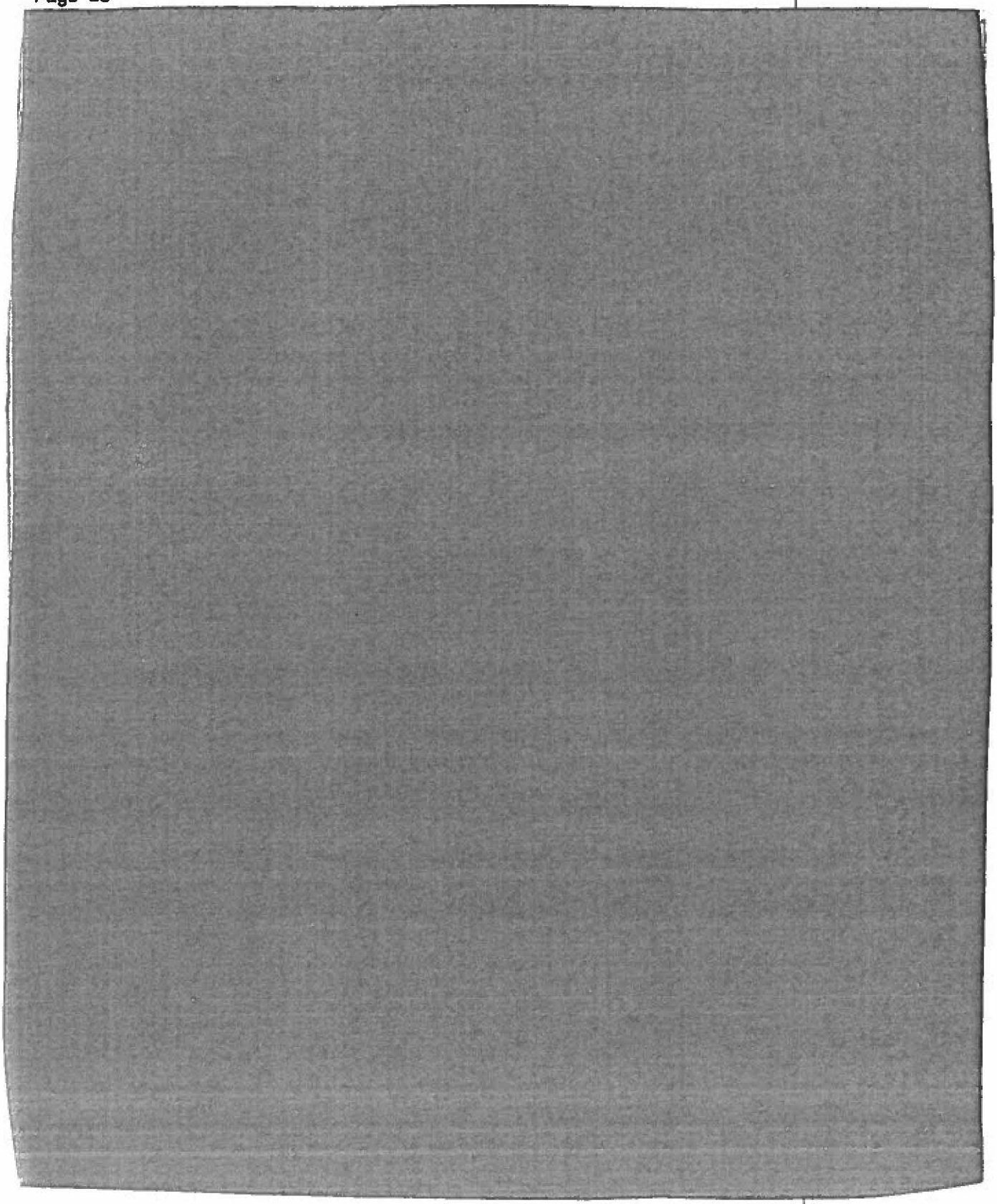

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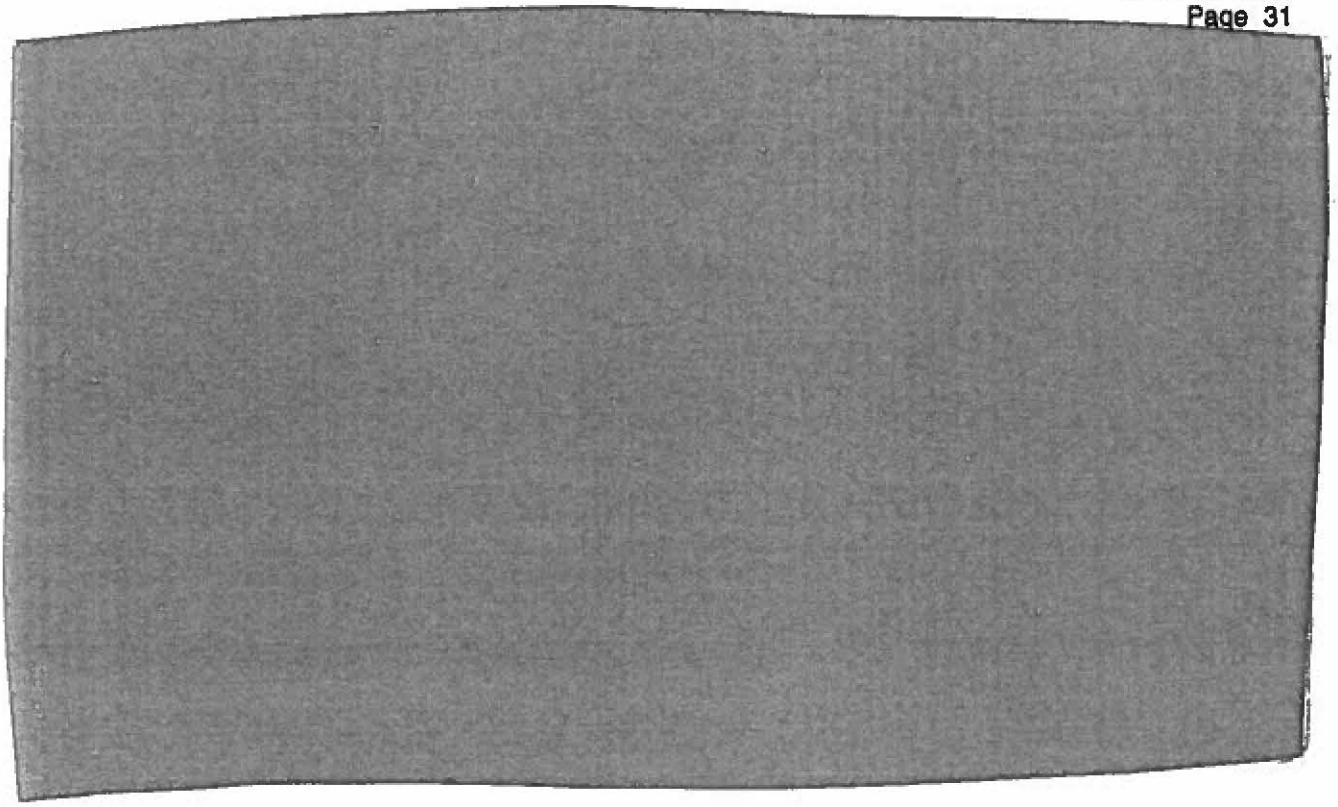

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