

**From:** [Chokshi, Nilesh](#)  
**To:** [Hiland, Patrick](#); [Gitter, Joseph](#)  
**Cc:** [Flanders, Scott](#); [Mayfield, Michael](#); [Bagchi, Goutam](#); [Manoly, Kamal](#)  
**Subject:** FW: Request to Re-Open My Earlier Tsunami Assessment Recommendations  
**Date:** Wednesday, March 23, 2011 12:04:03 PM  
**Attachments:** [DC tsunami memo 13Dec02.pdf](#)  
[DC tsunami memo 18Dec02.pdf](#)  
[DCPP tsunami memo 20Nov02 .pdf](#)  
[RTS\\_0301\\_SwRI\\_SRD.pdf](#)

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~~Official Use Only~~

Pat and Joe,

I am forwarding a message I received recently from Dr. Sewell, a consultant, and requires your consideration. Issues raised in this message have a prior history. Dr. Robert Sewell was a member of the Southwest Research Institute team helping the NRC in review of the Diablo canyon ISFSI licensing review. As a part of his review, Dr. Sewell generated a report, dated November 22, 2003, on tsunami hazard at the Diablo Canyon site looking at many scenarios. In a letter dated, November 20, 2002 and addressed to the SRI, Dr. Sewell raised number of questions regarding the tsunami analysis. Both of these documents and some other documents were attached to Dr. Sewell's message to me, and they are included here. By a memorandum dated February 3, 2005, (non-public) SFPO provided Dr. Sewell's report to me (I was Branch Chief of the Operating Experience Risk Analysis Branch Chief in the RES at that time, and only reason I received the memo was the fact that I was preparing a presentation in aftermath of the Sumatra tsunami of 2004 for a bi-lateral meeting with India) and Kamal Manoly of NRR. NRR (and RES) had Seismic Issues Technical Advisory Group (SITAG), comprised of seismic staff across the agency, review the report and prepare an evaluation. . Commissioner TAs were briefed on the evaluation. The memo from Mike Mayfield gives a more history. The following are ML nos. of these documents:

5/5/05 – Summary of Internal Meeting (ML051290085; Non-public)  
1/17/06 – SITAG Evaluation of Tsunami Hazards Report (ML060170138; Non-public)  
2/27/06 – Memo from M. Mayfield, Disposition of Draft Report (ML060460441; Non-public)

Please let us know if we can provide any assistance.

Scott and I will call you to see if you have any questions.

Thanks,

Nilesh

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**From:** (b)(6)  
**Sent:** Wednesday, March 16, 2011 9:44 AM  
**To:** Chokshi, Nilesh  
**Subject:** Request to Re-Open My Earlier Tsunami Assessment Recommendations

Dear Nilesh:

BR/370

On December 2007, I was part of an IAEA Seismic-EBP team that traveled to the Kashiwazaki-Kariwa NPP to inspect the damage and make recommendations to TEPCO concerning the level of safety diligence they should consider to pursue as they worked toward the prospect of re-starting the damaged reactors following the 2007 Chuetsu earthquake. I recommended to TEPCO to proceed cautiously and to undertake a special seismic program so that they could better understand the seismic hazard and the beyond-design seismic margin at their plants. (I reminded them that such programs were required by the NRC for Diablo Canyon, even though DCPD had not yet been damaged by a seismic event.) I cautioned the Japanese to take a well-reasoned and careful approach, even if this meant re-evaluating all of their plants and taking several years that might be needed before restart at the damaged NPPs. (It seemed clear to me and to participants from HSK [now ENSI] that the Japanese were not taking a SSHAC L4 approach to seismic hazard assessment and to consideration of the possibility for beyond-design-basis [or larger than historical] events.) At that time, consultants from EPRI painted a much more optimistic picture for the Japanese concerning what would be needed in terms of re-evaluation and restart. They certainly did not proceed as cautiously as I would have preferred. I am not saying that single meeting was so vital that its outcome was responsible for (or, in the alternative, could have prevented) the recent nuclear disaster in Japan, but I nonetheless do believe (based on what I have heard to this point regarding the cause of plant failures) that the tragedy was indeed very preventable -- e.g., had there been greater general caution and openness to considering beyond-design-level events and to perform the re-evaluations and regular and periodic diligent walkdowns needed to uncover potential vulnerabilities.

I have already offered my support directly to the Japanese and to the IAEA for assisting the Japanese with the engineering and scientific response efforts, reconnaissance, studies, advice, etc., needed in the aftermath of the disaster. *In case the NRC is organizing any similar effort, I ask you to make known to those responsible at the NRC that I similarly offer my assistance.*

Now, I want to turn to a related matter affecting the US nuclear industry ...

Please review the attached documents, which I prepared in 2002 and 2003 for the CNWRA as part of my review of the licensing application for the Diablo Canyon ISFSI facility. (Please note that, upon request, animations that I prepared are also available of the wave progression of the tsunami scenarios considered in the attached tsunami hazard study.) These documents provided recommendations -- well in advance of even the 2004 Indian Ocean tsunami -- that pertained to the tsunami licensing bases for Diablo Canyon Power Plant and, more generally, to other coastal US plants. Unfortunately, the recommendations went unheeded at that time, and the NRC was not then willing to open up the prospect of re-evaluating the tsunami design basis for DCPD. Furthermore, I was told at that time that (a) there was disbelief that a tsunami could truly damage a rugged nuclear power facility (something that the recent Japanese event has now proven otherwise), and (b) that there existed uncertainty (professional differences of opinion -- or epistemic scrutiny) as to whether or not the scenarios and frequencies I explored in my tsunami hazard study were credible (although that question of uncertainty was to my knowledge not further pursued, as I believe safety prudence should have dictated).

Again, I developed my research, analyses and recommendations back in 2002 and 2003, so there is perhaps some need to update and refine my assessment. However, my belief is that, for very large part, those analyses and recommendations have been supported by applicable data and methodologies developed since that time. I have been performing tsunami hazard and risk studies now for 13 years. In 2000, I visited with experts at our US West Coast and Alaska Tsunami Warning Center in Alaska (and in 2004, the Pacific Tsunami Warning Center in Hawaii), I developed a rigorous approach for probabilistic tsunami hazard assessment, and I coordinated a team of seismic instrumentation and tsunami warning specialists to design a local tsunami warning system for a LNG facility in Indonesia. In early 2004, I was part of a reconnaissance team to review tsunami damage and advise the relevant governmental authorities in Thailand, Malaysia, Singapore and Australia regarding tsunami hazard, risk assessment, and warning. I have participated as risk chairman and invited presenter at a number of tsunami conferences since 2000, and I have worked with many tsunami scientists.

I realize that increased efforts at understanding and evaluating the tsunami threat have been

undertaken in the nuclear industry since the Indian Ocean tsunami of 2004, but to date I have not seen evidence that the measures being pursued (e.g., in re-evaluating the licensing bases of NPPs) are complete/exhaustive, as they ought to be. A major problem that I believe remains is the limited scope of tsunami generators that are often included in tsunami studies, the lack of a complete treatment of epistemic uncertainty, and the lack of resolve to truly re-evaluate facilities (including the need to conduct concerted walkdowns and review walkdowns) for the tsunami threat. I made a brief visit of the DCPD last year as part of an IAEA Seismic-EBP mission. During that visit, PG&E provided us a presentation on their latest (at that time) tsunami hazard assessment, as well as a walking inspection at DCPD. Following that (admittedly) brief assessment, my concerns with the plant remained and do even more so today (in general, for all coastal NPPs).

Accordingly, in the continued interests of nuclear safety in the US and elsewhere, I am requesting you at this time to reconsider the attached documents, to personally review them, and to provide them to responsible parties within the NRC. (Note: These documents were prepared as account of work previously funded by USNRC. Although, I am under the assumption that they can be reviewed within the NRC without restriction, I trust that you will ensure they are suitably distributed.)

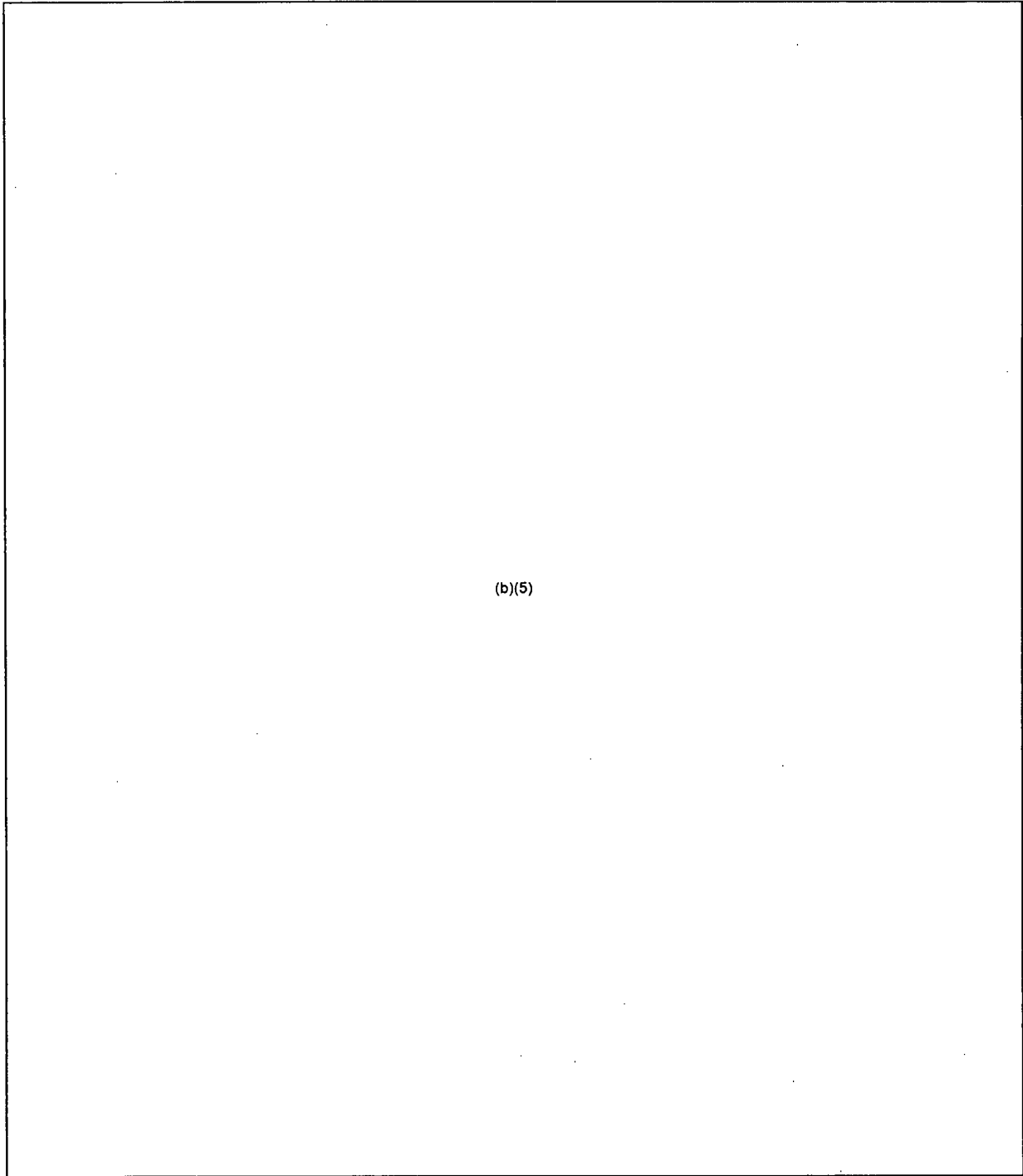
Please contact me in case I can further assist or in case you have any questions on this e-mail and attached documents.

Best regards,  
Rob Sewell

Dr. Robert T. Sewell  
President  
R.T. Sewell Associates  
500 Orchard Drive  
Louisville, CO 80027  
(b)(6) mobile  
303-665-2731 office  
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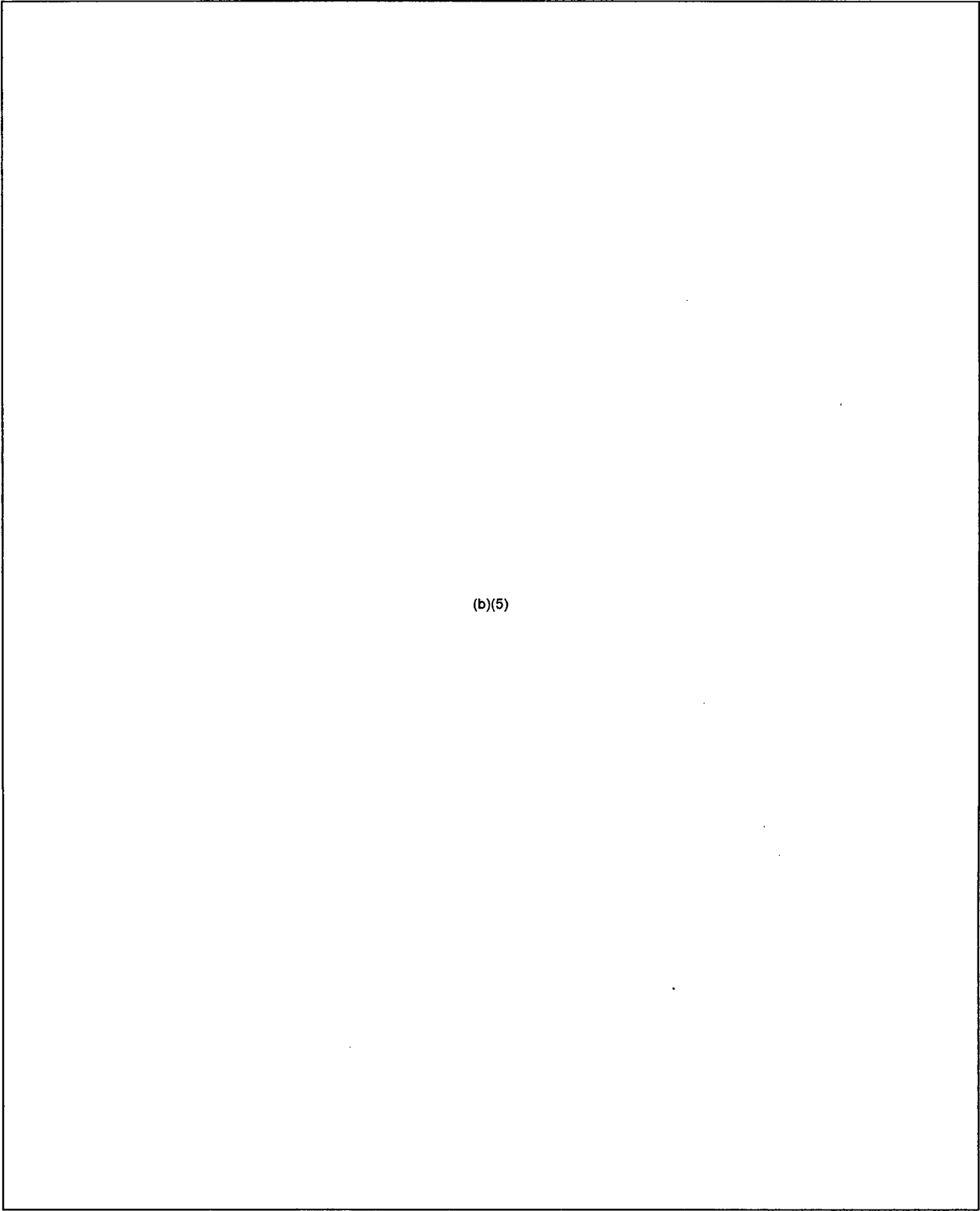
**TSUNAMI HAZARD AND DESIGN BASES;  
SPECIFIC ISSUES FOR THE DIABLO CANYON SITE  
AND IMPLICIT GENERIC ISSUES FOR EXISTING COASTAL NUCLEAR FACILITIES**

**December 17, 2002**

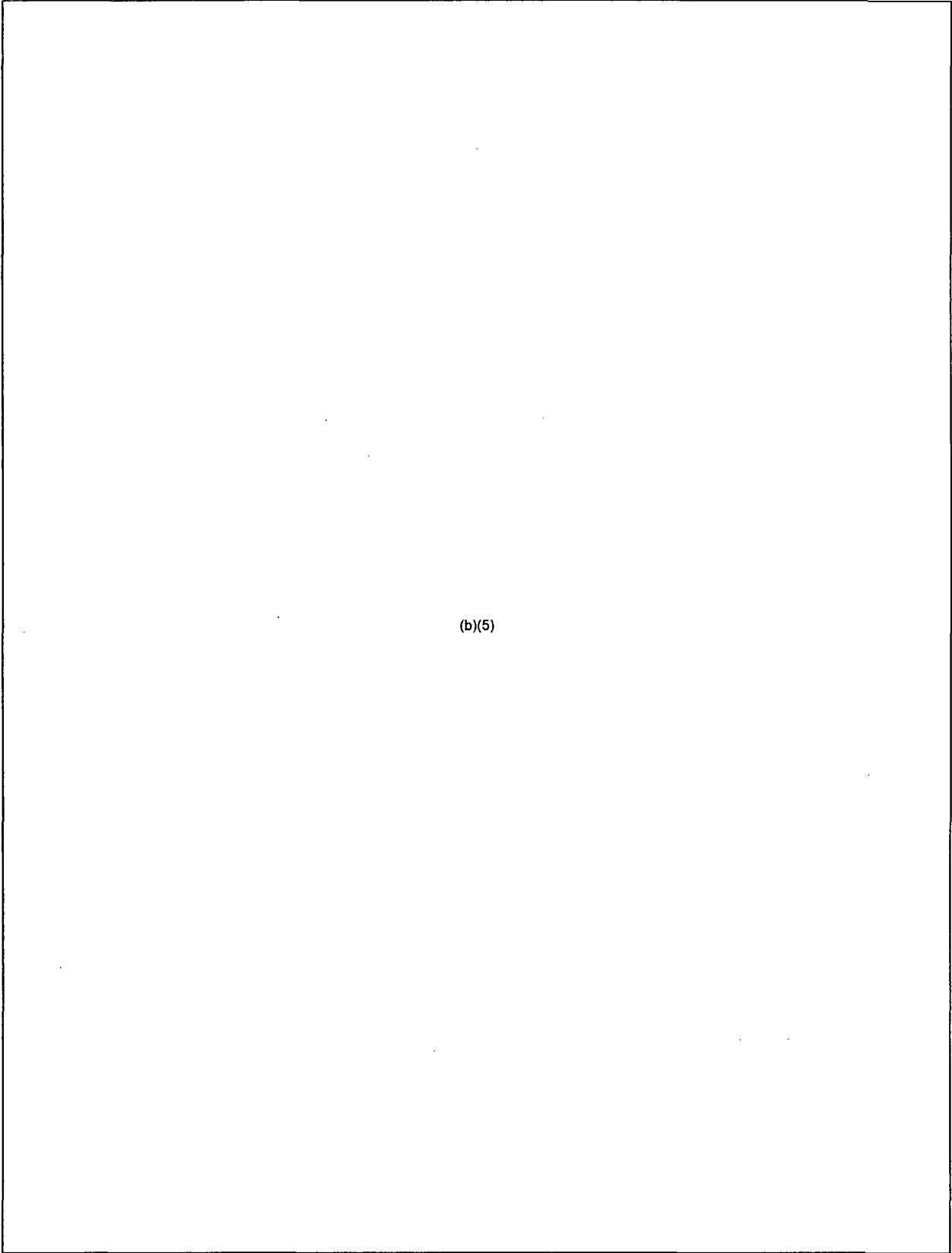


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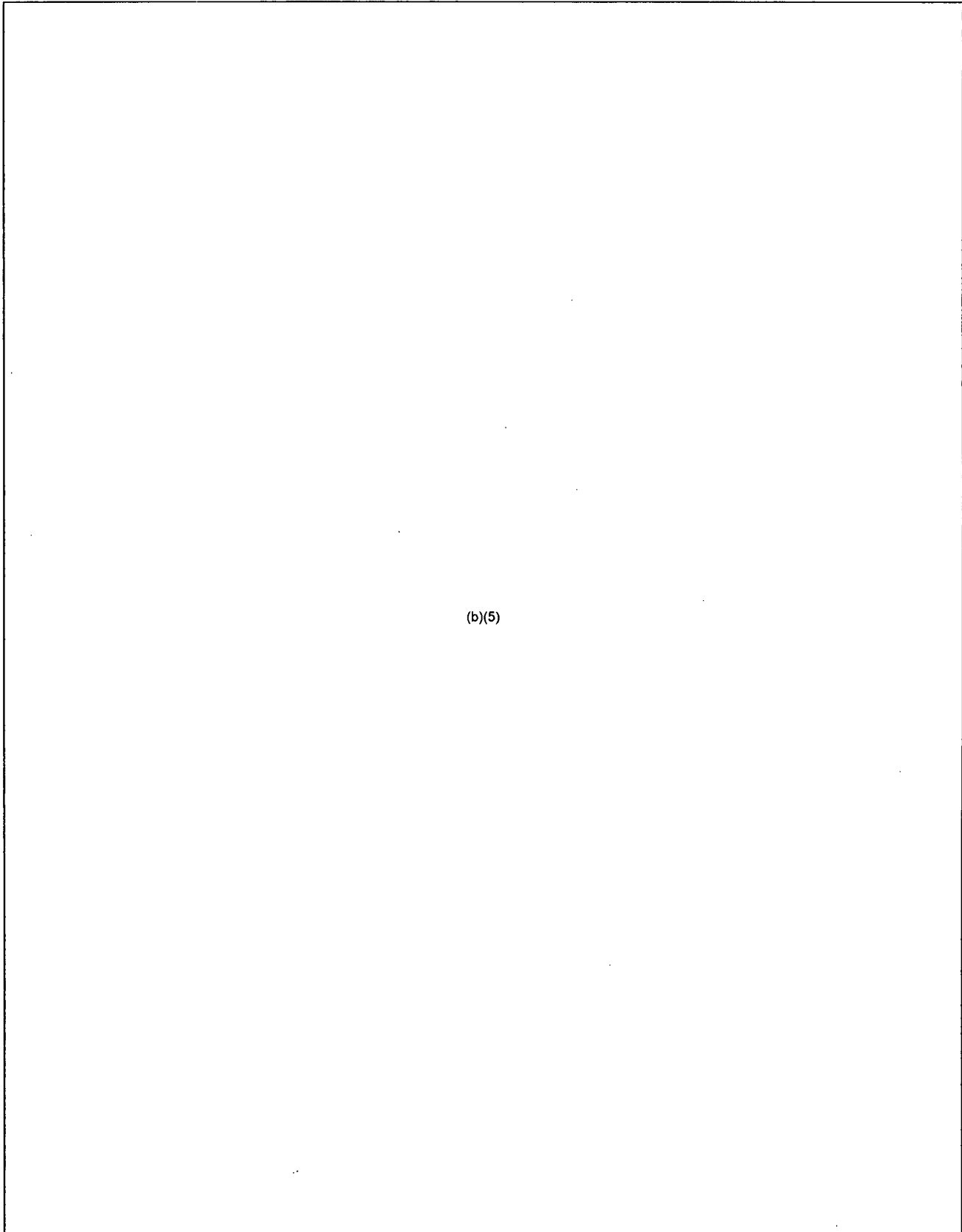
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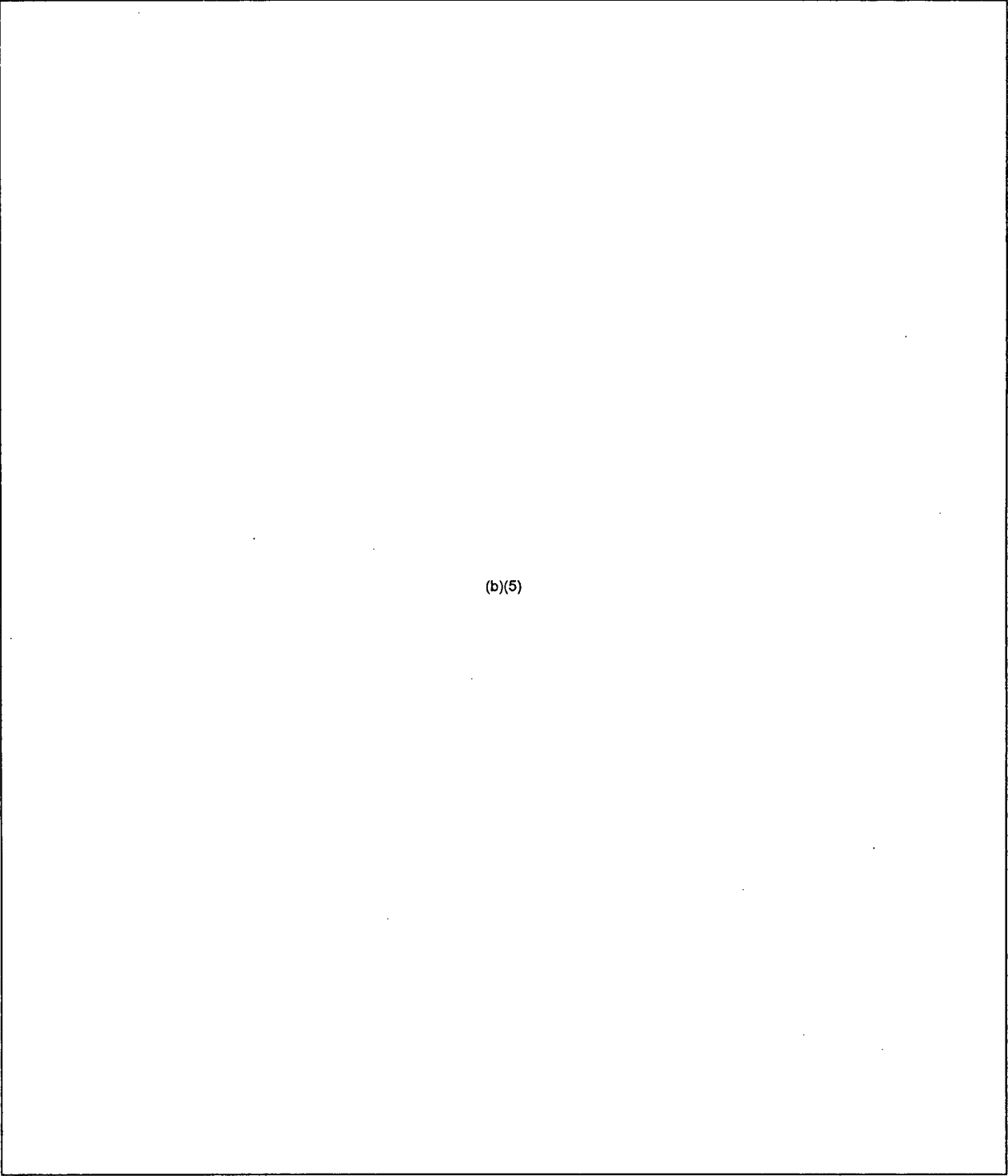


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**PREDECISIONAL AND CONFIDENTIAL**

**TO:** James Randall Hall (Spent Fuel Project Office, US NRC)

**FROM:** John Stamatakos (CNWRA) and Rob T. Sewell (Consultant to CNWRA)

December 18, 2002

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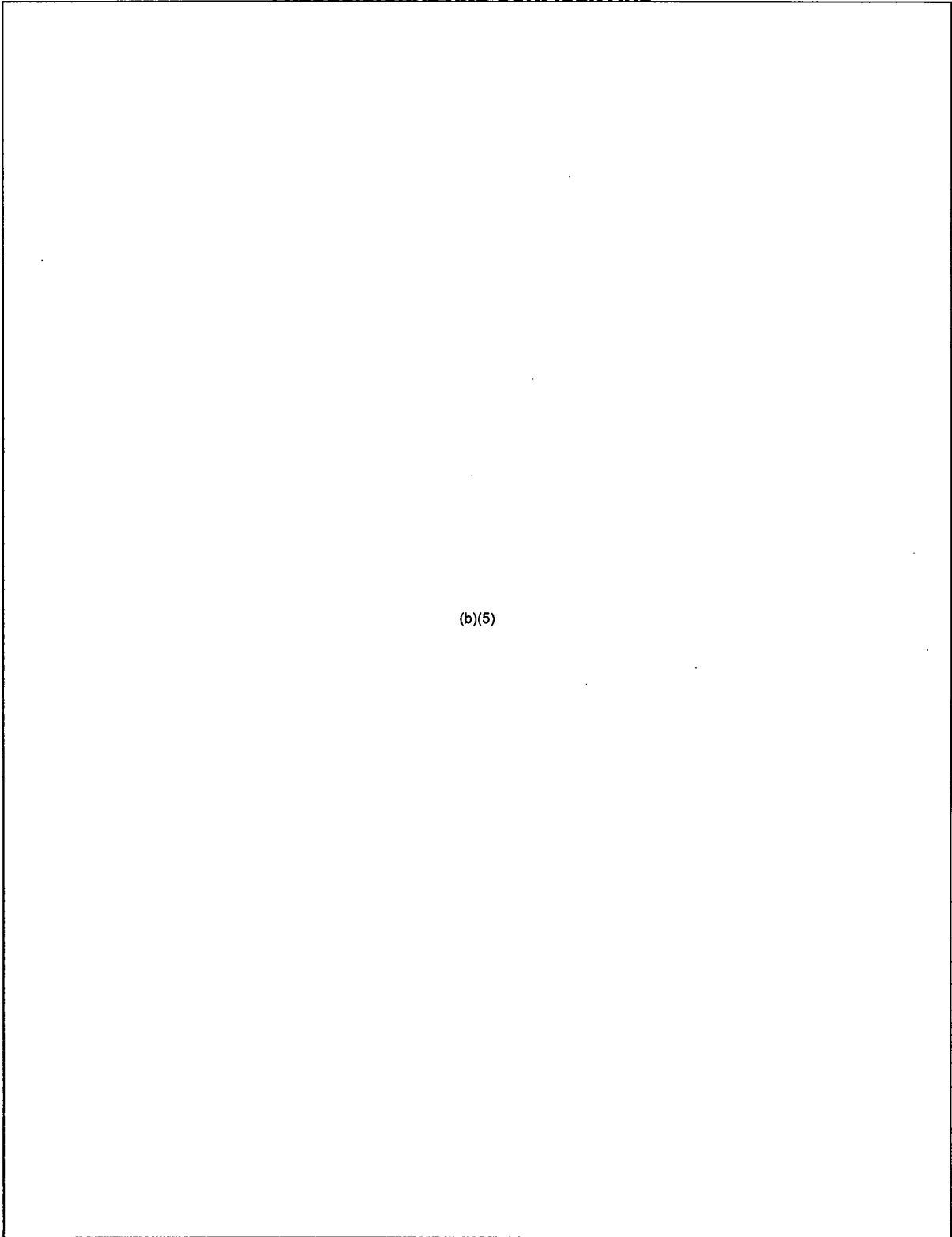
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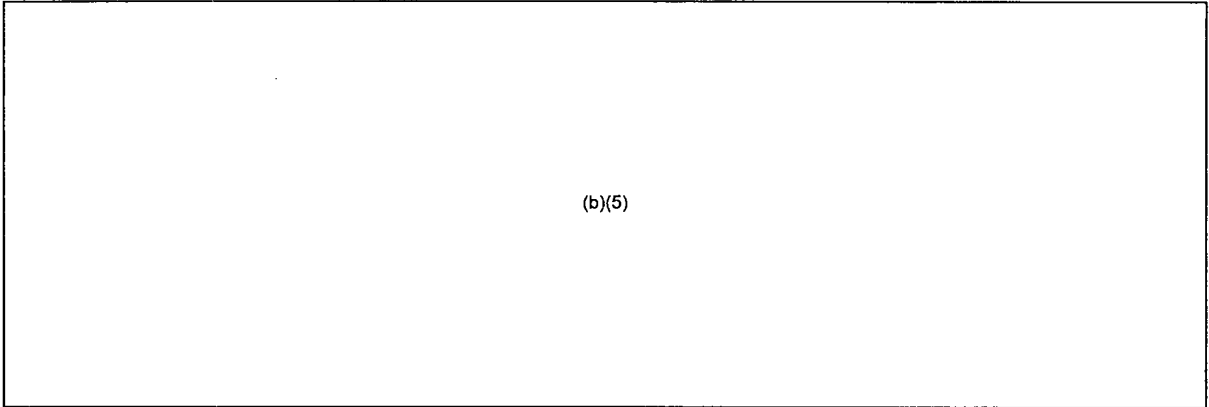
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**PREDECISIONAL AND CONFIDENTIAL**



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**Memorandum**

*R.T. Sewell Associates, Consulting*  
500 Orchard Drive • Louisville, CO 80027 USA

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To: Dr. John Stamatakos, CNWRA

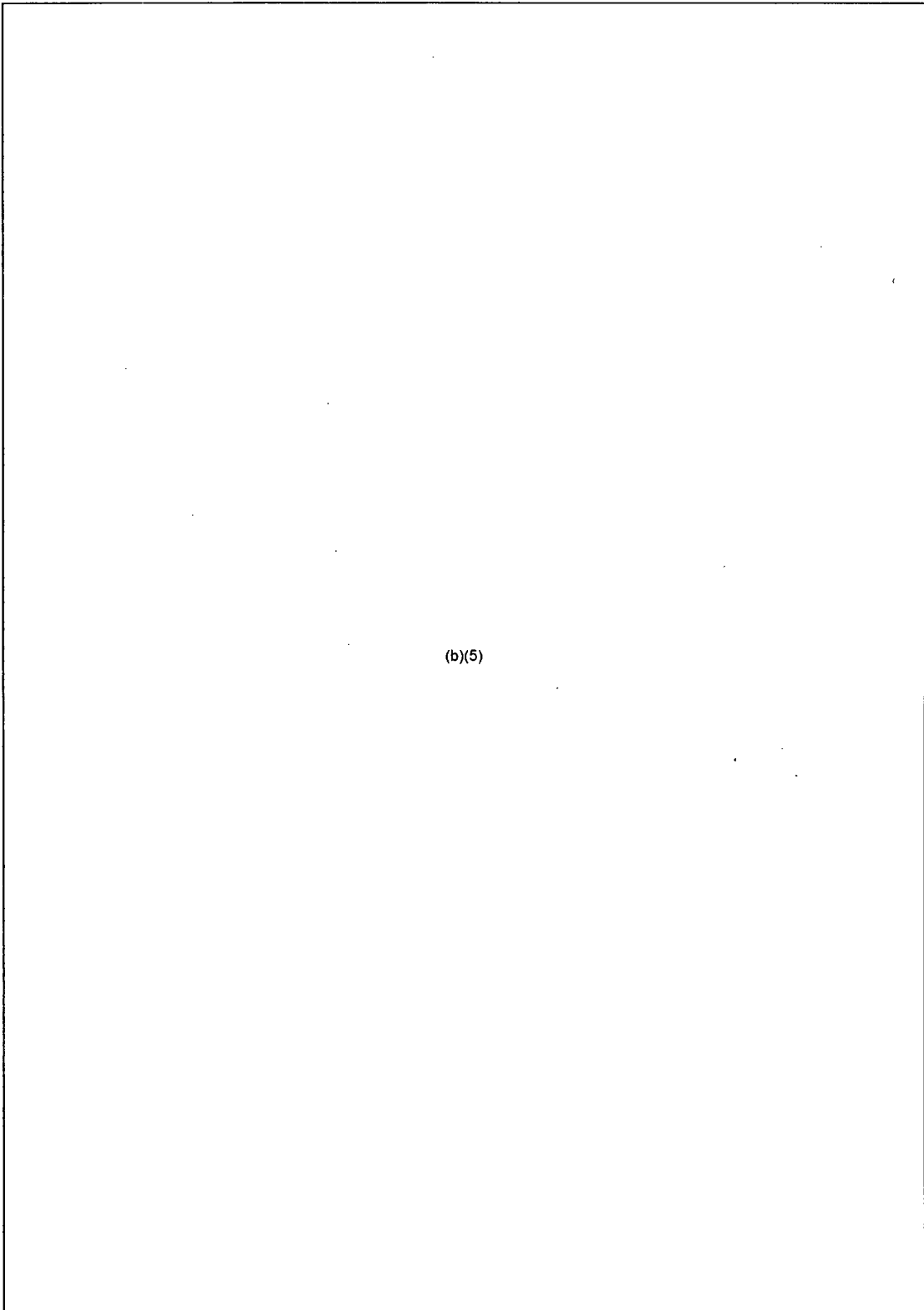
From: R.T. Sewell

Date: November 20, 2002

Subject: Review of Diablo Canyon (DC) Independent Spent Fuel Storage Installation (ISFSI)  
Safety Analysis Report (SAR), Section 2.4.6 "Probable Maximum Tsunami Flooding"

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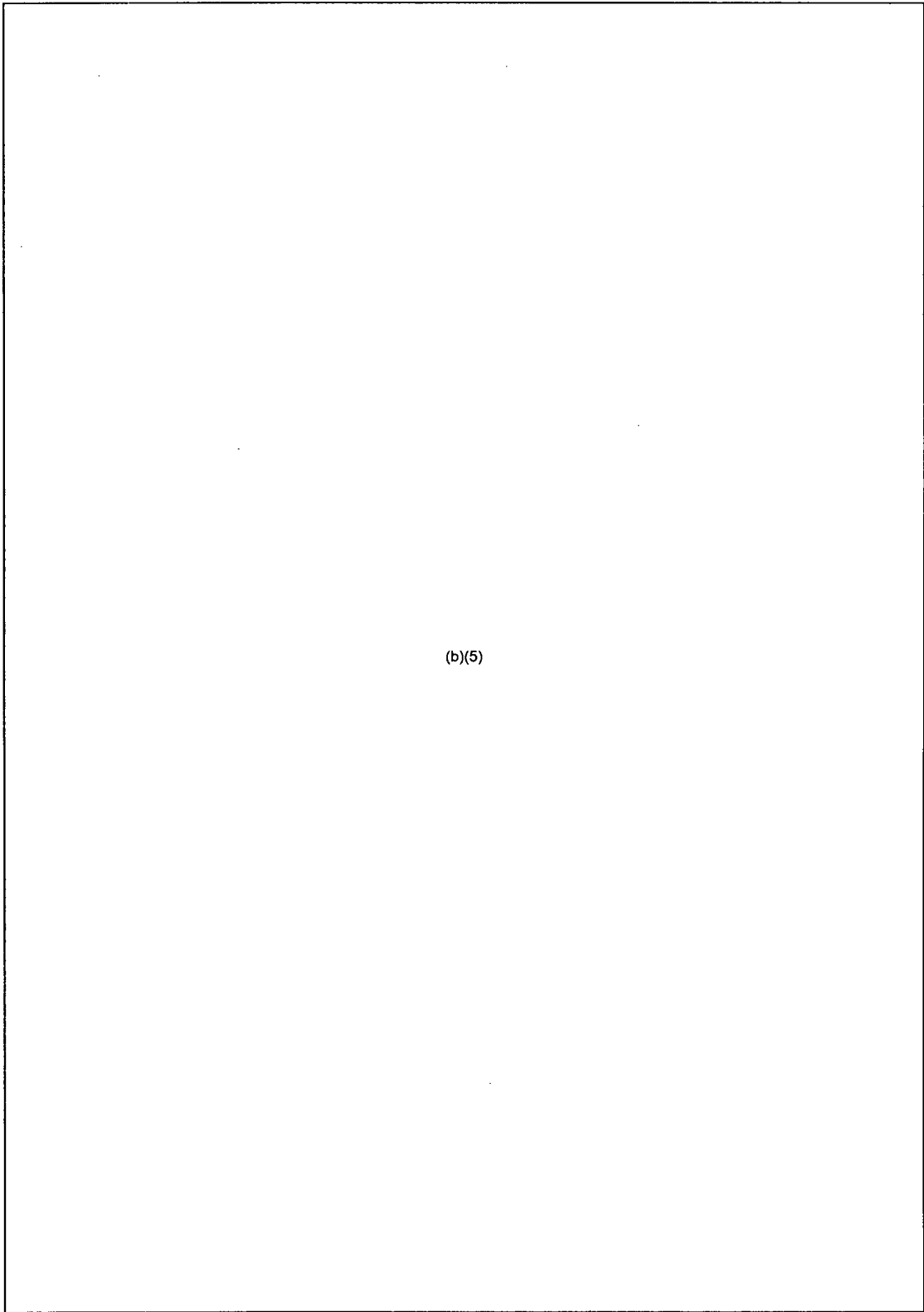


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Memo to: Dr. John Stamatakos, CNWRA  
November 20, 2002  
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Memo to: Dr. John Stamatakos, CNWRA  
November 20, 2002  
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**Li, Yong**

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**From:** Li, Yong  
**Sent:** Wednesday, March 23, 2011 12:16 PM  
**To:** Bagchi, Goutam  
**Subject:** RE: CNWRA Report on Tsunami

Here is the map including both NPPs and faults.  
I didn't make the map but a colleague here did it and he is not a geologist and seismologist.  
I assume he got the fault from GS.

It is too large and I will carry the CD to you.

**From:** Bagchi, Goutam  
**Sent:** Wednesday, March 23, 2011 11:40 AM  
**To:** Mayfield, Michael; Brach, Bill  
**Cc:** Chokshi, Niles; Hall, Randy; Li, Yong; Munson, Clifford; Manoly, Kamal  
**Subject:** RE: CNWRA Report on Tsunami

Mike and Bill,

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Your thoughts and contribution is what we need for a good Com Plan.

*Thank you,  
Goutam*

**From:** Mayfield, Michael  
**Sent:** Wednesday, March 23, 2011 10:50 AM  
**To:** Bagchi, Goutam; Brach, Bill  
**Cc:** Chokshi, Niles; Hall, Randy  
**Subject:** RE: CNWRA Report on Tsunami

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Mike

BR/371



**From:** Bagchi, Goutam  
**Sent:** Wednesday, March 23, 2011 9:27 AM  
**To:** Brach, Bill  
**Cc:** Mayfield, Michael; Chokshi, Nilesh; Hall, Randy  
**Subject:** CNWRA Report on Tsunami

Good morning Bill,

I am trying to piece together the time line of the subject report. If you have some recollection to help us fill in some of the gaps we have, it will help us enormously.

- Was the report placed in ADAMS as a restricted report for internal use only? If so, what is the accession number or approximate date we can search for?
- Date of briefing the Commissioners' TAs. Was there any written communication from the Commission or its date? You may recall that we were instructed (verbally!!) not to make the report public, nor our evaluation of the report.

I will be grateful for your feed back. Best regards and

*Thank you,*  
*Goutam Bagchi*  
Senior Advisor  
Division of Site & Environmental Reviews, NRO  
301-415-3305

**A Preliminary Numerical Study of the Hazard  
from Local Landslide Tsunami Scenarios  
at the Diablo Canyon Site  
in Central California**

*Summary Report (Draft)*  
November 22, 2003

**Investigator:**

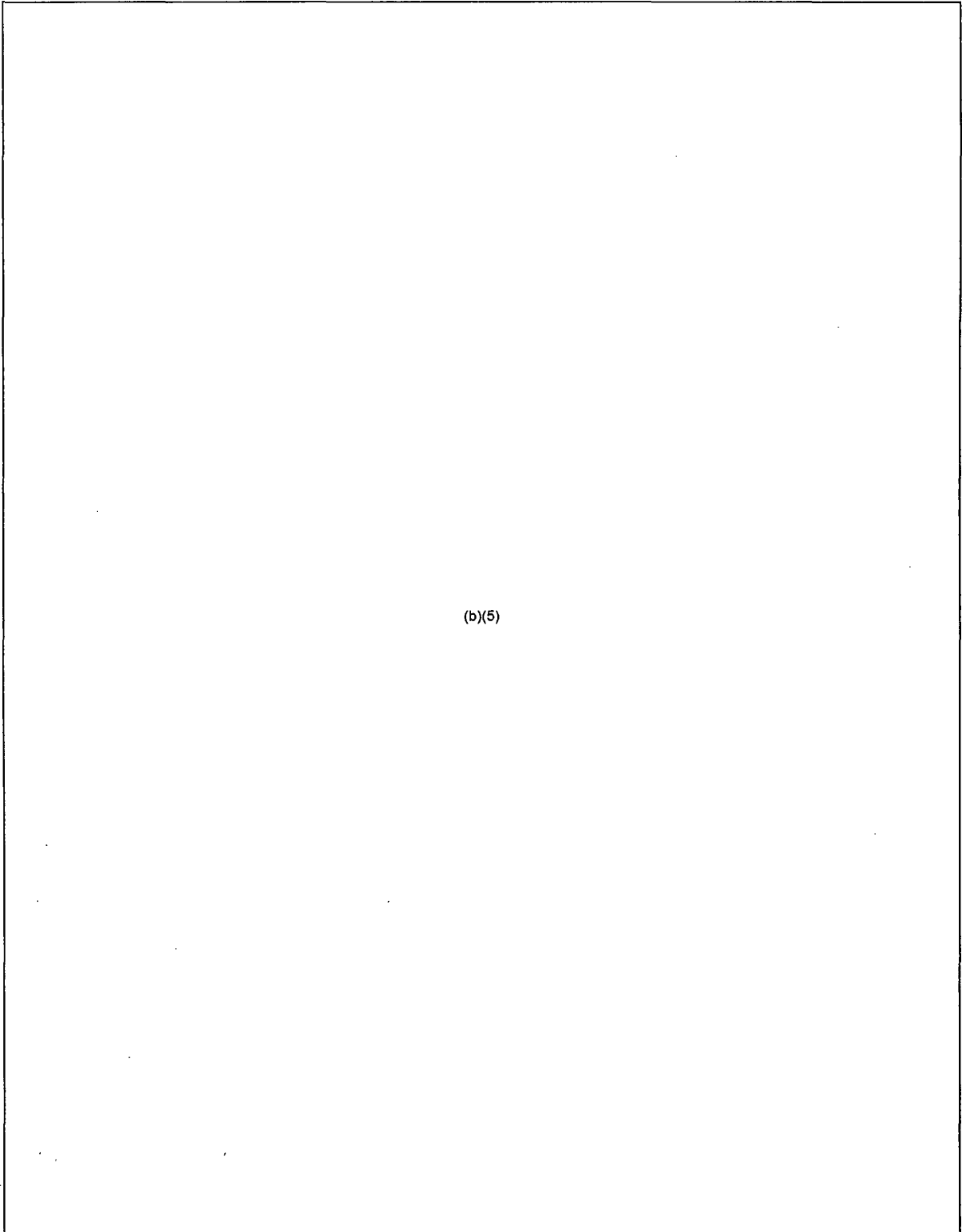
**Dr. R.T. Sewell  
R.T. Sewell Associates, Consulting  
Louisville, Colorado**

**Prepared for:**

**Southwest Research Institute  
U.S. Nuclear Regulatory Commission**

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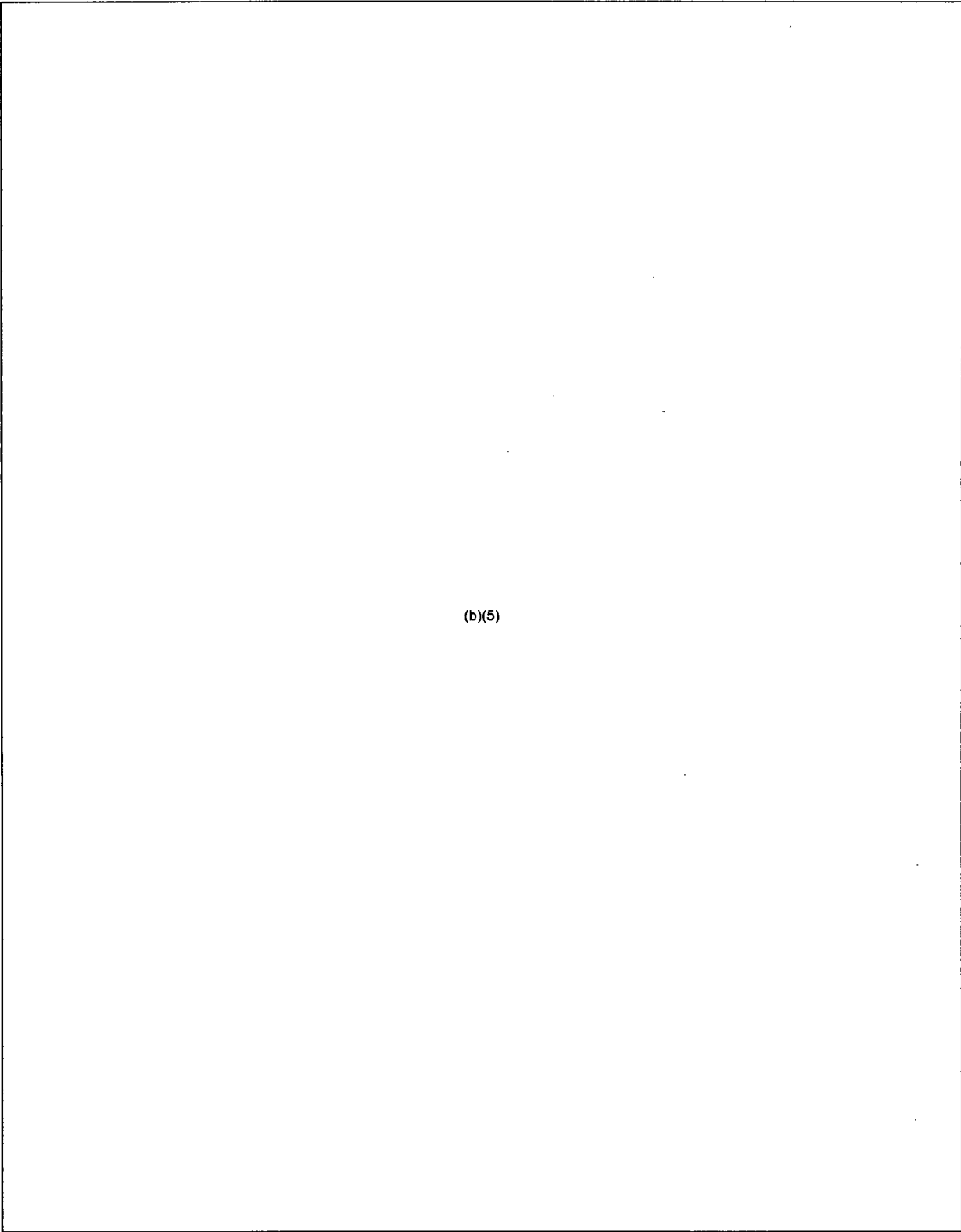
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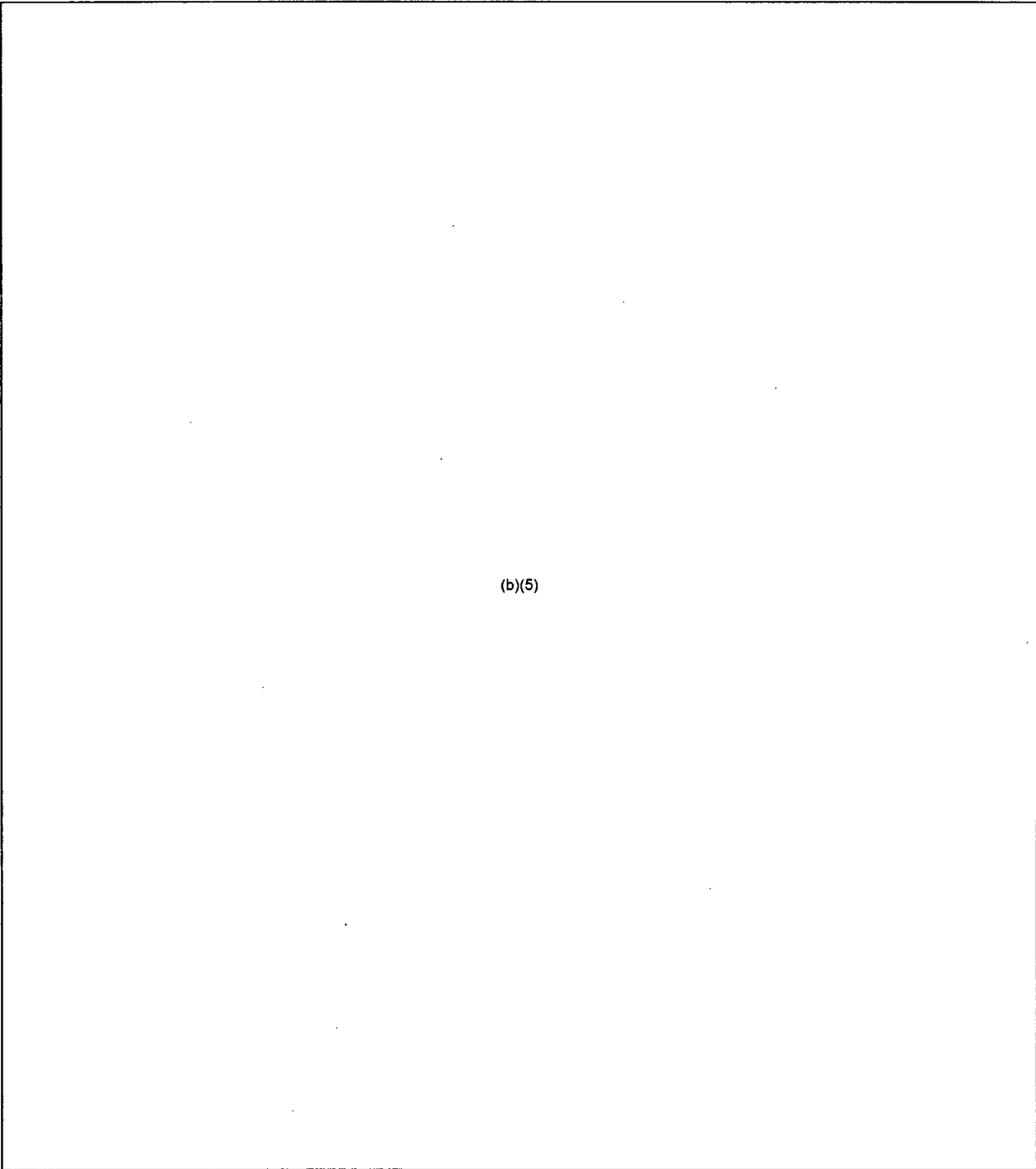
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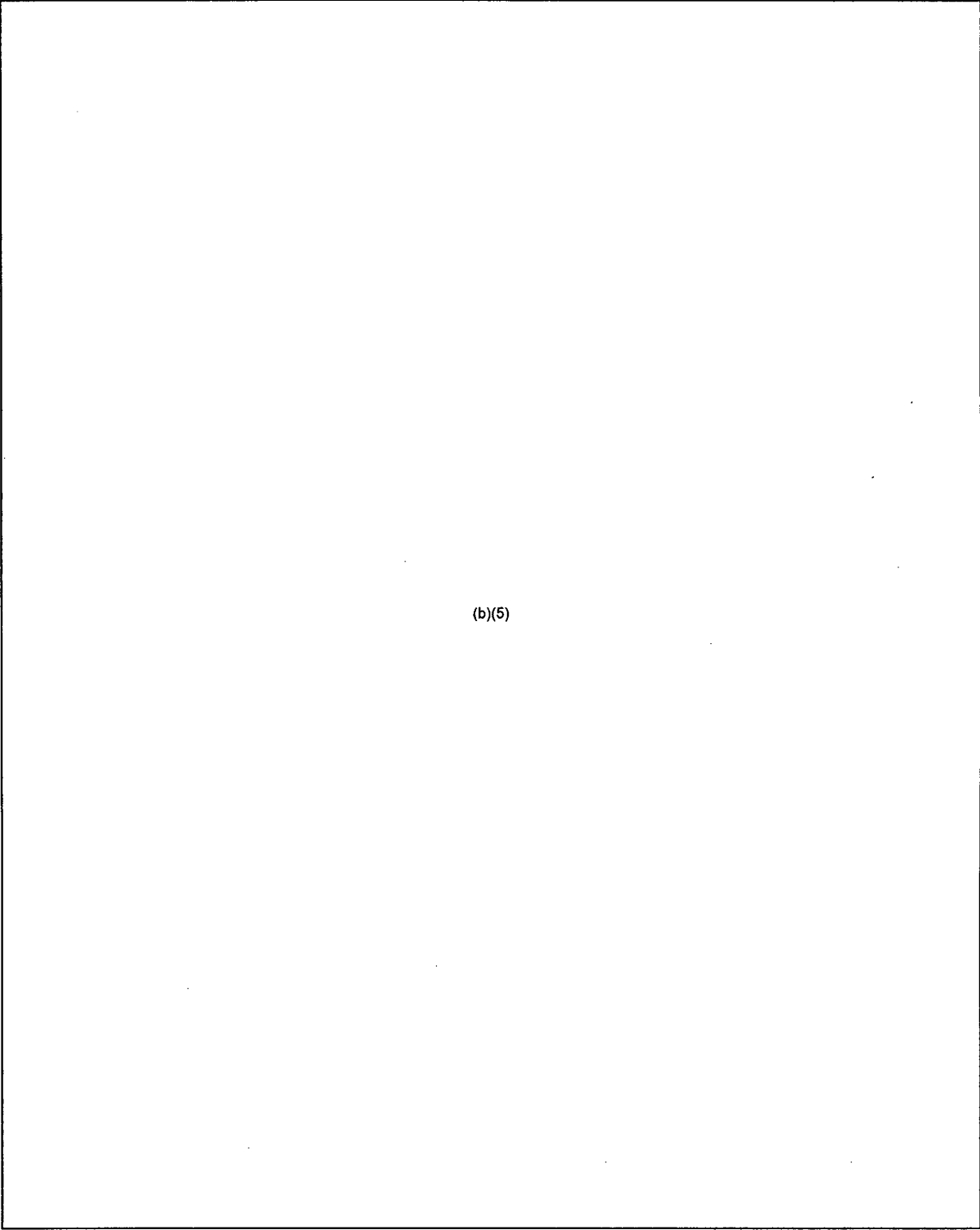
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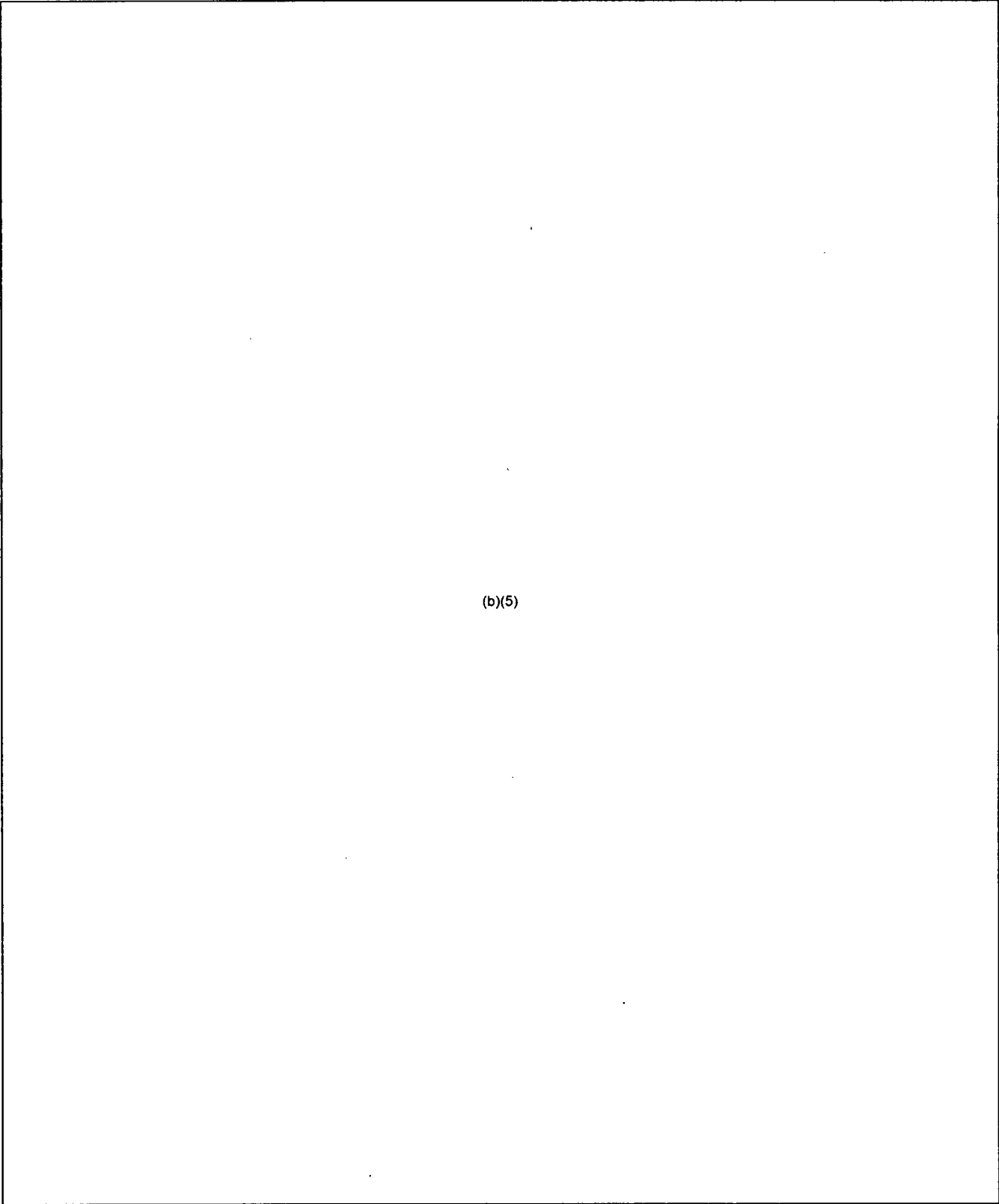
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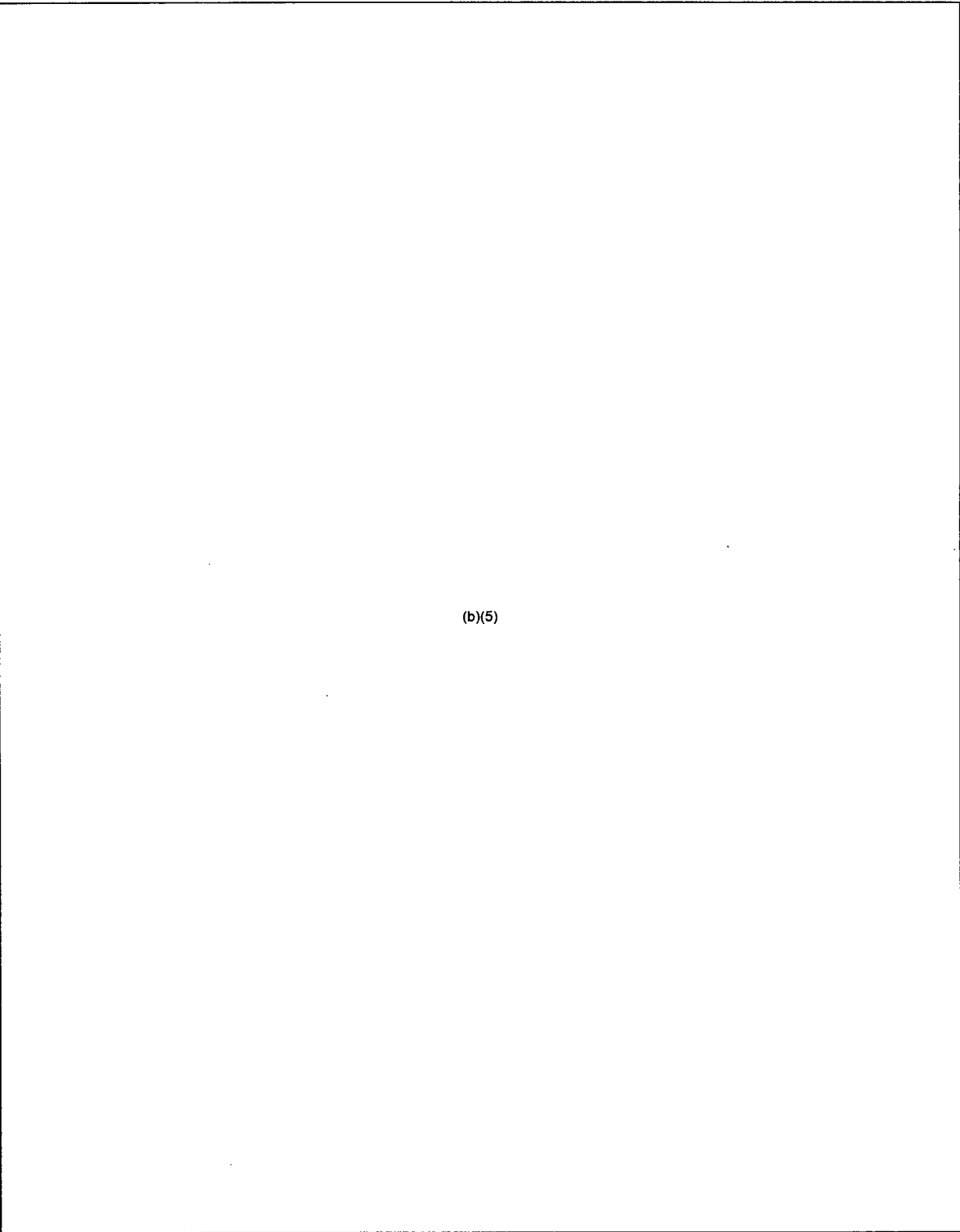


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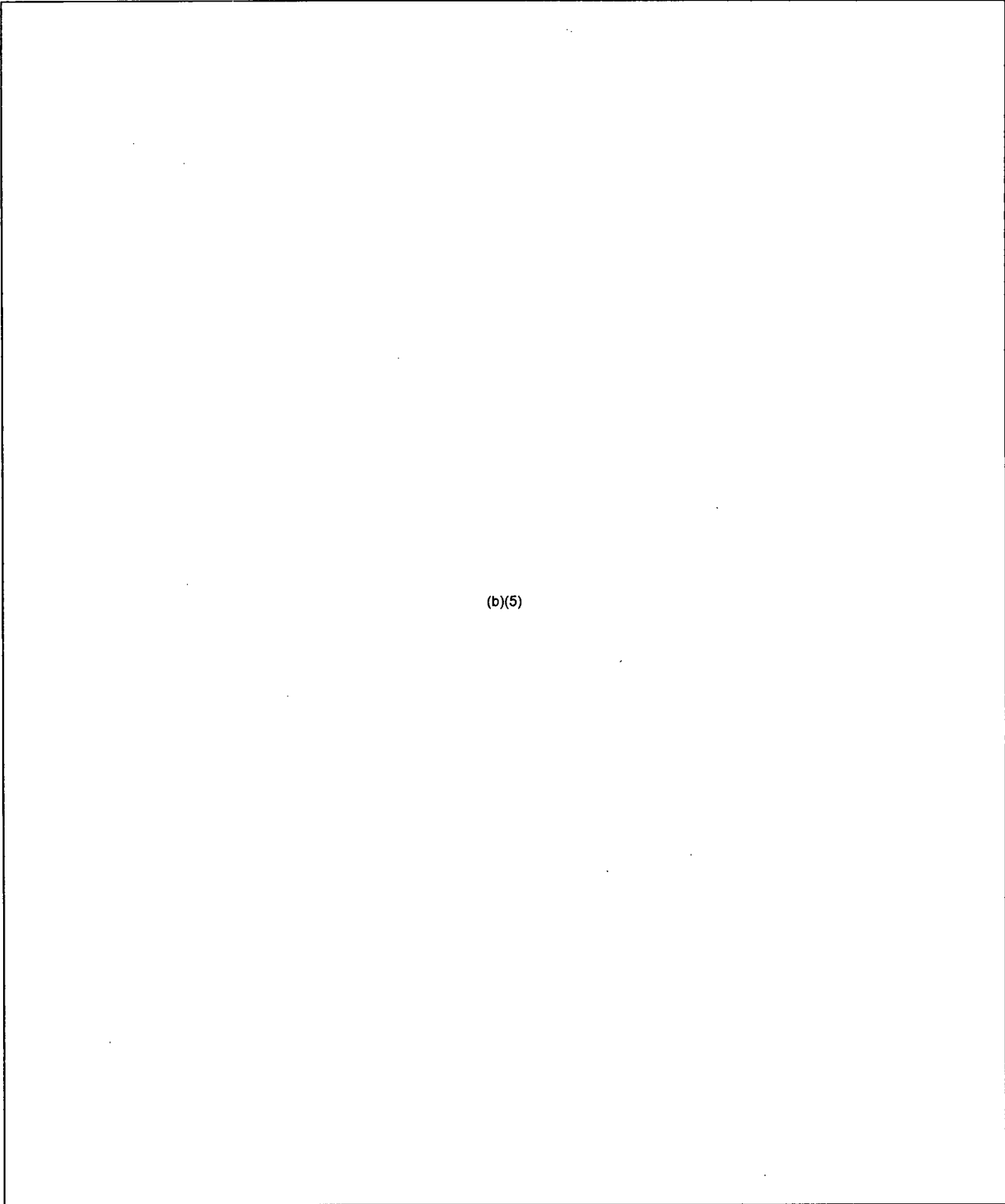


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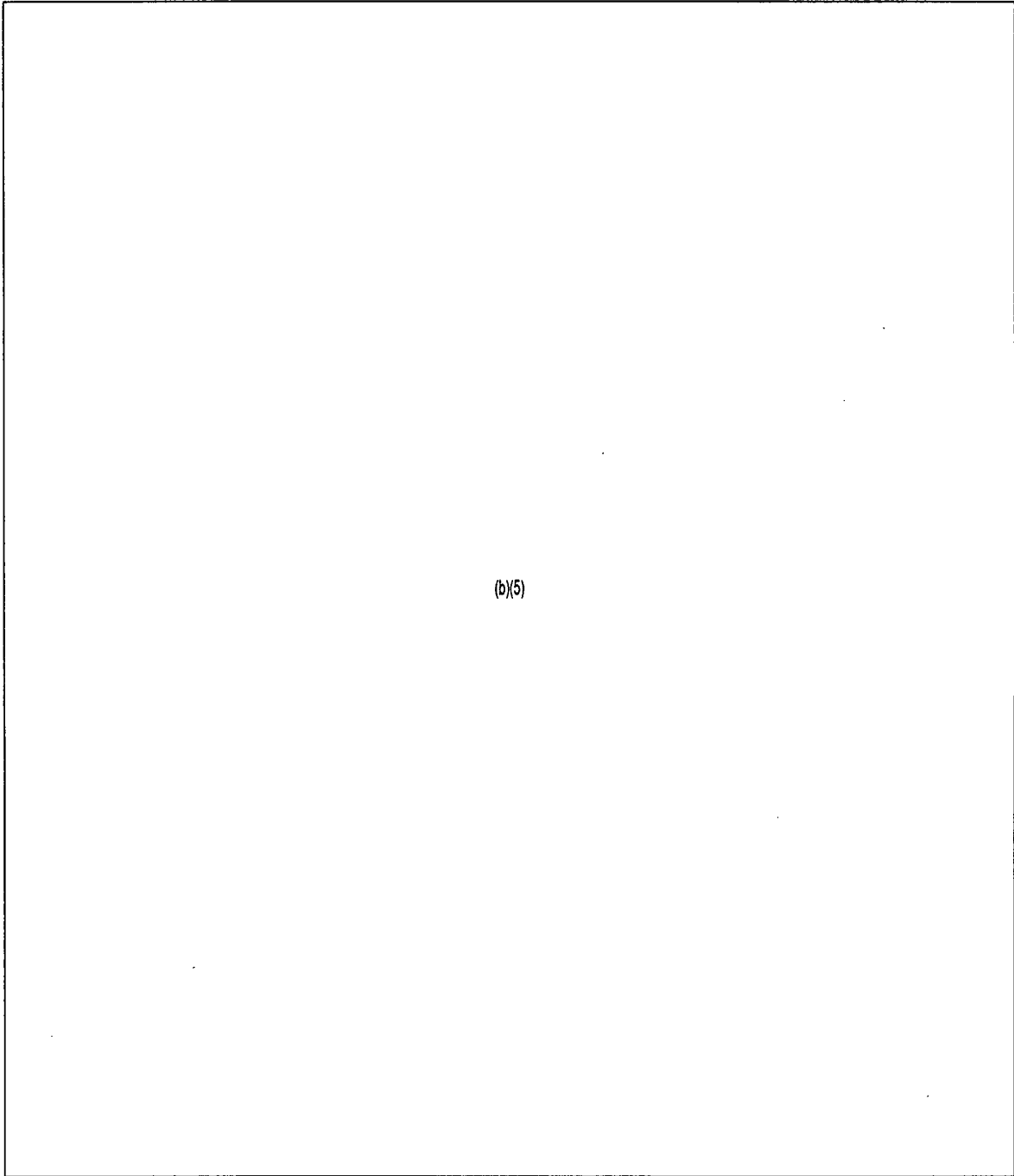


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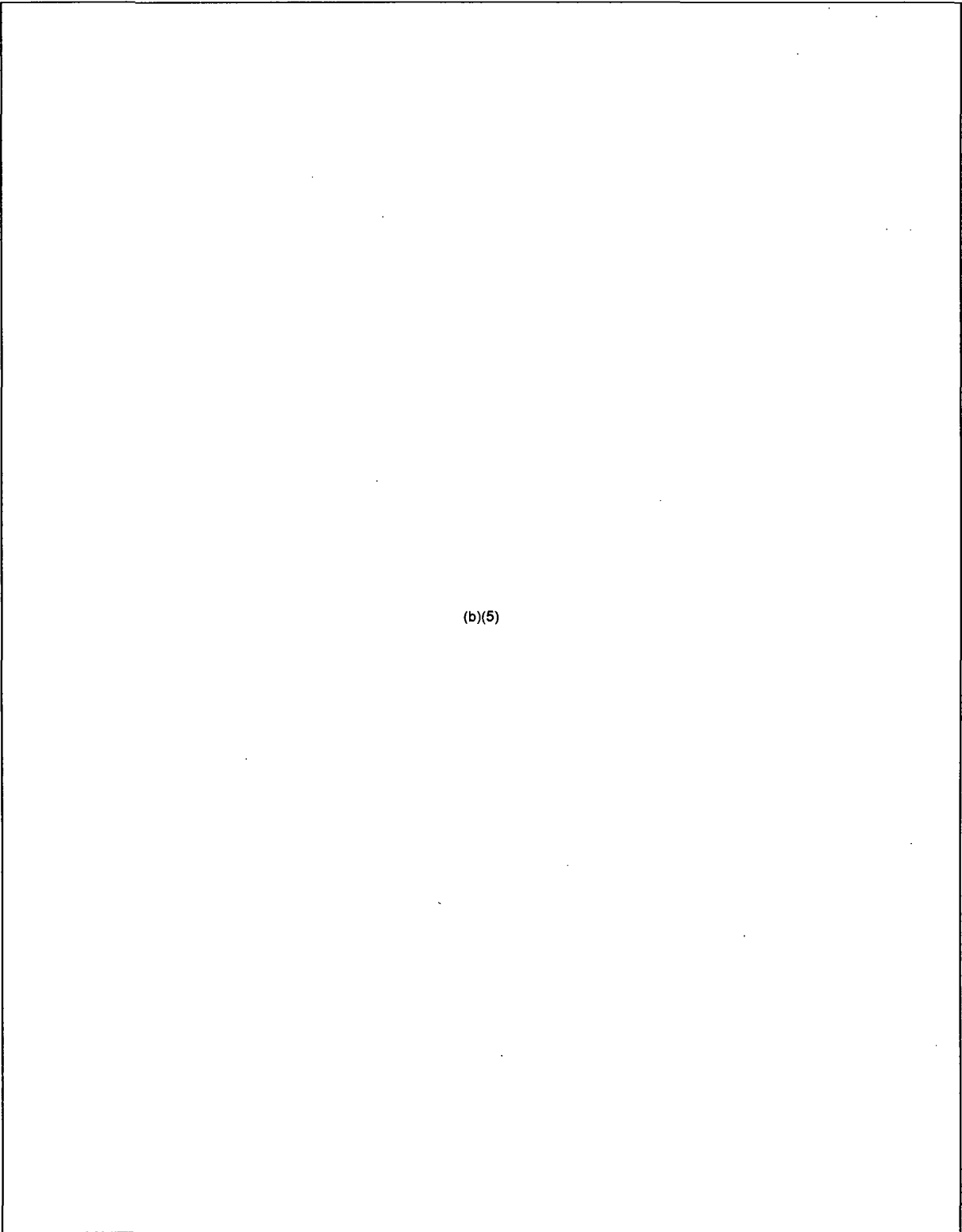


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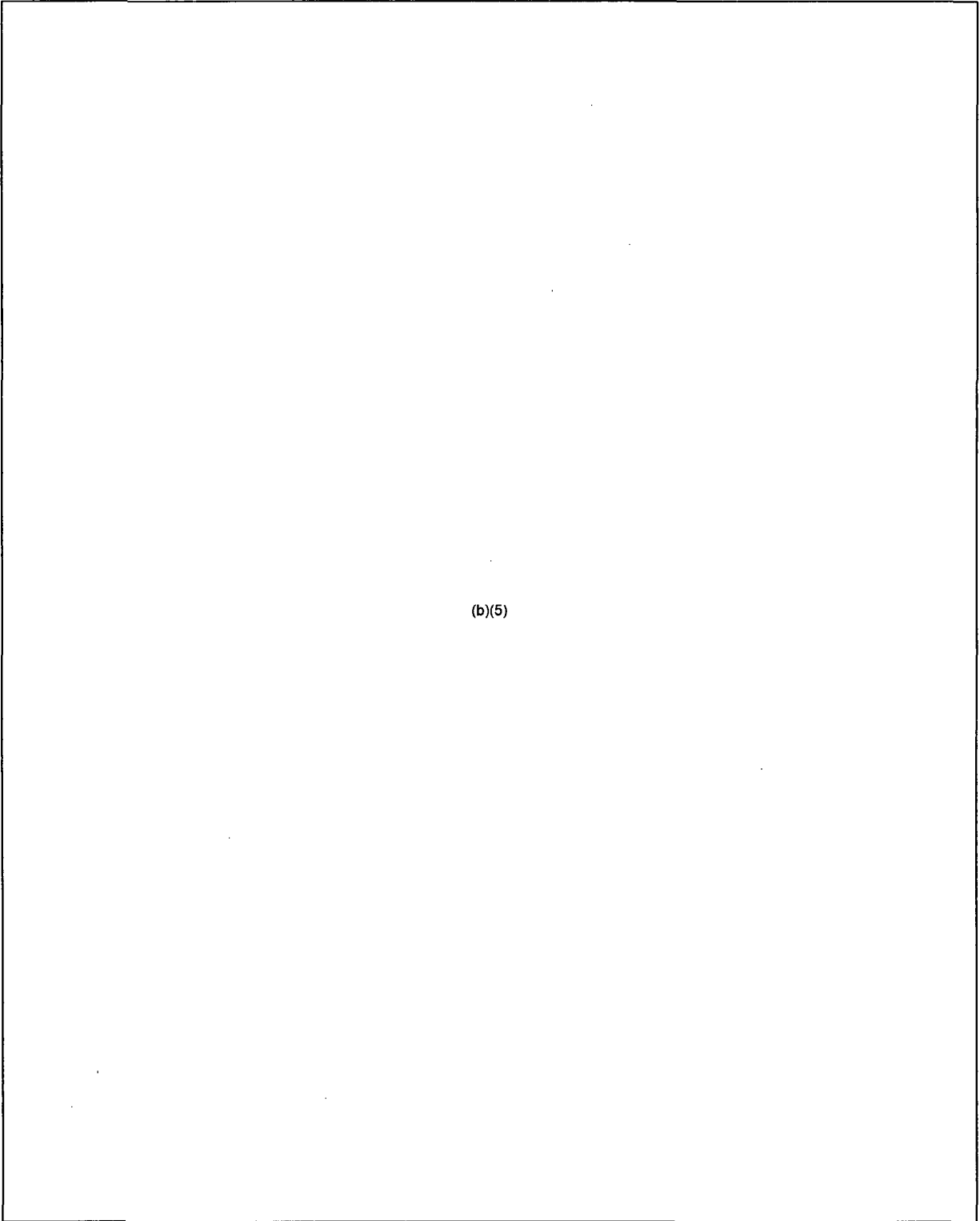
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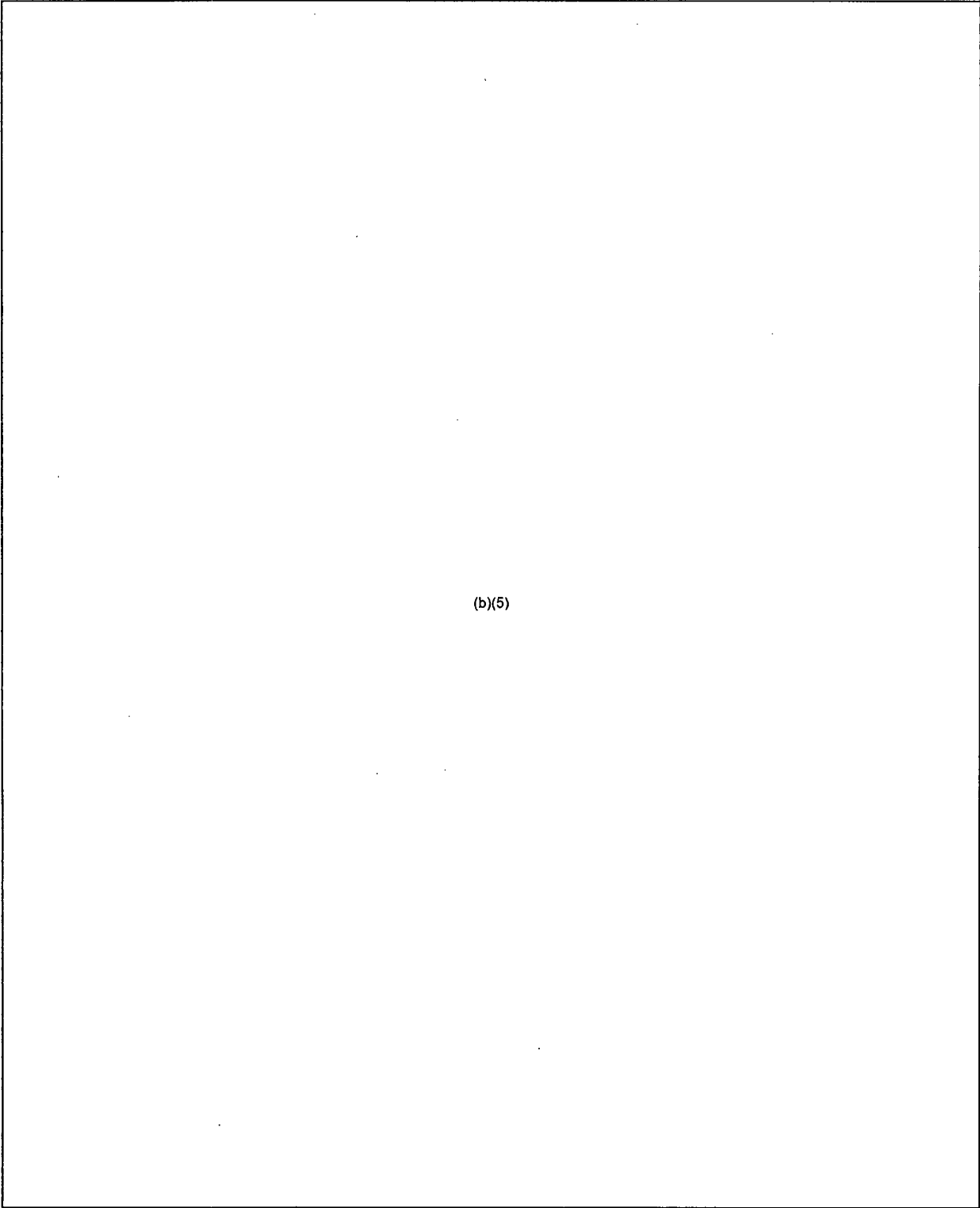
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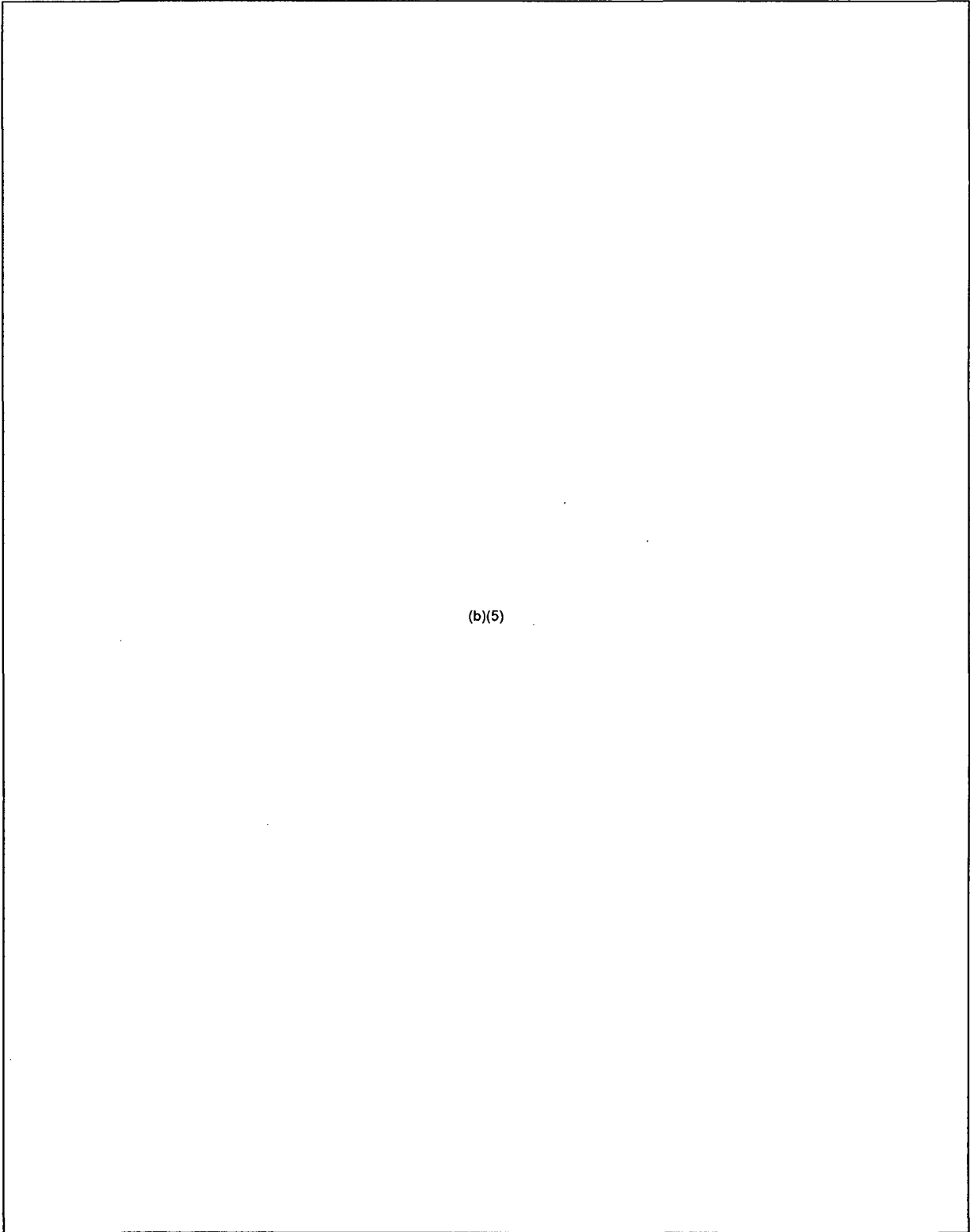
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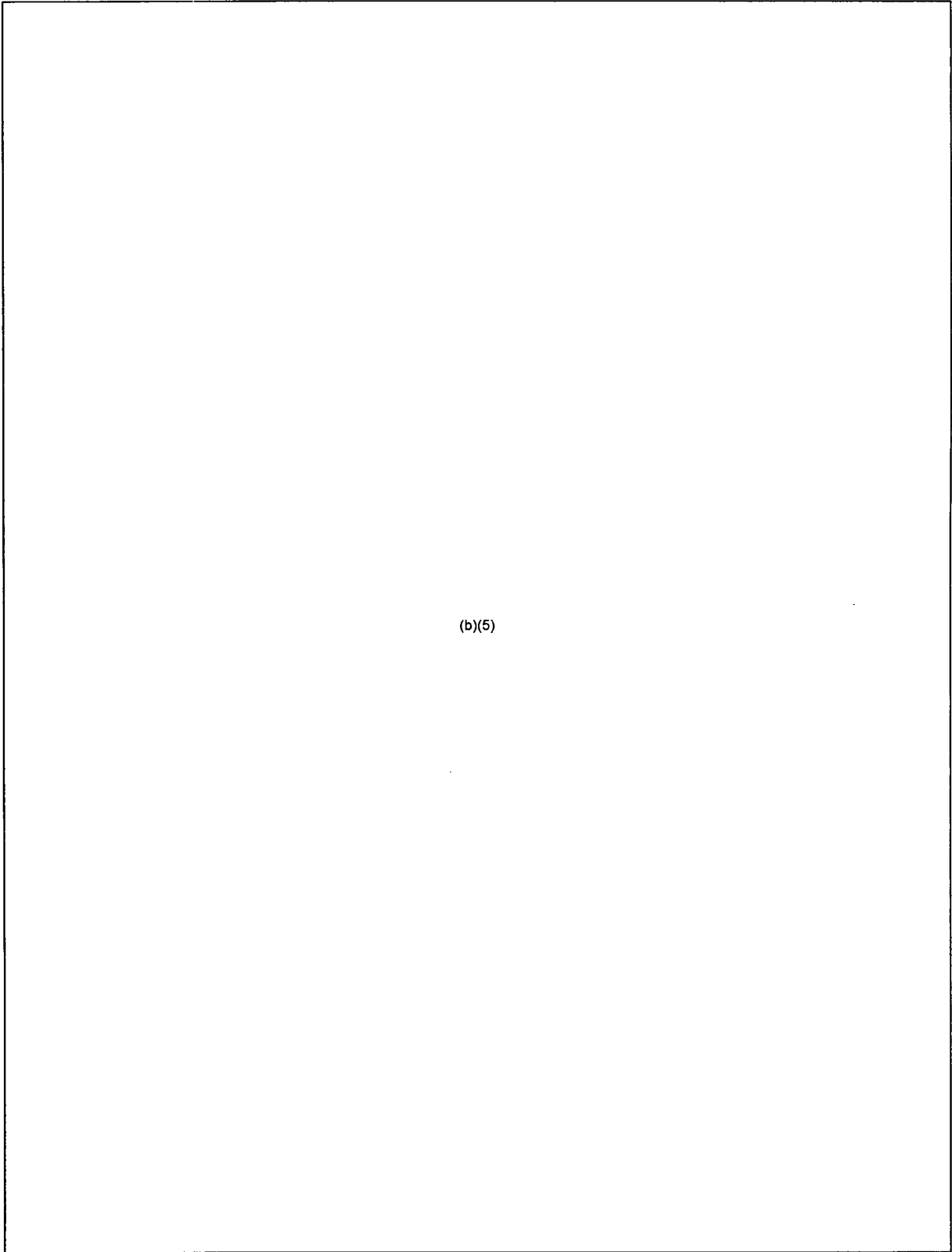
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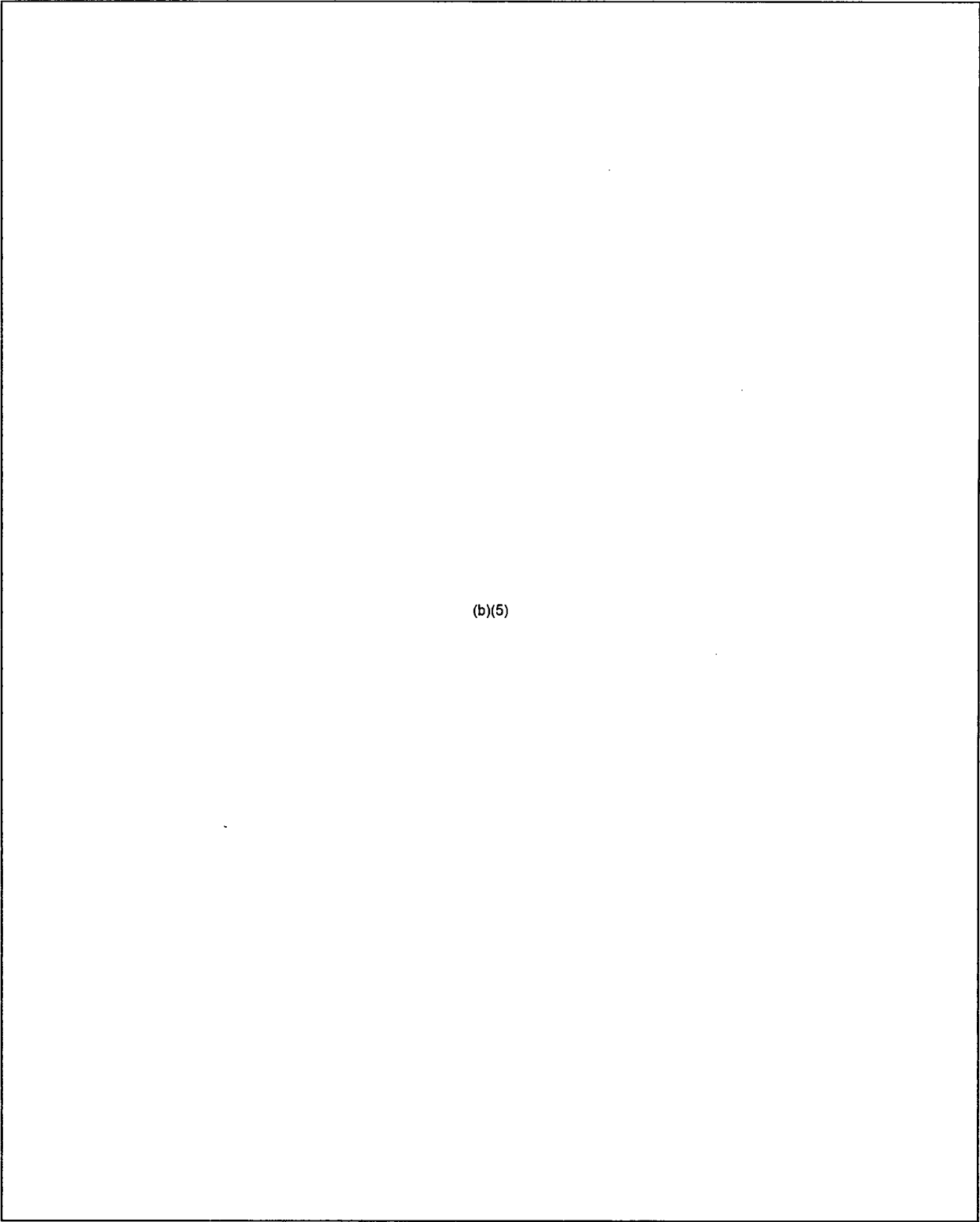
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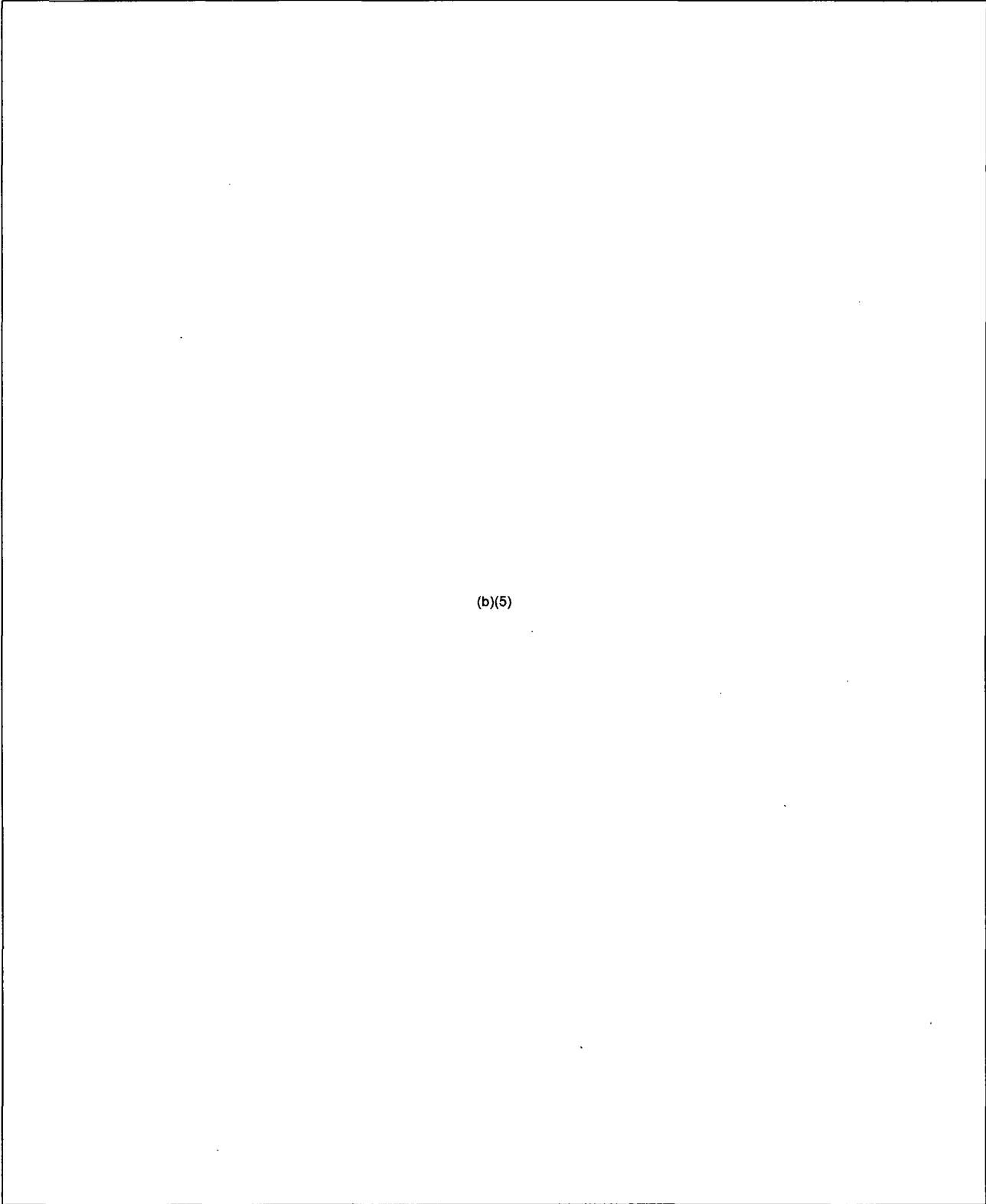
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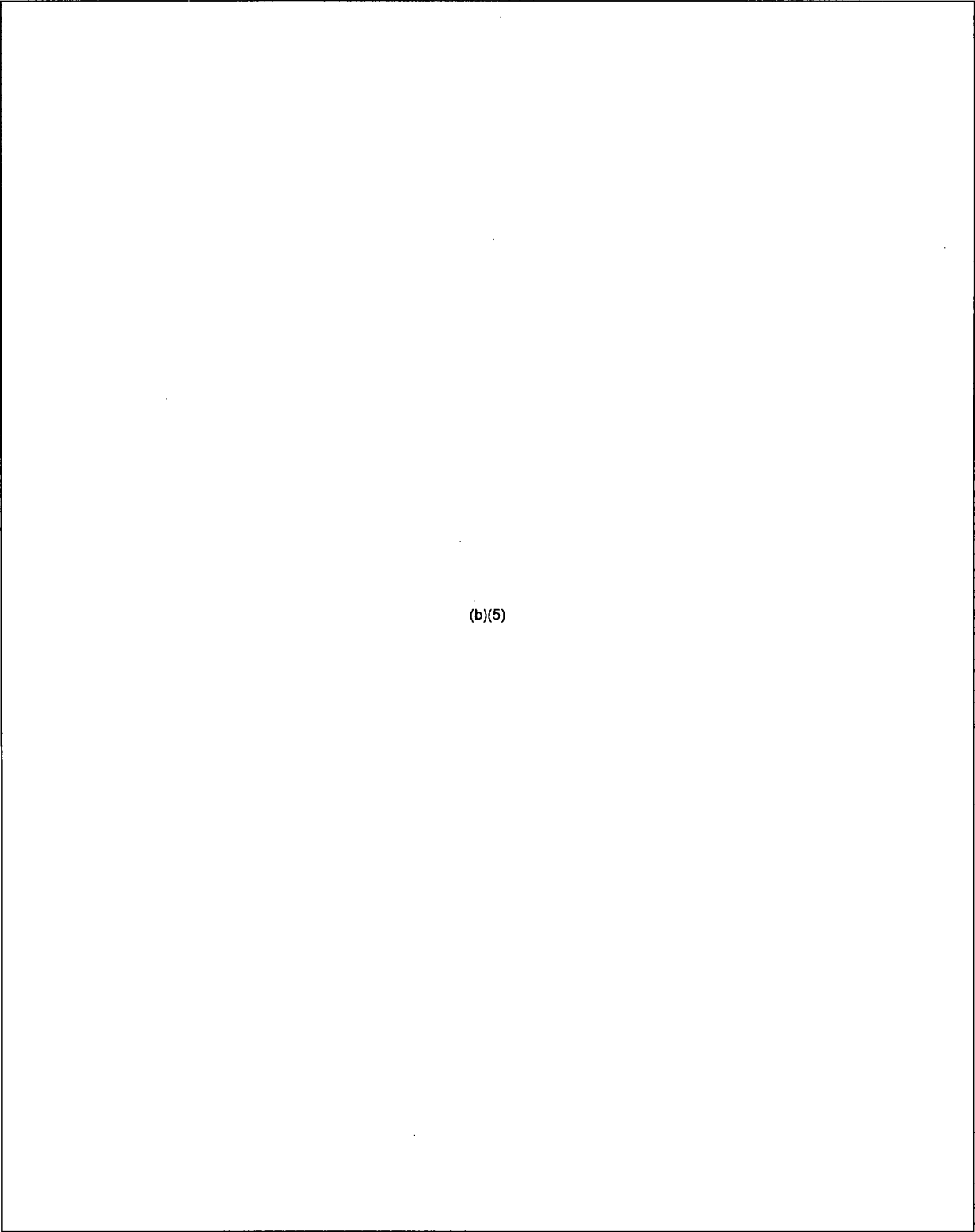
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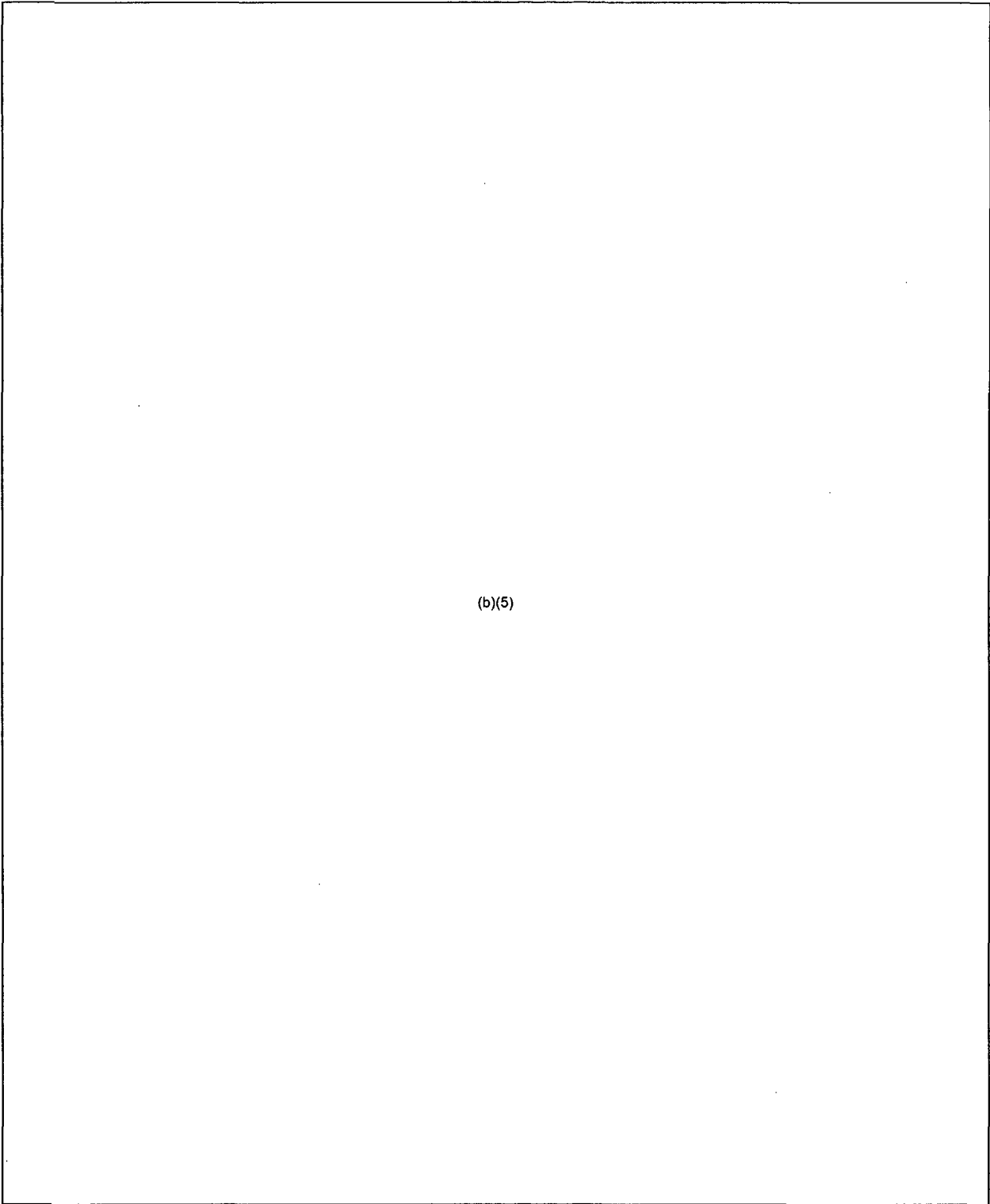
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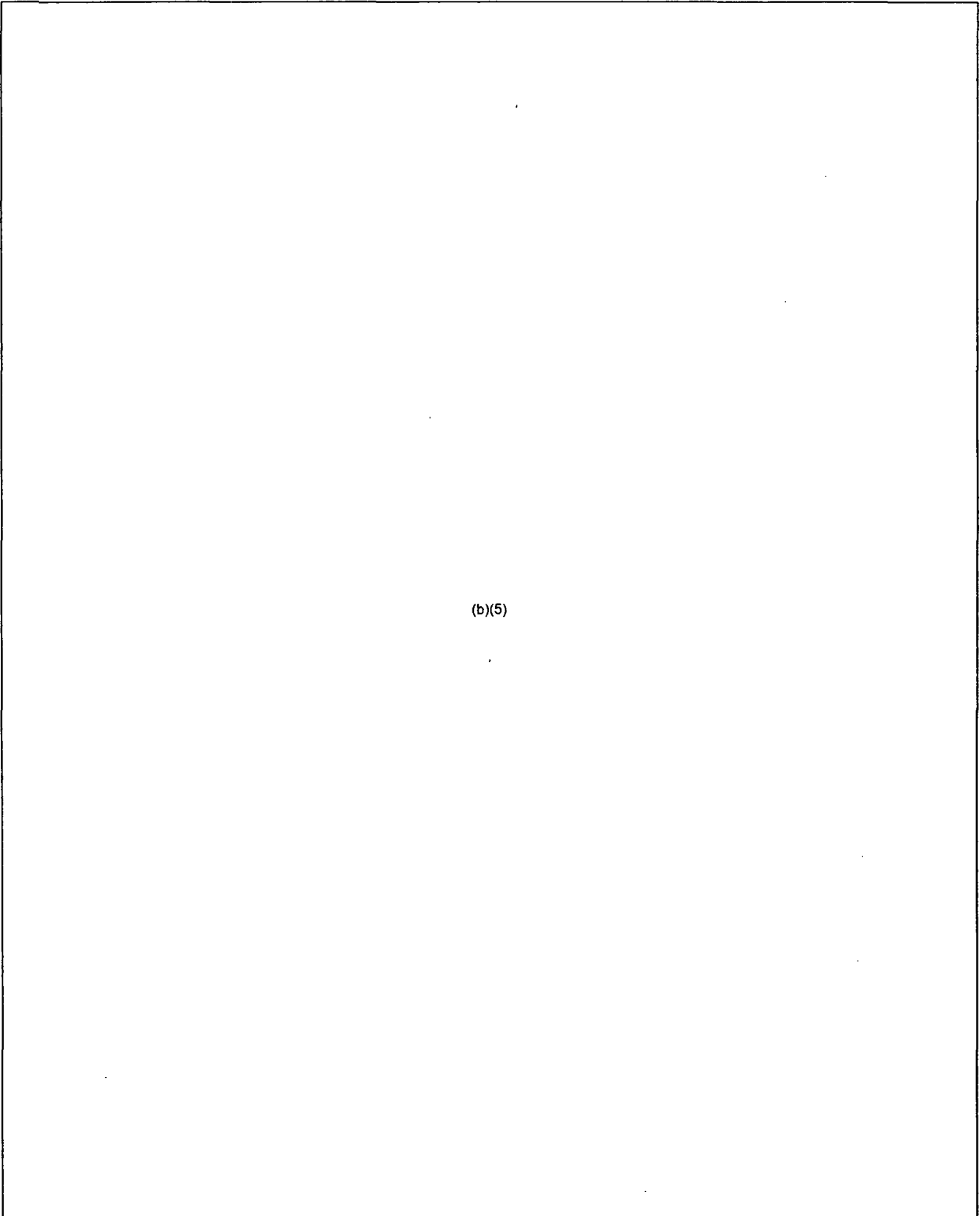
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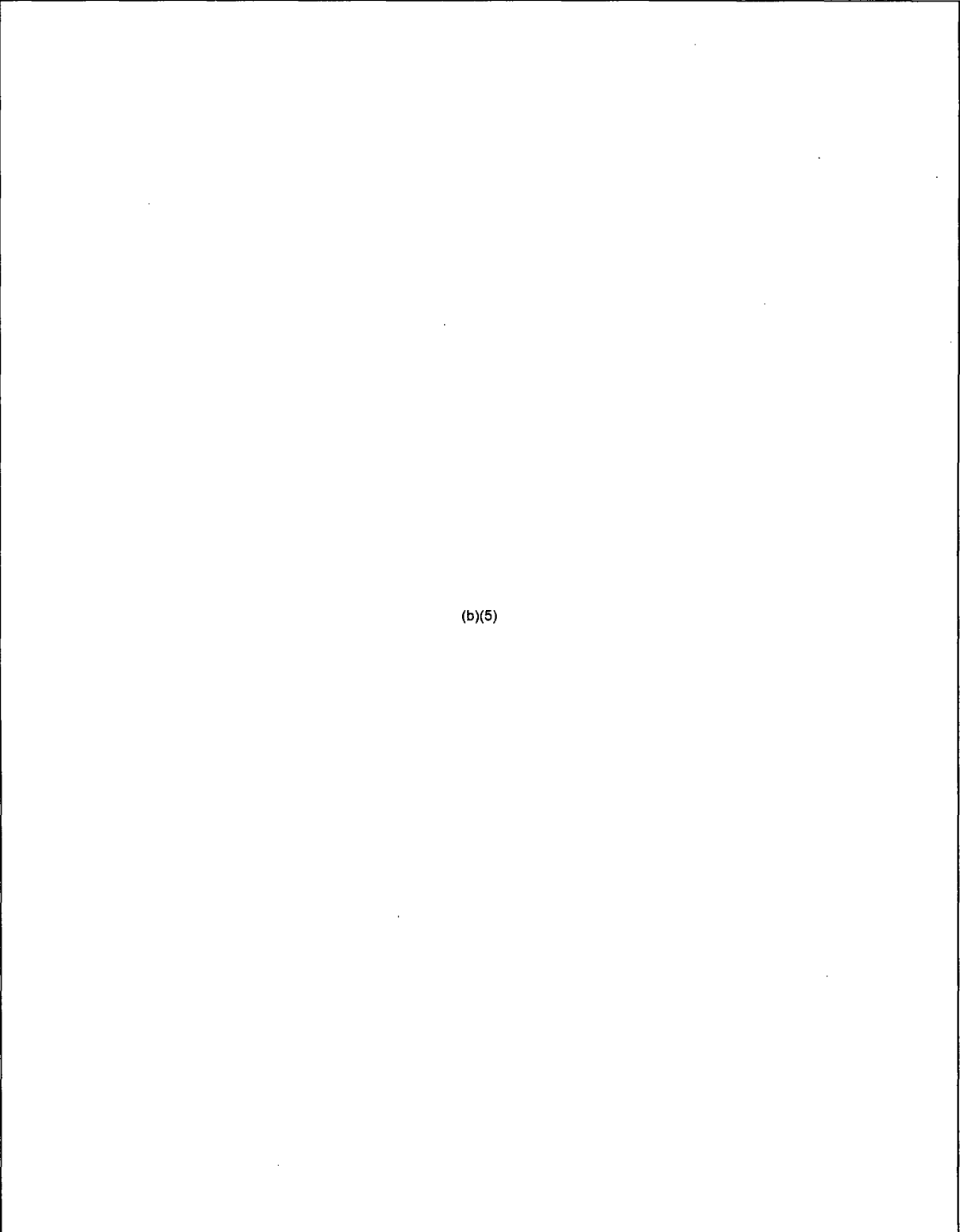




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