

ORIGINAL

91-109A-91

OFFICIAL TRANSCRIPT OF PROCEEDINGS

Agency: Nuclear Regulatory Commission
Incident Investigation Team

Title: Nine Mile Point Nuclear Power Plant
Interview of: MELVIN L. CRENSHAW

Docket No.

LOCATION: Scriba, New York

DATE: Thursday, August 22, 1991

PAGES: 1 - 14

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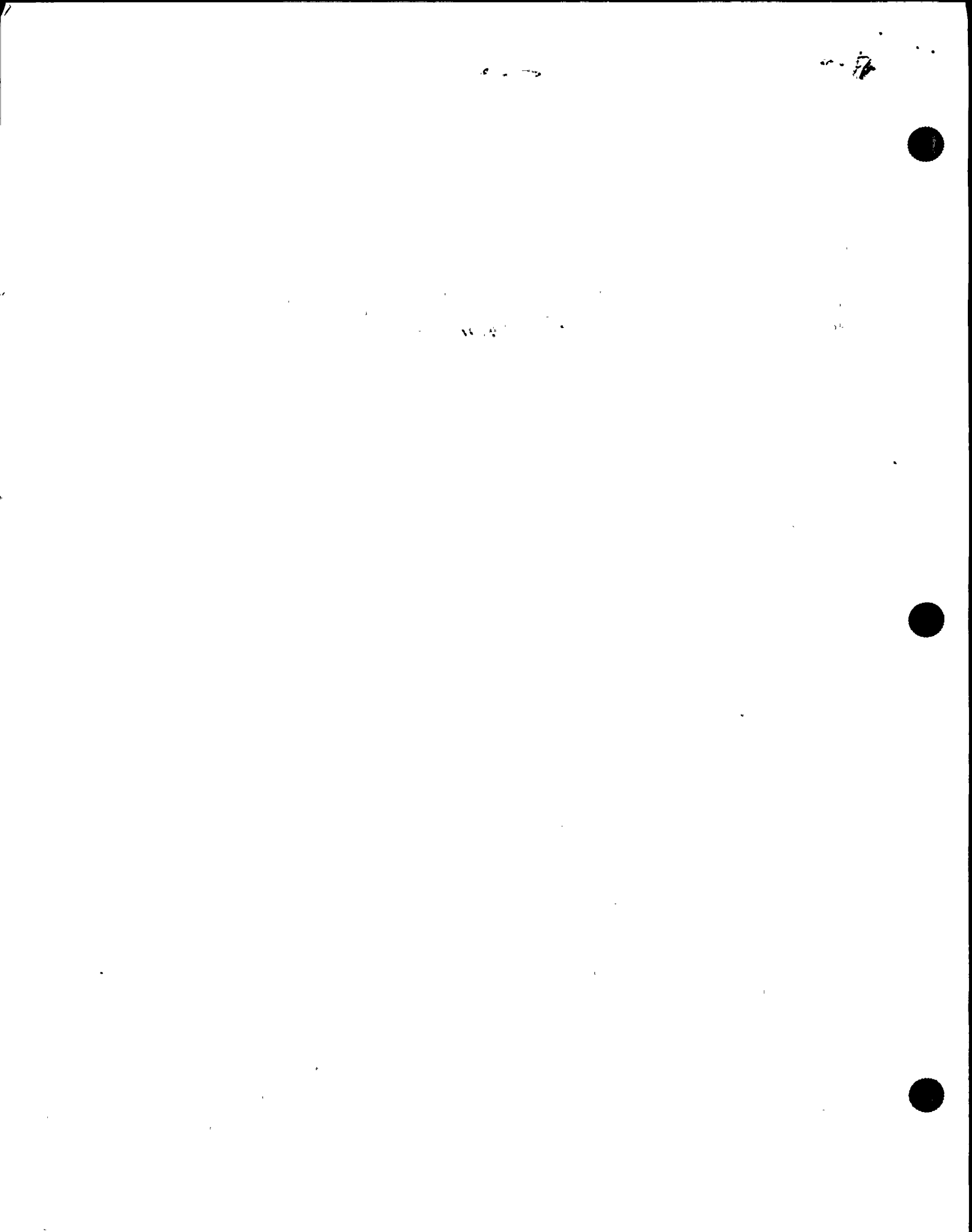
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Washington, D.C. 20006
(202) 293-3950.

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
INCIDENT INVESTIGATION TEAM

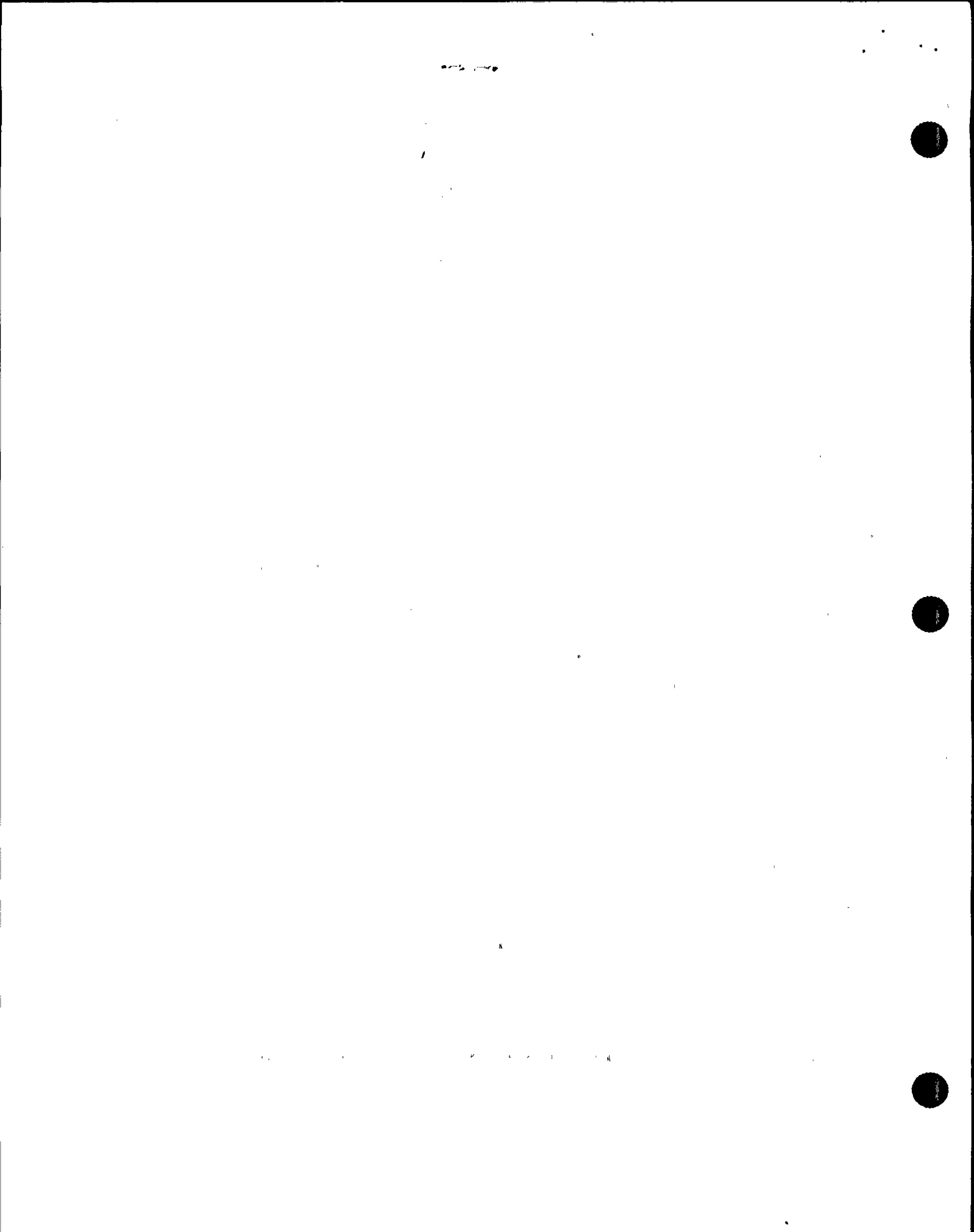
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Interview of :
MELVIN L. CRENSHAW :
(Closed) :

Conference Room A
Administration Building
Nine Mile Point Nuclear
Power Plant, Unit Two
Lake Road
Scriba, New York 13093
Thursday, August 22, 1991

The interview commenced, pursuant to notice,
at 8:22 a.m.

PRESENT FOR THE IIT:
Frank Ashe, NRC
Jose Ibarra, NRC
Jim Stoner, Duke Power Company, INPO



P R O C E E D I N G S

[8:22 a.m.]

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3 MR. IBARRA: This is Jose Ibarra of the NRC. With
4 me is Frank Ashe, also another team member. And we have Jim
5 Stoner from Duke Power acting as a consultant to INPO on
6 this investigation.

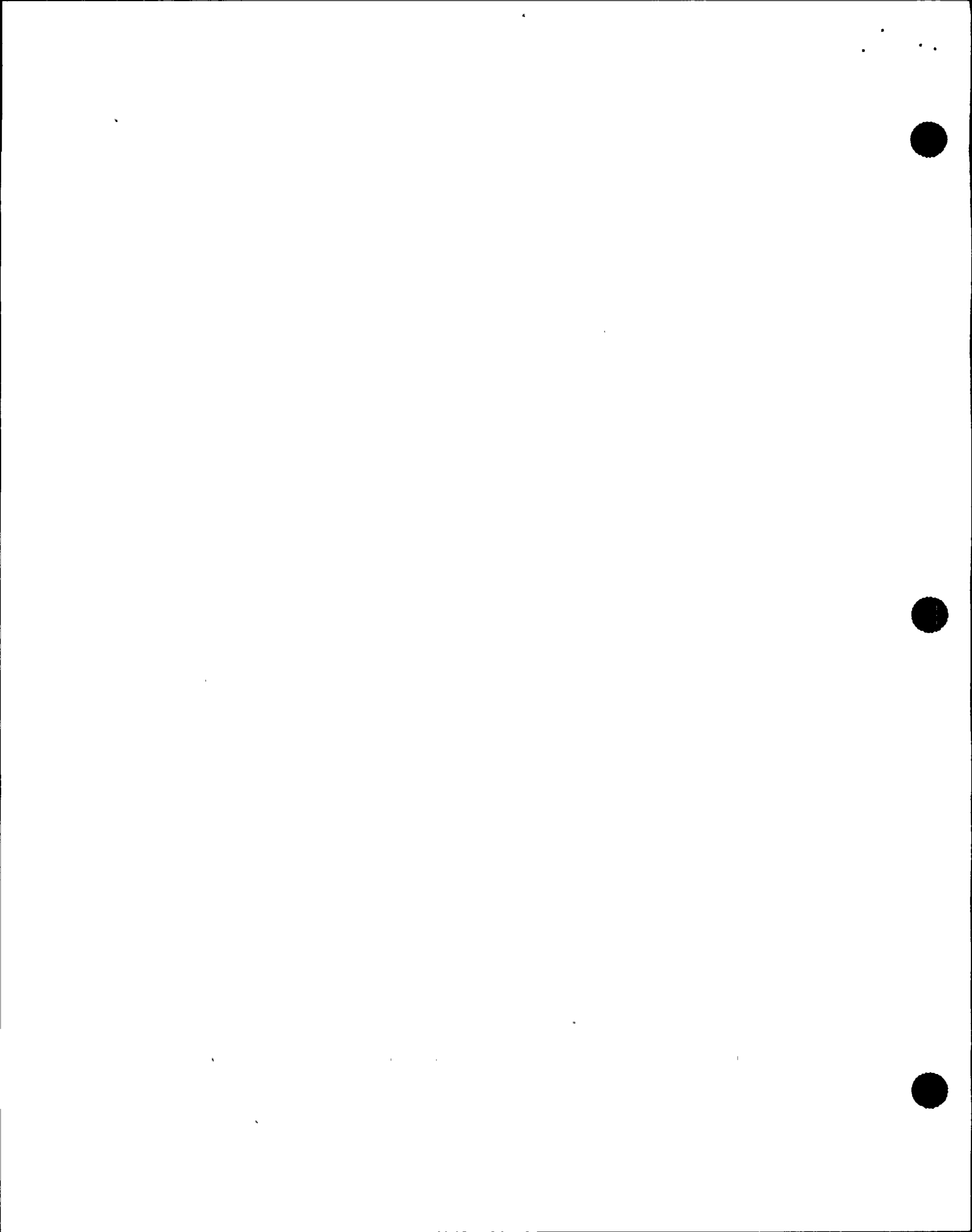
7 We are going to be interviewing Melvin Crenshaw,
8 a consultant to Niagara Mohawk. Would you please state your
9 name, company, experience and your connection with Niagara
10 Mohawk for this investigation?

11 MR. CRENSHAW: My name is Melvin L. Crenshaw. I
12 work for General Electric Industrial and Power Systems in
13 the Power Systems Engineering Department in Schenectady.

14 I am -- I serve as a consulting engineer both to
15 components within the General Electric Company; directly to
16 utilities such as Niagara Mohawk for studies and
17 investigation of incidents such as has occurred.

18 I was requested by Niagara Mohawk to review the
19 electrical distribution system at the Niagara Mohawk plant
20 and the event that had occurred with a view towards
21 determining if analytical studies could shed any further
22 light on the conditions existing on the plant distribution
23 buses which could have affected the UPS unit operations.

24 MR. IBARRA: From the information that you are
25 aware of today, can you determine if the disturbance



1 occurred on the low winding or the high winding of the
2 transformer phase B?

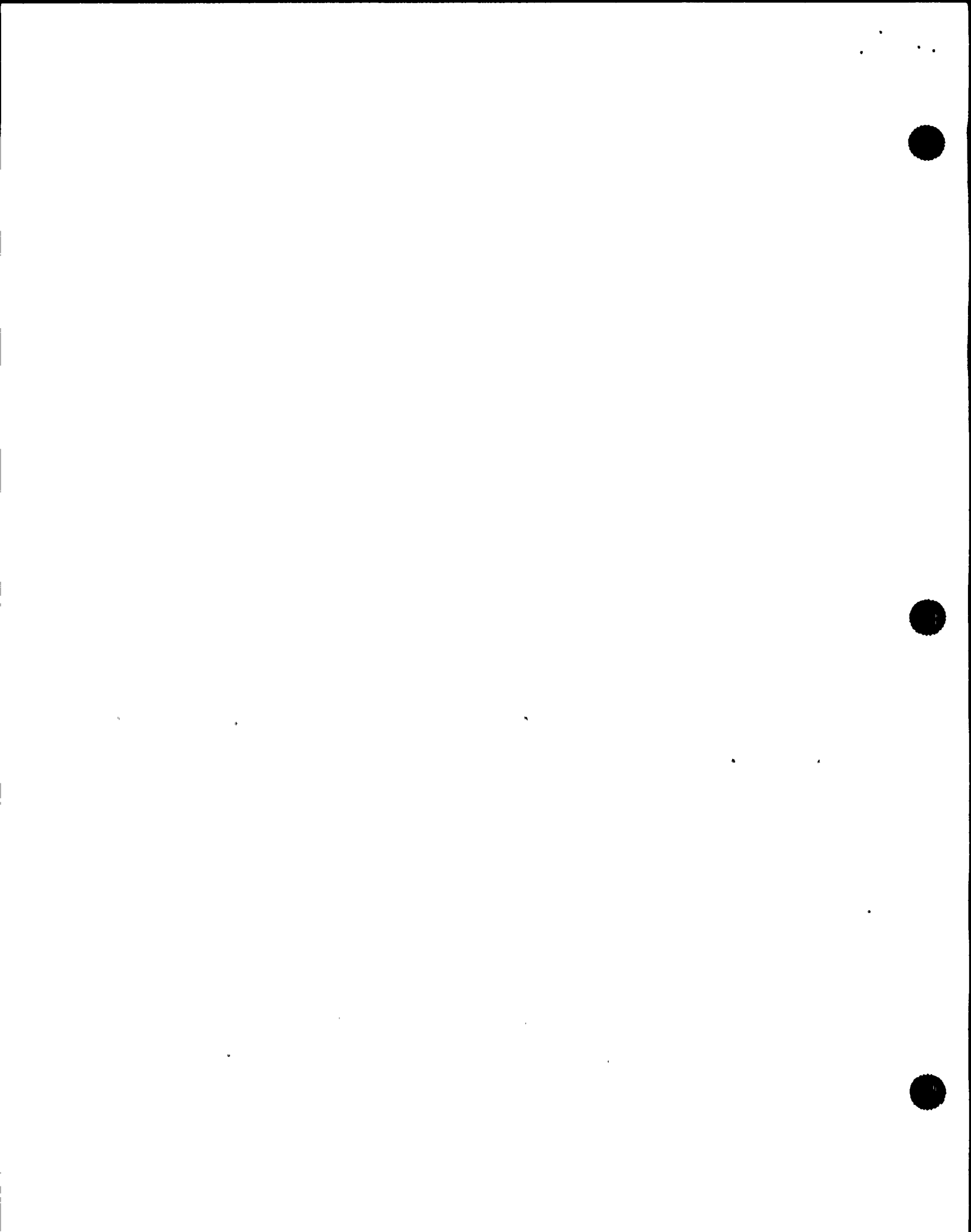
3 MR. CRENSHAW: The initial disturbance appears to
4 have begun with the high winding -- high voltage winding
5 going to ground in some manner. There is a lack of any
6 oscillographic records on the low voltage area or on other
7 plant buses that eliminate or prevent you from making any
8 conclusions, drawing any conclusions, about the involvement
9 of the low voltage winding.

10 MR. IBARRA: Previous to coming on Monday, did
11 the Niagara Mohawk believe that it was on the low winding
12 side due to the physical evidence that was seen once you
13 look into the transformer?

14 MR. CRENSHAW: Prior to my arrival at the site on
15 Monday at around noon time, I had no information at all
16 concerning the incident other than it had been a transformer
17 failure. I had had no discussion at all with anyone from
18 Niagara Mohawk.

19 MR. IBARRA: Have you reviewed the protection
20 schemes and from that the flags and whatever cues are
21 obtainable from that; what's your assessment, did the system
22 act properly? Did it protect itself?

23 MR. CRENSHAW: A review of the basic one-line
24 diagram showing the protective equipment and as it's
25 connected to the transformer and the generator indicates



1 that for the fault within the transformer all of the
2 protective relaying operated as it should have -- as
3 designed.

4 MR. STONER: Mr. Crenshaw, in your review of the
5 protection system, does the design of the protection system
6 seem to be appropriate for the distribution system that they
7 have at this plant?

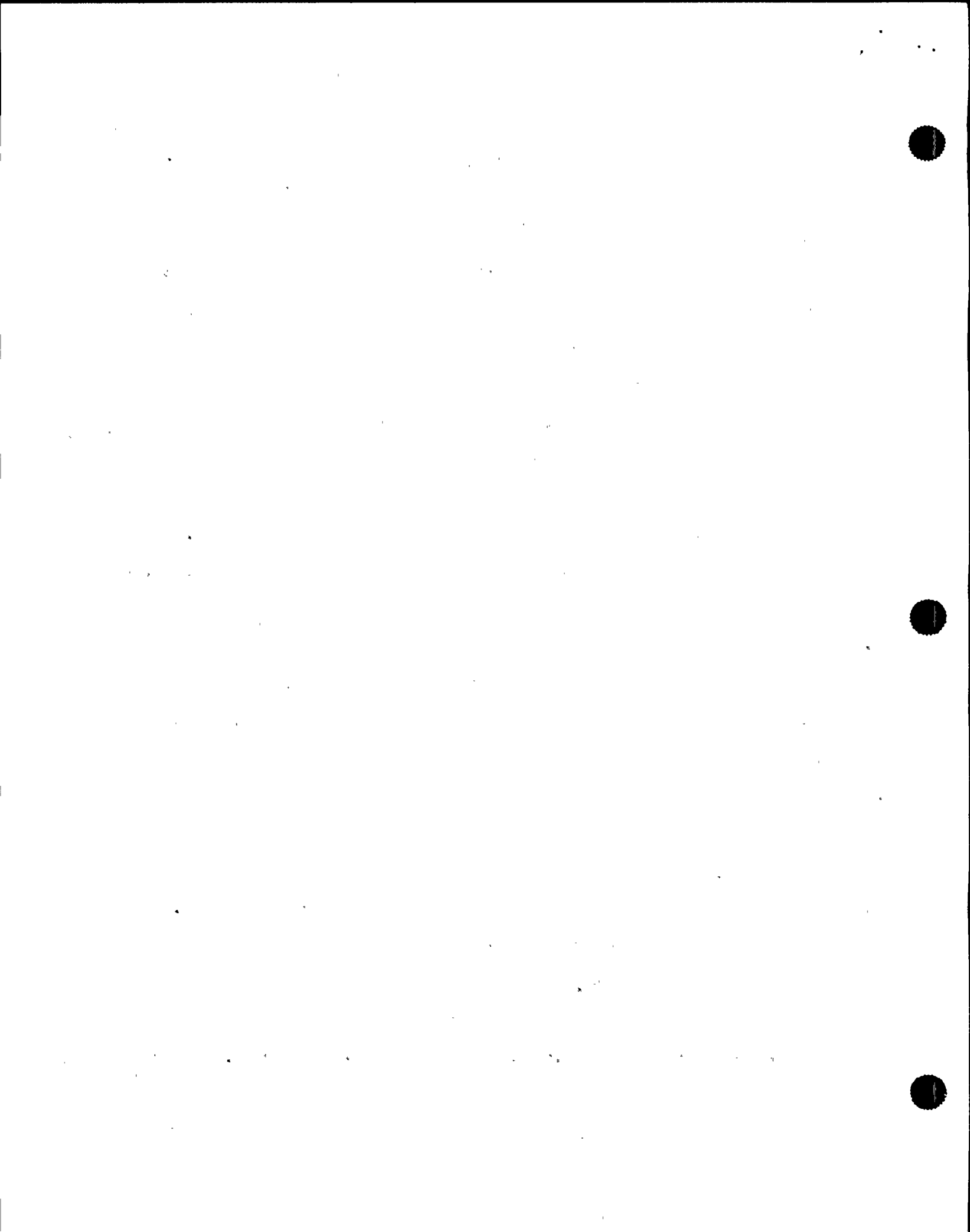
8 MR. CRENSHAW: Yes. It appears to be within the
9 guidelines established in IEEE standards.

10 MR. STONER: Did you assess the voltage-way forms
11 that were reflected on the UPS 600 volt sources during and
12 following the event and also on the 4160 volt safety buses?

13 MR. CRENSHAW: The only oscillographic records
14 that exist are for the 345 KV switchyard, lines that enter
15 and leave the plant and the 115 KV circuits. There are no
16 low voltage oscillographic records available from any of the
17 buses within the plant.

18 MR. STONER: From this information that is
19 available, could you approximate what voltage-way forms on
20 these lower voltages most likely would have looked like?

21 MR. CRENSHAW: I don't think it's possible. And
22 the reason I say that is impossible to know the exact nature
23 of the fault within the transformer. Little can be
24 determined from the oscillographs except the fact that the
25 fault involved the high voltage winding and ground in some



1 manner.

2 That fault could have been a flashover from the
3 high voltage winding to the low voltage and then to ground;
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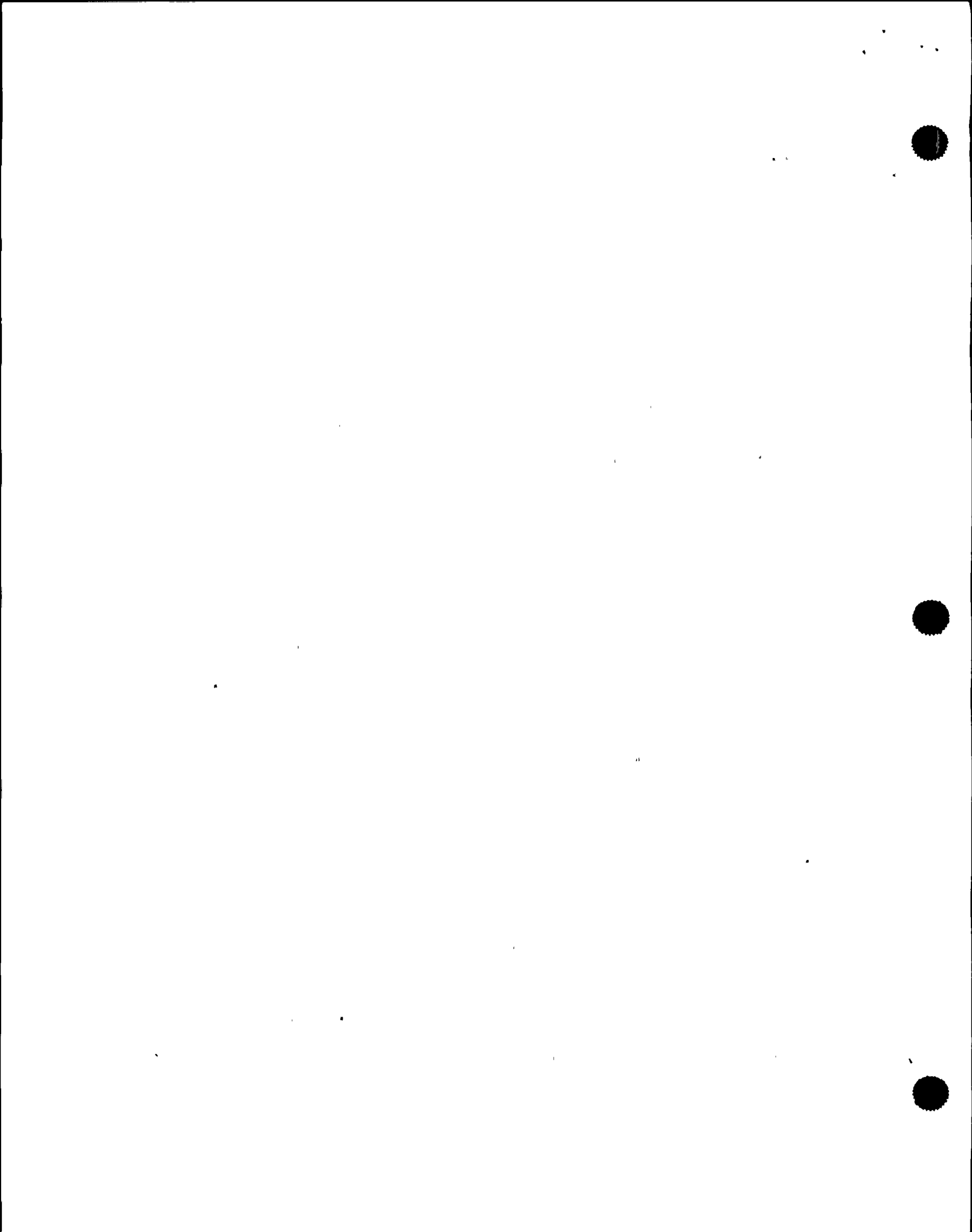
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9 perturbations to have been superimposed upon the voltage-way
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11 MR. CRENSHAW: A review of the oscillographic
12 records shows no unusual perturbations of the high voltage
13 buses. If, in fact, the flashover had gone from the high
14 voltage winding to the low voltage windings there could have
15 been elevation of voltages that were not recorded.

16 MR. STONER: Do you consider the failure of such a
17 transformer to be unusual or usual, expected or unexpected,
18 or how would you characterize your assessment of the failure
19 of such a transformer?

20 MR. CRENSHAW: In terms of the plant experience it
21 would certainly be an unusual or an unexpected event. In
22 terms of the broad spectrum of plants in service,
23 transformer failures are not rare.

24 MR. IBARRA: Have you had a chance to look at the
25 grounding -- the grounding scheme and what's your assessment



1 of it? Could that have caused additional problems for the
2 UPS?

3 MR. CRENSHAW: I have looked only at the grounding
4 scheme with regard to the one line diagram which yields no
5 details of how the grid might be connected and how the
6 grounds might be interconnected. My assessment, though,
7 from looking at the one line in normal practices would
8 suggest that there would be no ground current in the plant
9 associated with that fall since there is not evidence that
10 the generator neutral grounding equipment failed. That
11 grounding equipment would limit the ground fault currents
12 within the plant for a transformer failure to a magnitude
13 less than 10 amperes.

14 MR. ASHE: Frank Ashe, NRC. With regard to the A
15 and C phases, do you think there was significant distortion
16 at the time of the fault in the B phase occurred and the A
17 and C phases?

18 MR. CRENSHAW: From the 345 KV side and the 115 KV
19 records there is very minimal distortion of the waves.
20 There appears to be an abrupt reduction in the voltage
21 levels, but relatively little distortion of the waves. It
22 must be borne in mind that the recording equipment which is
23 reasonably -- which is a high caliber recording equipment
24 operates at a scan rate of just over 5 kilohertz.
25 Therefore, accurate display of wave forms above, perhaps, 500



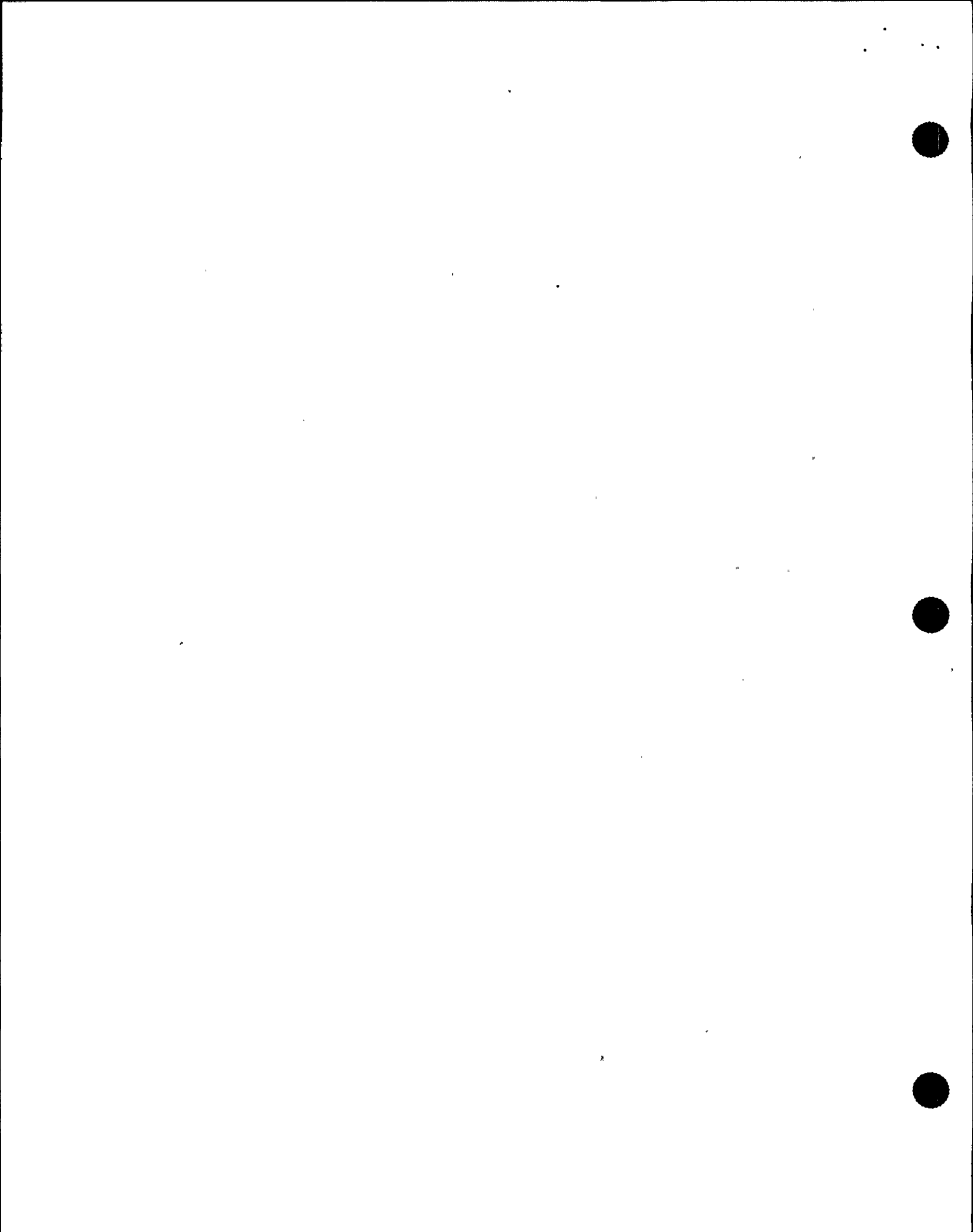
1 hertz would not be expected -- would not be obtained from
2 the recordings directly.

3 MR. ASHE: From your review would you say that the
4 disturbance as seen by the 4160 would be greater than or
5 less significant than that seen by the 13.8 KV side, this is
6 in the in-plant side, the safety-related?

7 MR. CRENSHAW: Since the disturbance was within
8 the transformer, the step-up transformer and did not depress
9 the 345 KV voltage lower than about 40 percent, 37 to 40
10 percent, it is apparent that the fault was further in the
11 transformer than at the high voltage terminal. This
12 somewhat precludes you from making any assessment of how
13 depressed a generator terminal voltage may have been. It
14 could have been lower than the 345 bus because the system
15 voltage and system contribution could possibly hold the 345
16 bus and the 115 KV bus at a higher voltage level than the
17 generator voltage which was at that time through the normal
18 unit auxillary transformer supplying the auxiliary buses.
19 They could have been depressed to a lower level.

20 MR. STONER: Do you believe that if a dynamic
21 analysis were performed on the electrical distribution
22 system to simulate this event -- do you believe that the
23 results would be meaningful? And why?

24 MR. CRENSHAW: I believe the results would be -- I
25 believe that any analysis would be especially difficult



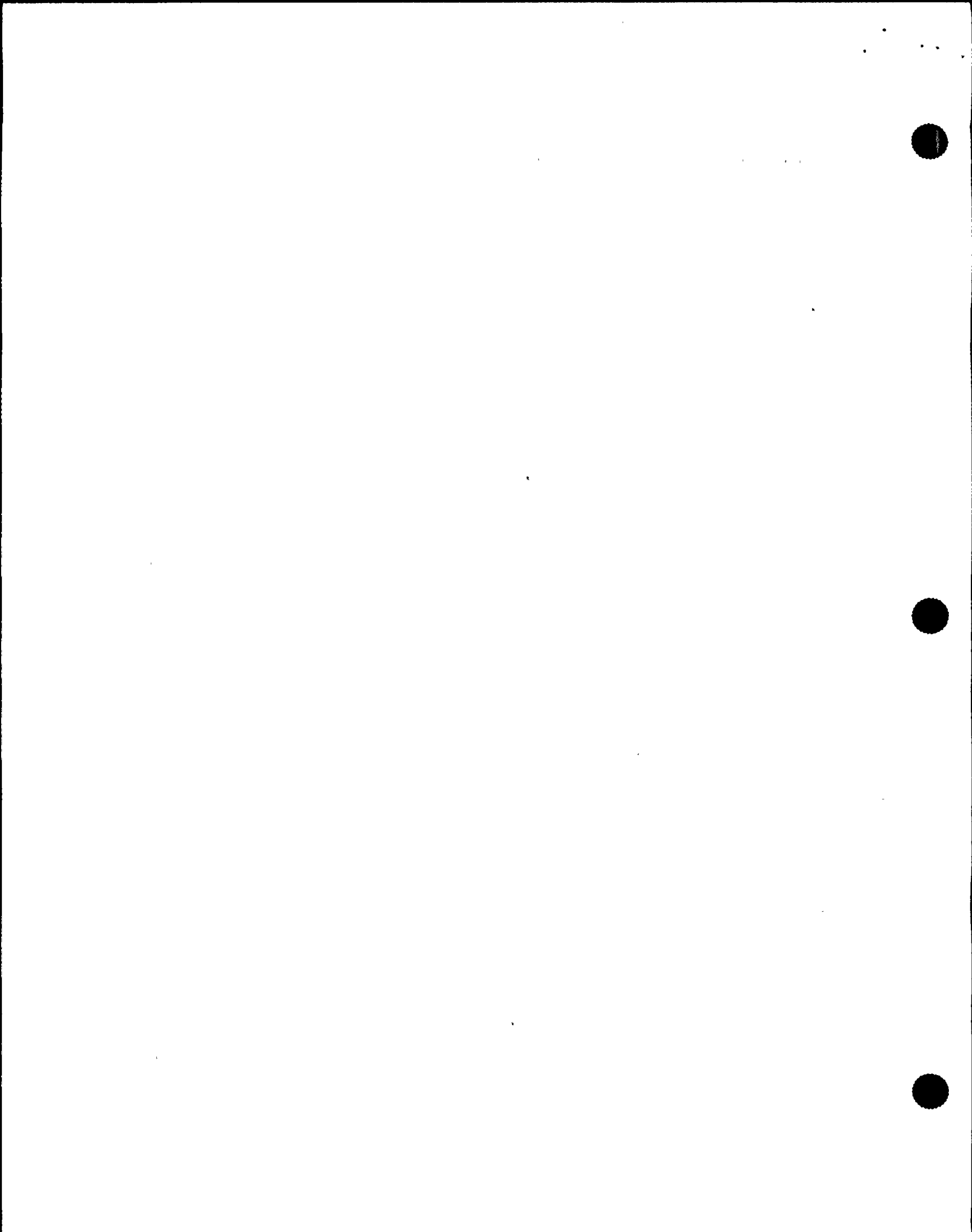
1 because of a lack of definitive knowledge of the failure
2 within the transformer. In the condition that it exists
3 now, after having sustained fault currents for a number of
4 seconds as the generator coasted down, there will be little
5 -- I believe, substantive evidence of the exact nature of
6 the fault during the 6-cycle period that the buses were
7 being supplied by the generator.

8 MR. ASHE: For a fault of this magnitude, do you
9 feel that there was sort of a precursor in the B-phase?

10 MR. CRENSHAW: There was no evidence from the
11 oscillographic record which shows about four to five cycles
12 of pre-fault information.

13 MR. ASHE: Is a fault of this magnitude -- you
14 mentioned earlier transformer failures were certainly not
15 uncommon, would you characterize this type of failure, your
16 observed physical damage on a transformer, is it worse than,
17 less than, for transformers of this category?

18 MR. CRENSHAW: I have not viewed this transformer
19 intimately. I have seen photographs of it and it has been
20 described to me that the damage was, in fact, spectacular.
21 It is not at all unusual to find very severe transformer
22 damage in a case like this. The fault energy that occurs
23 very early in a fault event of this type the pressure waves
24 in the oil that occur very early, almost at the beginning of
25 the fault, can be very destructive in the sense of rupturing



1 tanks and other things of that sort.

2 The subsequent electrical damage to the windings
3 is, of course, somewhat the result of the relatively long
4 decay time as a generator continues to feed a fault in the
5 permanently connected, solidly connected transformer.

6 MR. ASHE: Do you have any type of preliminary
7 assessment as to what you feel may have caused this?

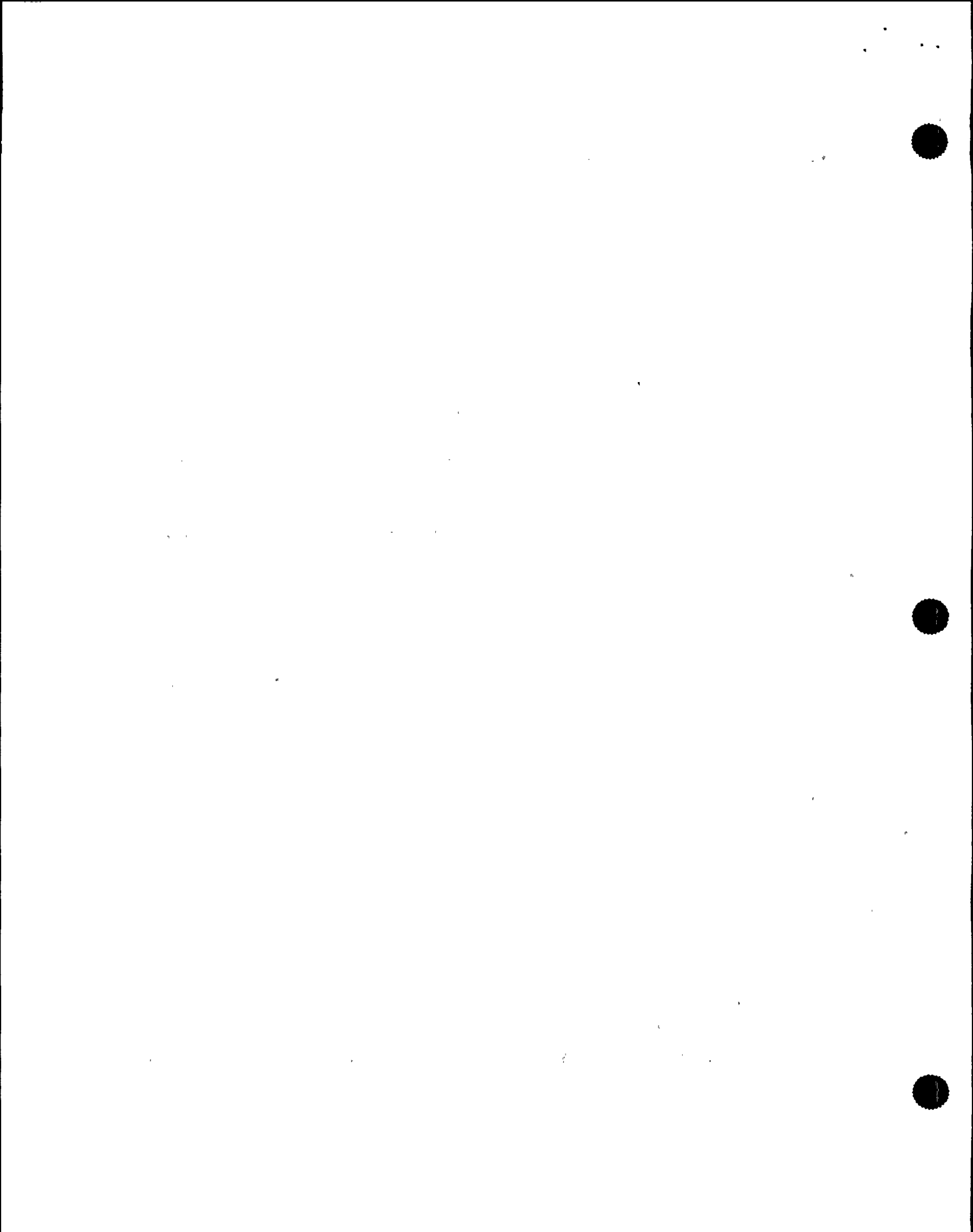
8 MR. CRENSHAW: That is an area beyond my field of
9 expertise, the assessment of how a fault could and would
10 evolve within a transformer.

11 MR. ASHE: Would a transformer fault of this
12 nature necessarily end in any type of damage to running
13 equipment or the actual distribution system that it was
14 powering at the time the fault occurred?

15 MR. CRENSHAW: I would say that it's not unusual
16 for a transformer failure to result in failure of connected
17 and associated equipment, in the sense that energy from high
18 voltage windings due to an internal failure can be coupled
19 to the low voltage circuitry by flashovers internally, so it
20 is not unusual to have more equipment damaged than only the
21 transformer.

22 MR. STONER: Have you drawn any conclusion on the
23 cause of the UPS unit failure and if so, what are they?

24 MR. CRENSHAW: I haven't been asked to
25 specifically look at the UPS and its electronics. I have



1 been involved in discussions with the plant engineers and
2 looked over their tests that they have run and things they
3 have found out about the UPS.

4 I have not looked at the UPS directly.

5 MR. ASHE: If there are two significant things,
6 based on your observations and your scope, your work scope,
7 what are the most two significant things that have occurred
8 in this event?

9 MR. CRENSHAW: I was requested to review the event
10 and the power circuitry with a view towards seeing if
11 analytical studies could perhaps shed light on the 600 volt
12 circuits, the lower voltage circuits in the power plant.

13 My assessment is that it is not possible to do a
14 definitive study that would shed any light on that, given
15 the lack of any records of the generator voltage or of the
16 lower voltage circuits in the high tension yard.

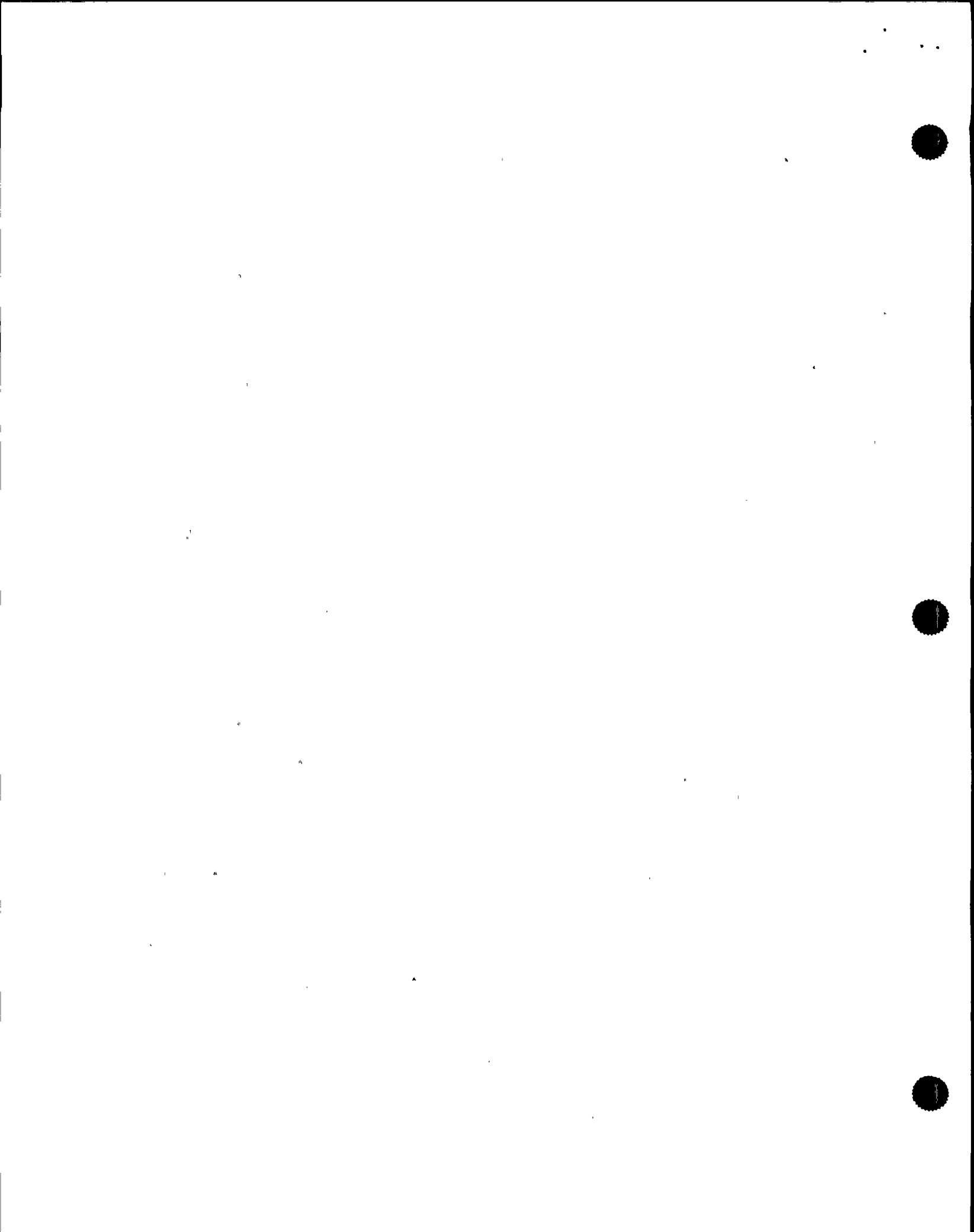
17 MR. ASHE: Is there a second one, a second
18 significant --

19 MR. CRENSHAW: No.

20 MR. STONER: I believe that you said earlier that
21 a ground fault on the low voltage winding would not have
22 been detected with the protection system that is installed.

23 Could you expand on that?

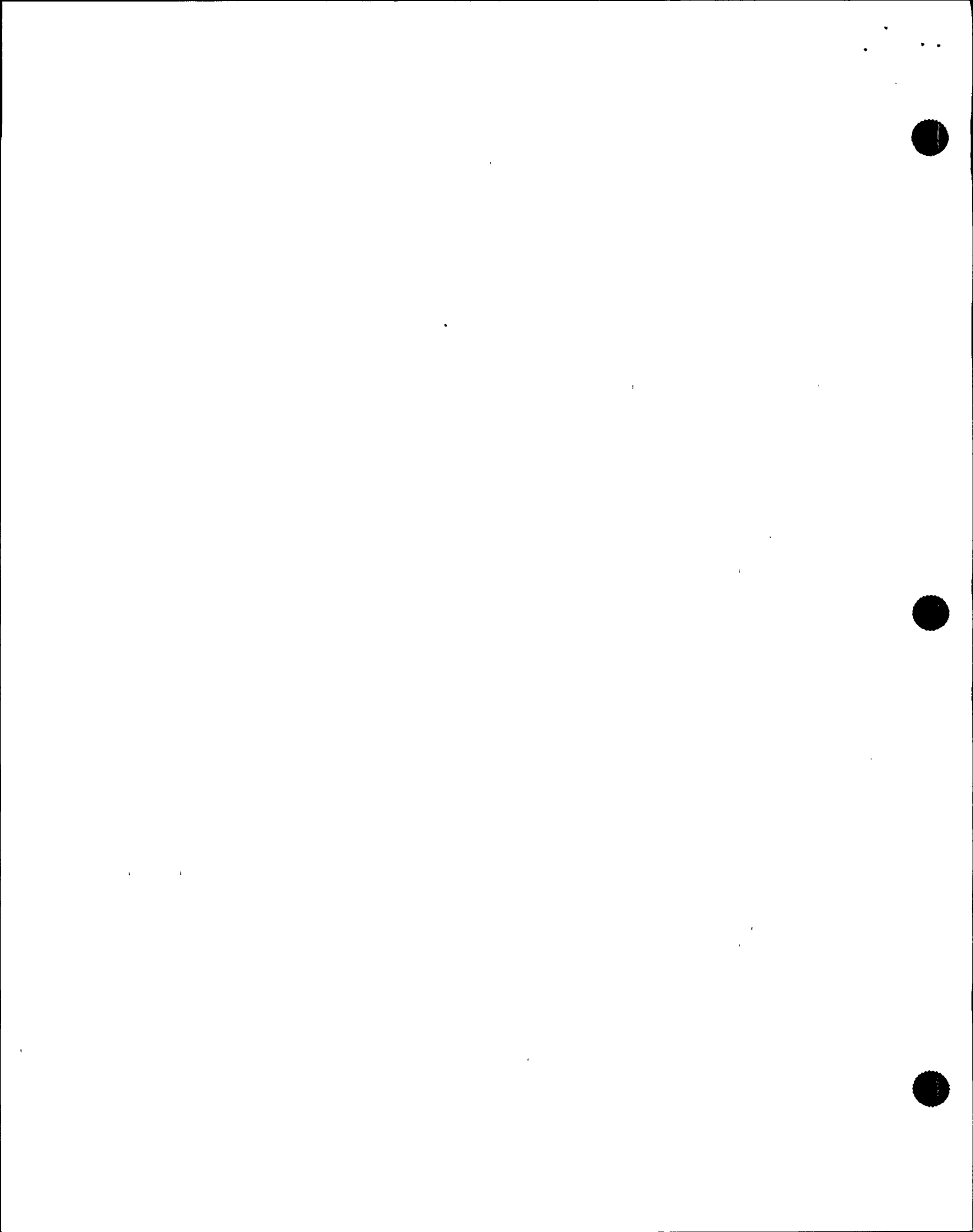
24 MR. CRENSHAW: The protective system follows the
25 IEEE standard recommended for generator protective relaying,



1 which suggests that in order to protect generator-ground
2 relaying from damage, since it is a very sensitive relay and
3 during a severe fault can be subjected to a number of -- a
4 multiple of its continuous duty rating, the generator ground
5 protective relaying was removed from service by the
6 generator lockup relay. That means that once -- and the
7 generator ground relay is not an instantaneous acting
8 device so that once the overall, the unit differential and
9 overall differential relays had detected the fault virtually
10 within a few cycles of its initiation, the ground relaying
11 was disconnected as the system had been designed and it was
12 no longer monitoring the generator ground.

13 MR. ASHE: In your assessment of the grounding
14 system, could the ground potential have increased during
15 this -- during or subsequent to this faulting condition?

16 MR. CRENSHAW: It appears very unlikely, since the
17 ground current in the transformer, around 6800 to 6900
18 amperes, was being supplied essentially by the power system
19 and the generator contribution to ground current as long as
20 the grounding equipment is intact, which it has not to my
21 knowledge been verified as of yet, but with that grounding
22 equipment intact the generator contributes only 15 amperes
23 of ground current into the grid or into the connection
24 within the plant, so I would see no reason to expect the
25 plant grounding system to be elevated.



1 MR. STONER: Do you anticipate that any RF signals
2 which may have been generated during this event would have
3 been propagated or attenuated within the plant?

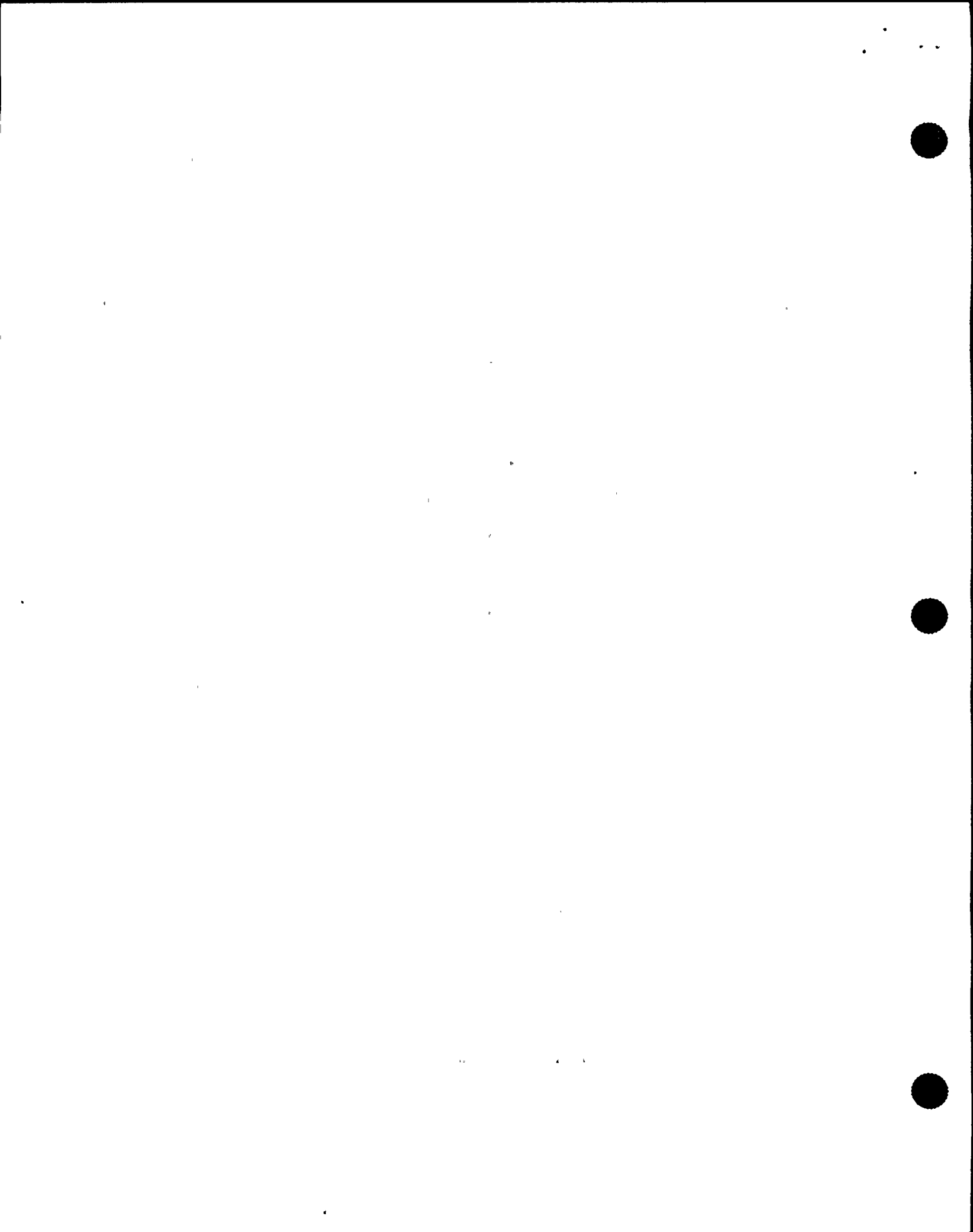
4 MR. CRENSHAW: Our experience in RF propagation
5 through transformers is somewhat limited to the testing that
6 is done on transformers to verify the integrity of the
7 windings.

8 For example, during an induced test where a
9 relatively high frequency, high voltage is applied to a
10 transformer and corona measurements are made, if corona is
11 detected, testing is frequently done to determine if in fact
12 the observed evidence of corona is a true one within the
13 transformer or is coming from the testing device that
14 energizes the transformer.

15 To verify this, tests are made in accordance with
16 IEEE standards to measure the attenuation or the transfer if
17 you will from the high side to the low side of the
18 transformer.

19 Our experience in measuring power transformer
20 attenuation shows that the one megahertz signal which is
21 the standard used by IEEE, the one megahertz signals the
22 attenuation is frequently in the ballpark of at least 1000
23 to 1, perhaps tens of thousands to 1, depending on the
24 transformer design.

25 The attenuation of one megahertz signals occurring



1 on one side of a transformer and transferred through it
2 depends a lot on the transformer design.

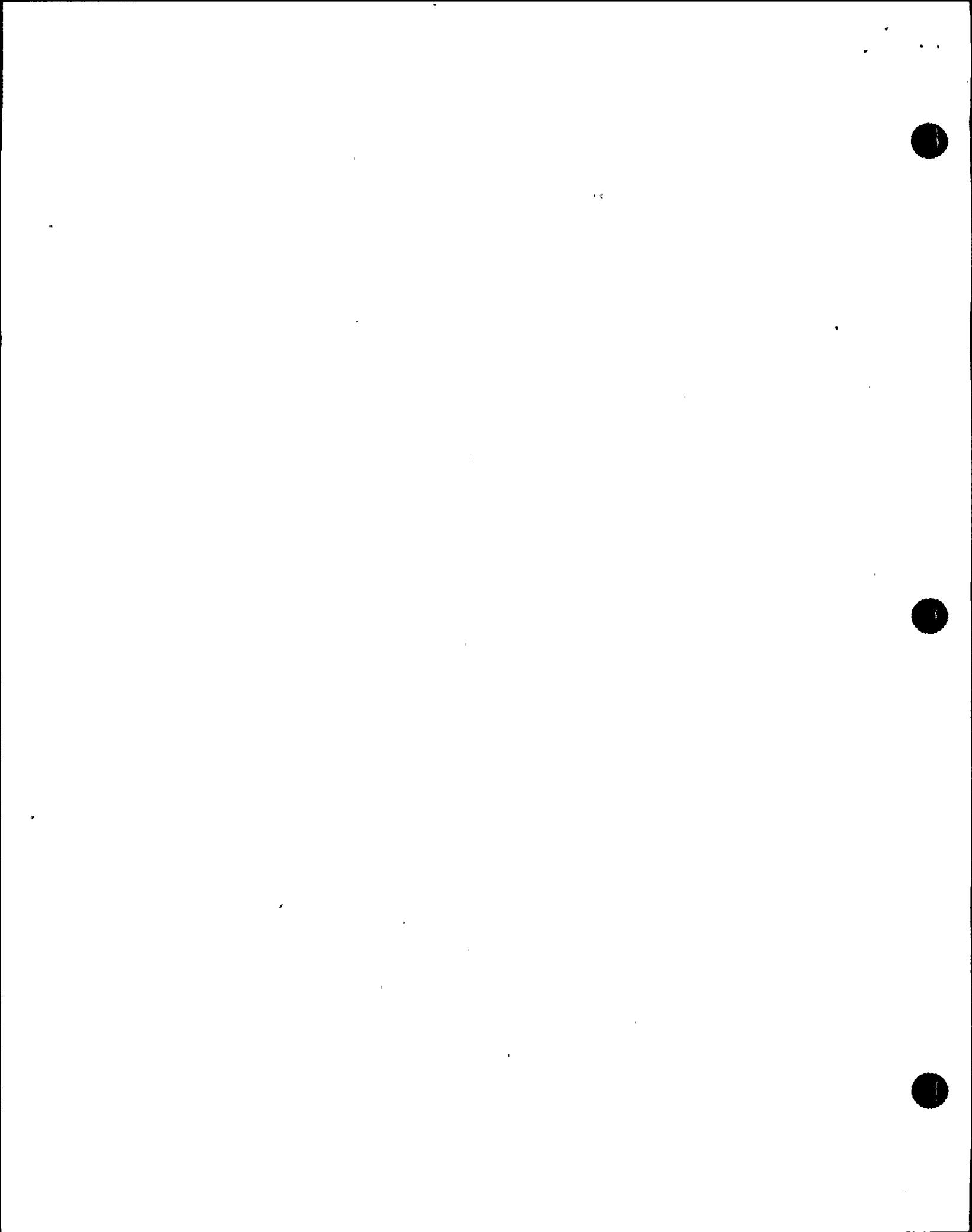
3 MR. ASHE: Based on your review of the
4 transformer and the in-house electrical distribution system,
5 do you feel that maintenance played, or the lack of
6 maintenance played, any type of role in the occurrence of
7 this event?

8 MR. CRENSHAW: I don't have a detailed knowledge
9 of the maintenance that would have been performed on the
10 transformer that failed. I have not seen any of the
11 maintenance records, and I am not really qualified to
12 comment on that.

13 MR. ASHE: Based on this event, in-plant
14 monitoring of the distribution system, would that yield
15 helpful information for other reasons, other than event
16 analysis?

17 MR. CRENSHAW: Certainly recordings of
18 disturbances and the voltages in various circuits can yield
19 information concerning the status of equipment connected to
20 those circuits. In addition to simply acting as an event
21 record of what happened, it can also tell you, perhaps, the
22 status of the connected equipment. It could prove useful,
23 yes.

24 MR. STONER: Are there any other things which you
25 looked at or considerations which you have made or



1 conclusions which you have drawn that we have not asked that
2 you feel are pertinent as the result of this event?

3 MR. CRENSHAW: Not to the best of my knowledge.

4 MR. ASHE: Is there anything else that you'd like
5 to say, for whatever reason?

6 MR. CRENSHAW: Nothing that I can really add,
7 beyond what I have said.

8 MR. ASHE: Okay. That's it.

9 [Whereupon, at 8:46 a.m., the taking of the
10 interview was concluded.]

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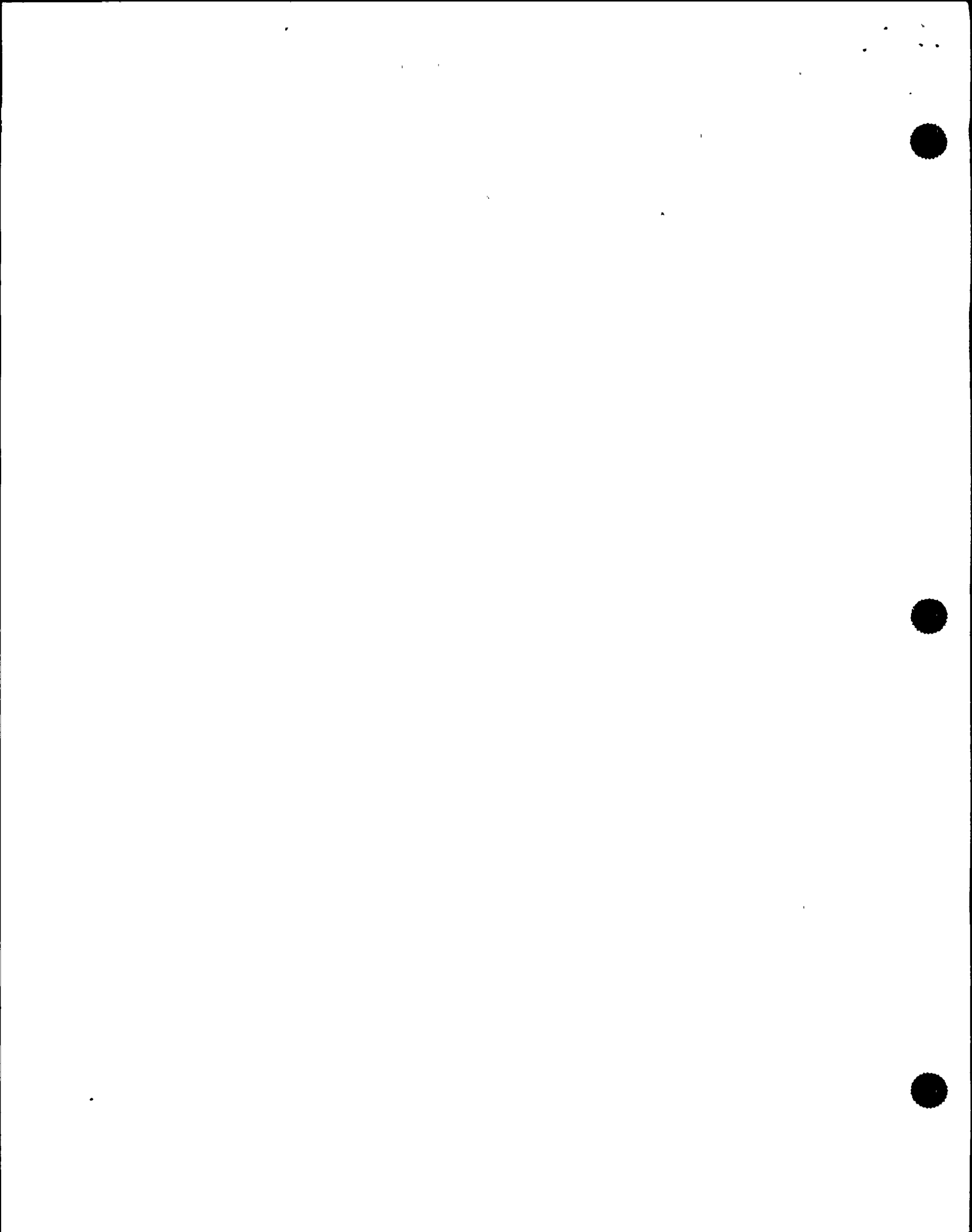
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REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission

in the matter of:

NAME OF PROCEEDING: Int. of MELVIN L. CRENSHAW

DOCKET NUMBER:

PLACE OF PROCEEDING: Scriba, N.Y.

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.



IAN ROTHROCK

Official Reporter
Ann Riley & Associates, Ltd.

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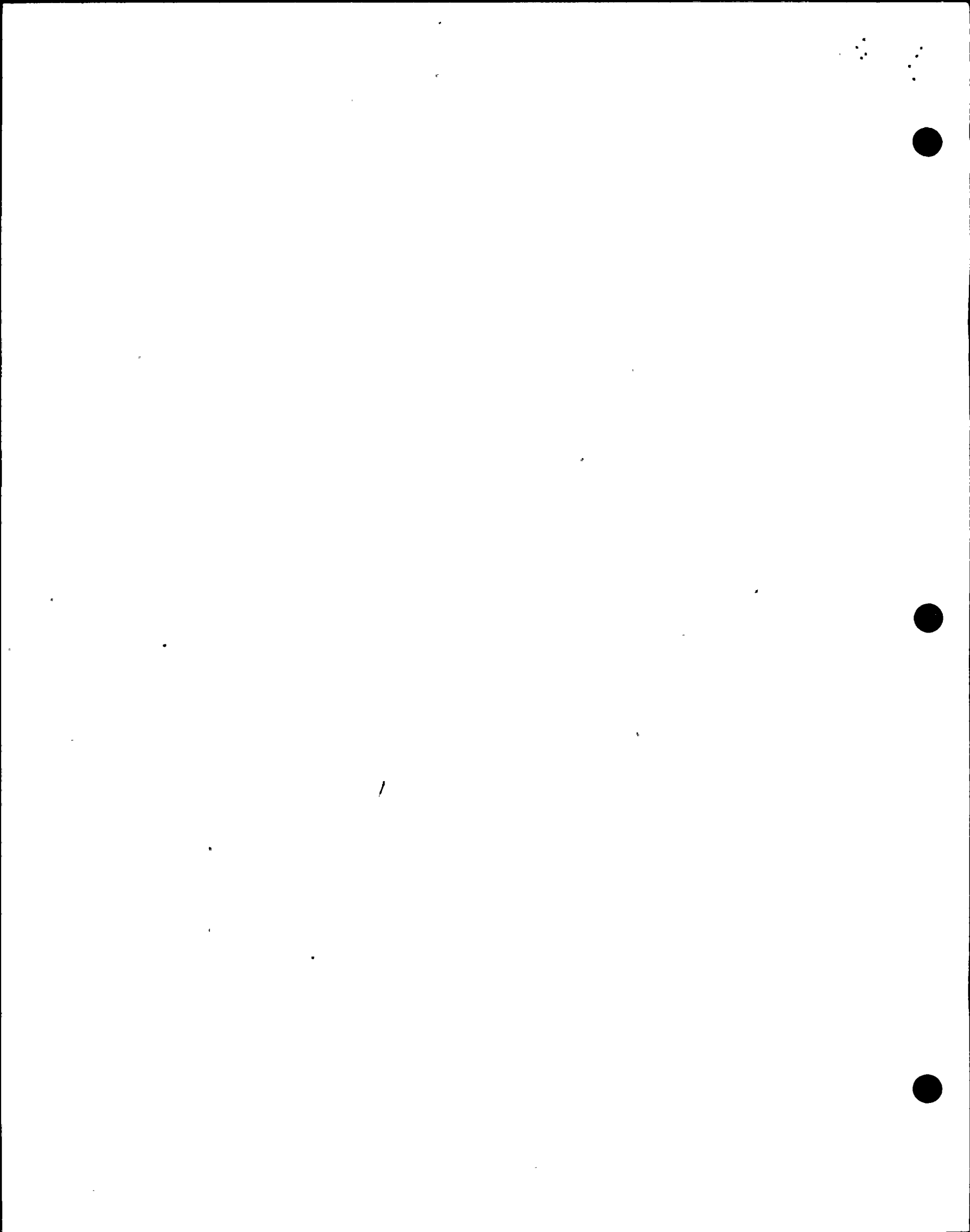
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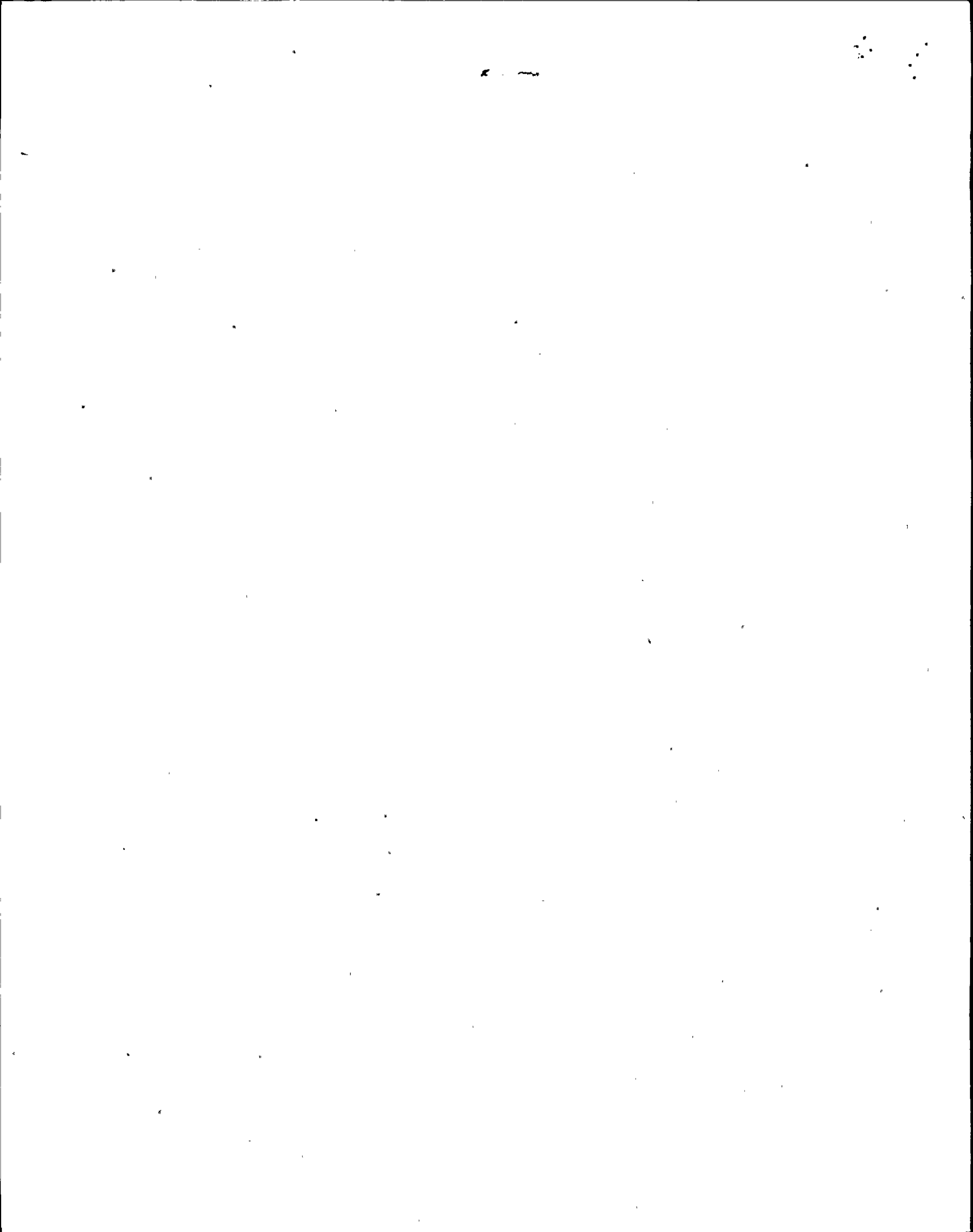
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ADDENDUM TO INTERVIEW OF Melvin L. Crenshaw
(Name/Position)

<u>Page</u>	<u>Line</u>	<u>Correction and Reason for Correction</u>
4	10	Change "voltage-way" to "voltage-wave"
4	19	Change "voltage-way" to "voltage-wave"
5	7	Change "MR. CRENSHAW" to "MR. STONER"
6	9	Change "FALL" to "FAULT"
8	13	Change "IS" to "IN"

Page 1 of 1 Signature [Signature] Date 8/25/91



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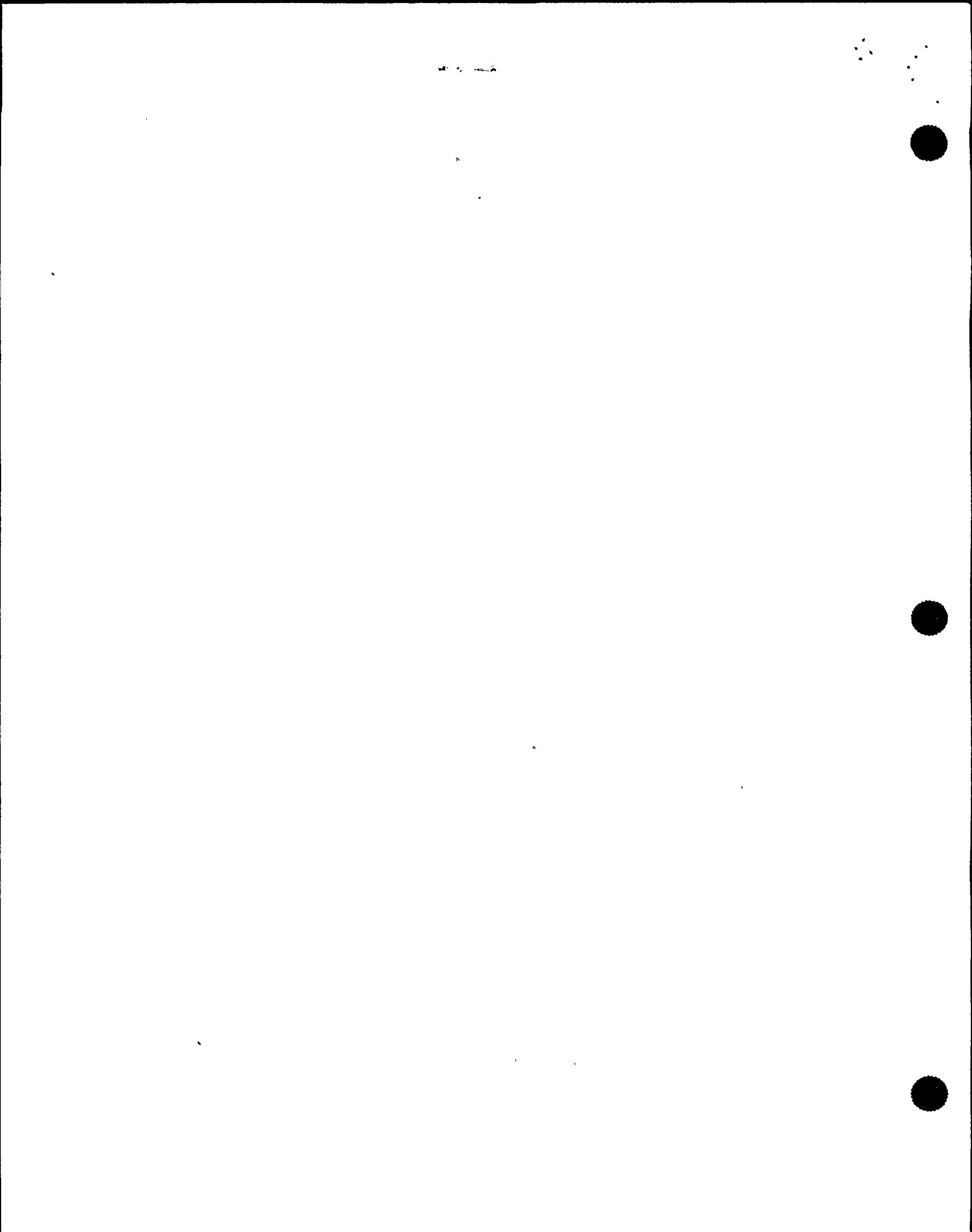
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7 We are going to be interviewing Melvin Crenshaw,
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14 I am -- I serve as a consulting engineer both to
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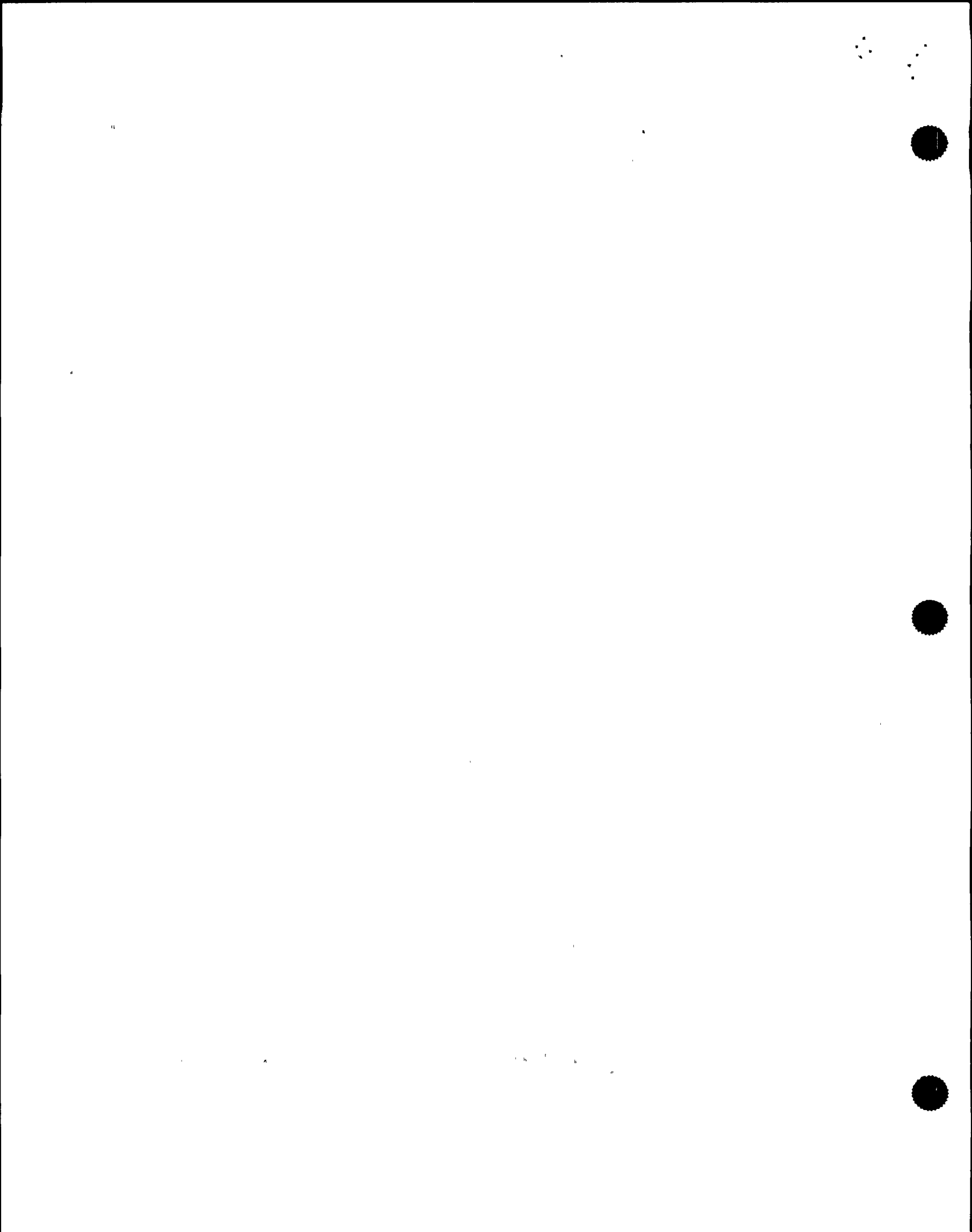
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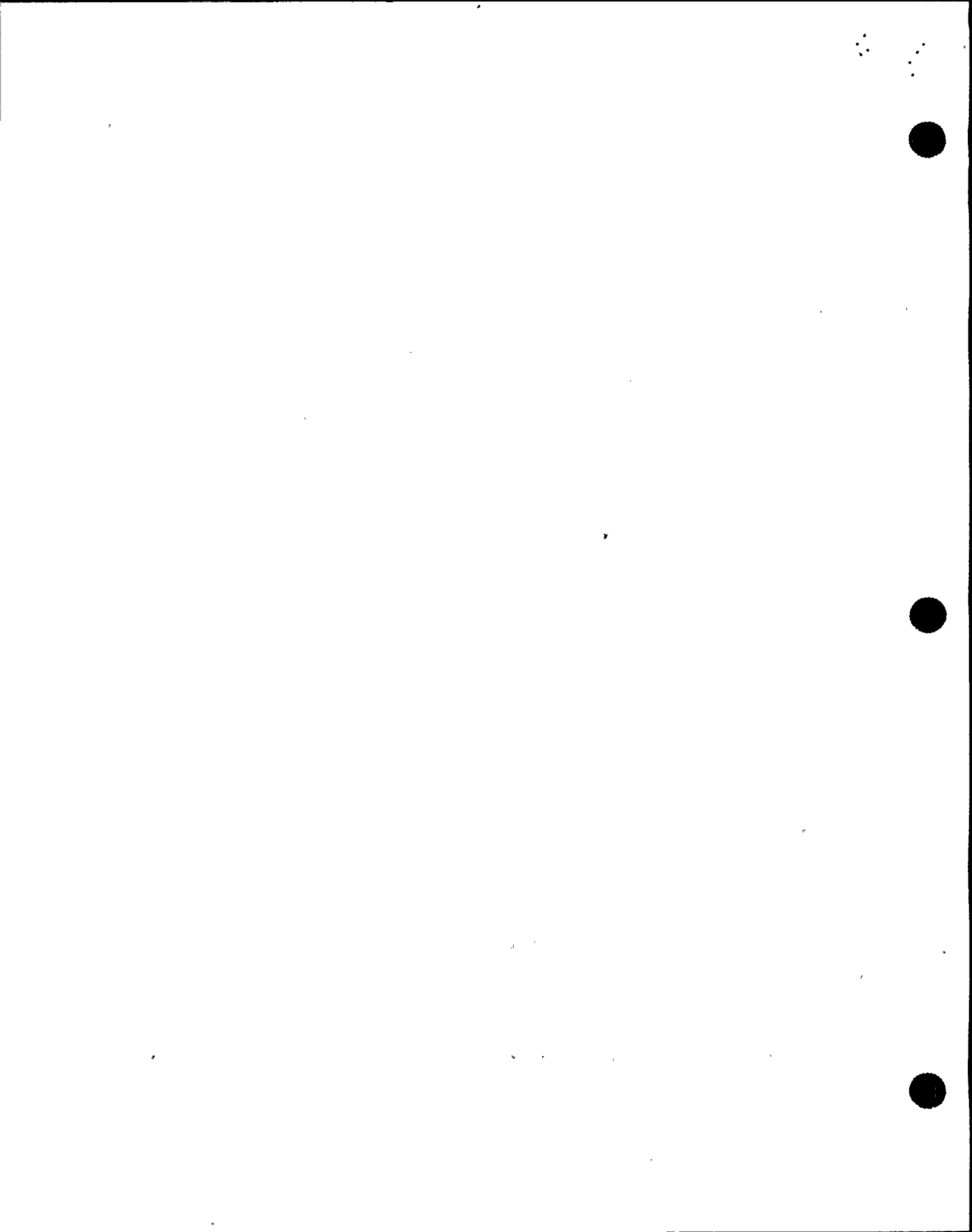
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16 MR. STONER: Do you consider the failure of such a
17 transformer to be unusual or usual, expected or unexpected,
18 or how would you characterize your assessment of the failure
19 of such a transformer?

20 MR. CRENSHAW: In terms of the plant experience it
21 would certainly be an unusual or an unexpected event. In
22 terms of the broad spectrum of plants in service,
23 transformer failures are not rare.

24 MR. IBARRA: Have you had a chance to look at the
25 grounding -- the grounding scheme and what's your assessment

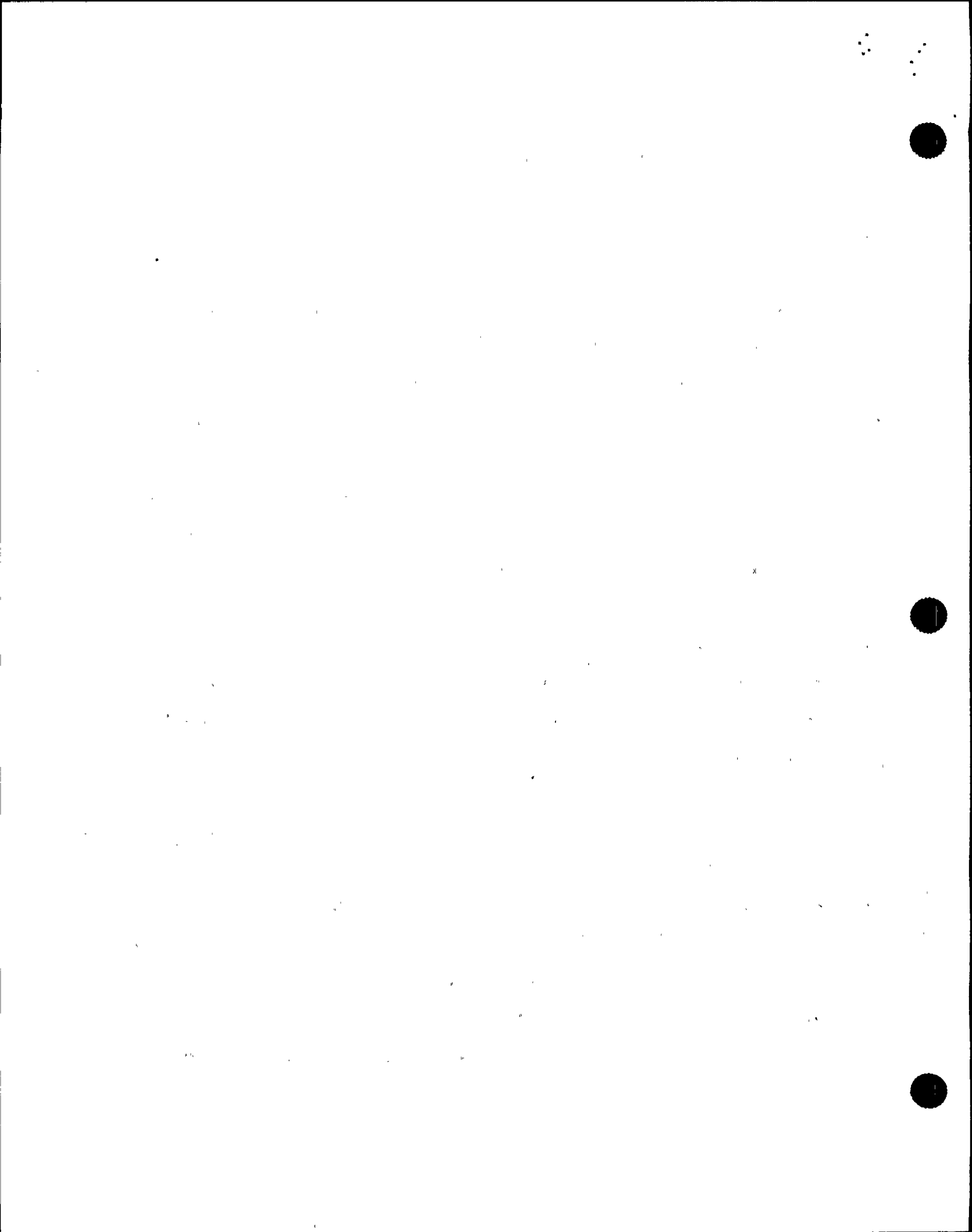


1 of it? Could that have caused additional problems for the
2 UPS?

3 MR. CRENSHAW: I have looked only at the grounding
4 scheme with regard to the one line diagram which yields no
5 details of how the grid might be connected and how the
6 grounds might be interconnected. My assessment, though,
7 from looking at the one line in normal practices would
8 suggest that there would be no ground current in the plant
9 associated with that fall since there is not evidence that
10 the generator neutral grounding equipment failed. That
11 grounding equipment would limit the ground fault currents
12 within the plant for a transformer failure to a magnitude
13 less than 10 amperes.

14 MR. ASHE: Frank Ashe, NRC. With regard to the A
15 and C phases, do you think there was significant distortion
16 at the time of the fault in the B phase occurred and the A
17 and C phases?

18 MR. CRENSHAW: From the 345 KV side and the 115 KV
19 records there is very minimal distortion of the waves.
20 There appears to be an abrupt reduction in the voltage
21 levels, but relatively little distortion of the waves. It
22 must be borne in mind that the recording equipment which is
23 reasonably -- which is a high caliber recording equipment
24 operates at a scan rate of just over 5 kilohertz.
25 Therefore, accurate display of wave forms above, perhaps, 500



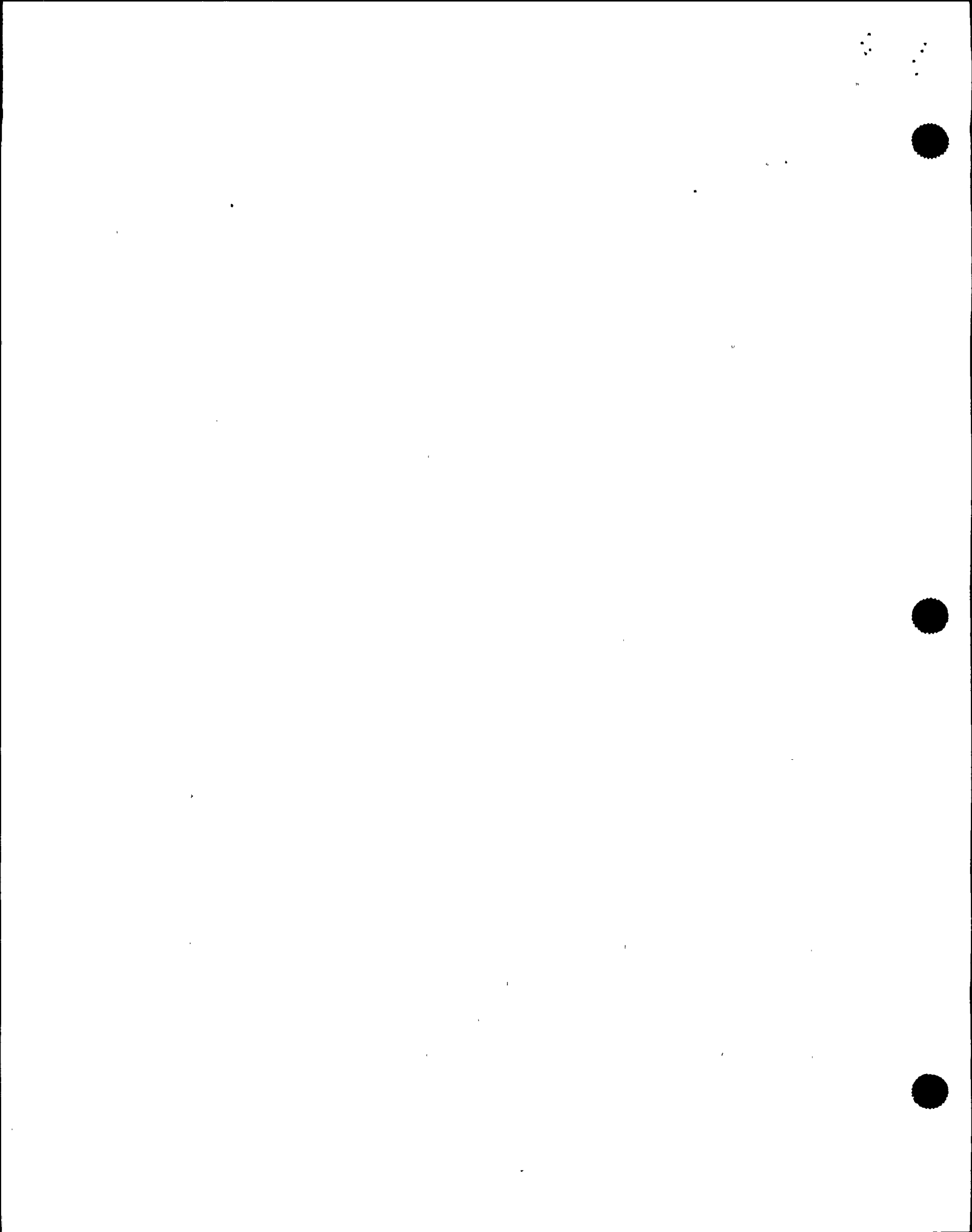
1 hertz would not be expected -- would not be obtained from
2 the recordings directly.

3 MR. ASHE: From your review would you say that the
4 disturbance as seen by the 4160 would be greater than or
5 less significant than that seen by the 13.8 KV side, this is
6 in the in-plant side, the safety-related?

7 MR. CRENSHAW: Since the disturbance was within
8 the transformer, the step-up transformer and did not depress
9 the 345 KV voltage lower than about 40 percent, 37 to 40
10 percent, it is apparent that the fault was further in the
11 transformer than at the high voltage terminal. This
12 somewhat precludes you from making any assessment of how
13 depressed a generator terminal voltage may have been. It
14 could have been lower than the 345 bus because the system
15 voltage and system contribution could possibly hold the 345
16 bus and the 115 KV bus at a higher voltage level than the
17 generator voltage which was at that time through the normal
18 unit auxillary transformer supplying the auxiliary buses.
19 They could have been depressed to a lower level.

20 MR. STONER: Do you believe that if a dynamic
21 analysis were performed on the electrical distribution
22 system to simulate this event -- do you believe that the
23 results would be meaningful? And why?

24 MR. CRENSHAW: I believe the results would be -- I
25 believe that any analysis would be especially difficult



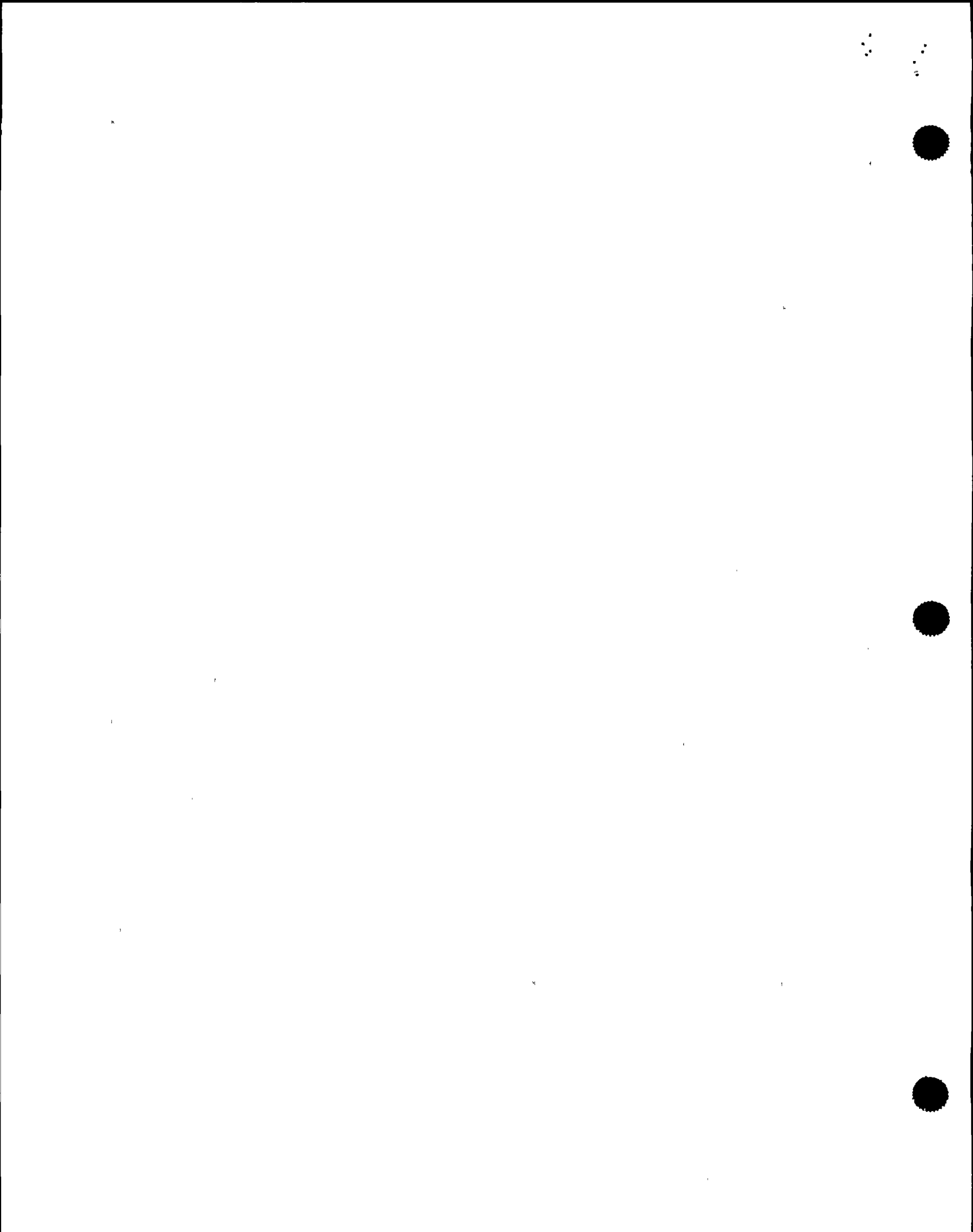
1 because of a lack of definitive knowledge of the failure
2 within the transformer. In the condition that it exists
3 now, after having sustained fault currents for a number of
4 seconds as the generator coasted down, there will be little
5 -- I believe, substantive evidence of the exact nature of
6 the fault during the 6-cycle period that the buses were
7 being supplied by the generator.

8 MR. ASHE: For a fault of this magnitude, do you
9 feel that there was sort of a precursor in the B-phase?

10 MR. CRENSHAW: There was no evidence from the
11 oscillographic record which shows about four to five cycles
12 of pre-fault information.

13 MR. ASHE: Is a fault of this magnitude -- you
14 mentioned earlier transformer failures were certainly not
15 uncommon, would you characterize this type of failure, your
16 observed physical damage on a transformer, is it worse than,
17 less than, for transformers of this category?

18 MR. CRENSHAW: I have not viewed this transformer
19 intimately. I have seen photographs of it and it has been
20 described to me that the damage was, in fact, spectacular.
21 It is not at all unusual to find very severe transformer
22 damage in a case like this. The fault energy that occurs
23 very early in a fault event of this type the pressure waves
24 in the oil that occur very early, almost at the beginning of
25 the fault, can be very destructive in the sense of rupturing



1 tanks and other things of that sort.

2 The subsequent electrical damage to the windings
3 is, of course, somewhat the result of the relatively long
4 decay time as a generator continues to feed a fault in the
5 permanently connected, solidly connected transformer.

6 MR. ASHE: Do you have any type of preliminary
7 assessment as to what you feel may have caused this?

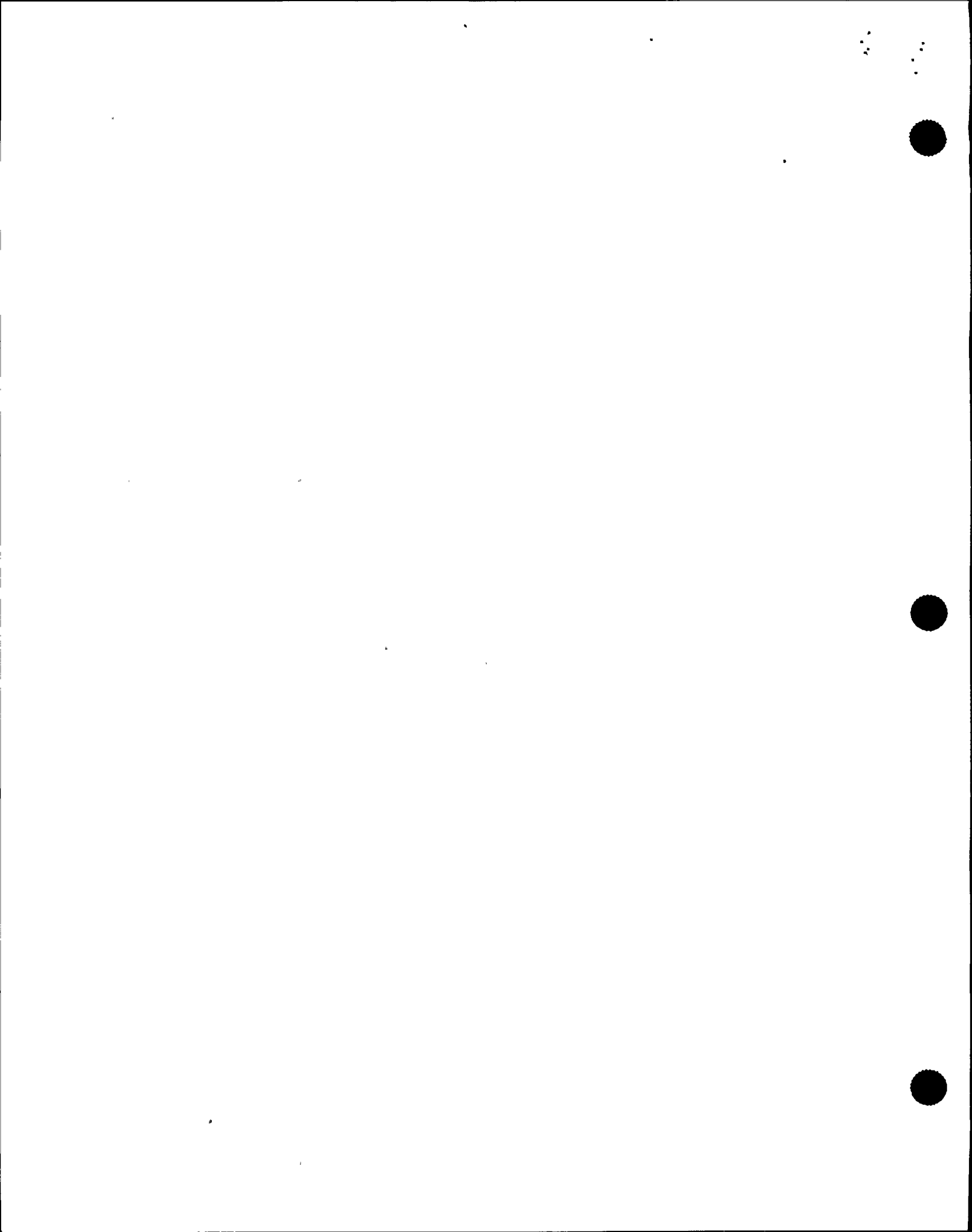
8 MR. CRENSHAW: That is an area beyond my field of
9 expertise, the assessment of how a fault could and would
10 evolve within a transformer.

11 MR. ASHE: Would a transformer fault of this
12 nature necessarily end in any type of damage to running
13 equipment or the actual distribution system that it was
14 powering at the time the fault occurred?

15 MR. CRENSHAW: I would say that it's not unusual
16 for a transformer failure to result in failure of connected
17 and associated equipment, in the sense that energy from high
18 voltage windings due to an internal failure can be coupled
19 to the low voltage circuitry by flashovers internally, so it
20 is not unusual to have more equipment damaged than only the
21 transformer.

22 MR. STONER: Have you drawn any conclusion on the
23 cause of the UPS unit failure and if so, what are they?

24 MR. CRENSHAW: I haven't been asked to
25 specifically look at the UPS and its electronics. I have



1 been involved in discussions with the plant engineers and
2 looked over their tests that they have run and things they
3 have found out about the UPS.

4 I have not looked at the UPS directly.

5 MR. ASHE: If there are two significant things,
6 based on your observations and your scope, your work scope,
7 what are the most two significant things that have occurred
8 in this event?

9 MR. CRENSHAW: I was requested to review the event
10 and the power circuitry with a view towards seeing if
11 analytical studies could perhaps shed light on the 600 volt
12 circuits, the lower voltage circuits in the power plant.

13 My assessment is that it is not possible to do a
14 definitive study that would shed any light on that, given
15 the lack of any records of the generator voltage or of the
16 lower voltage circuits in the high tension yard.

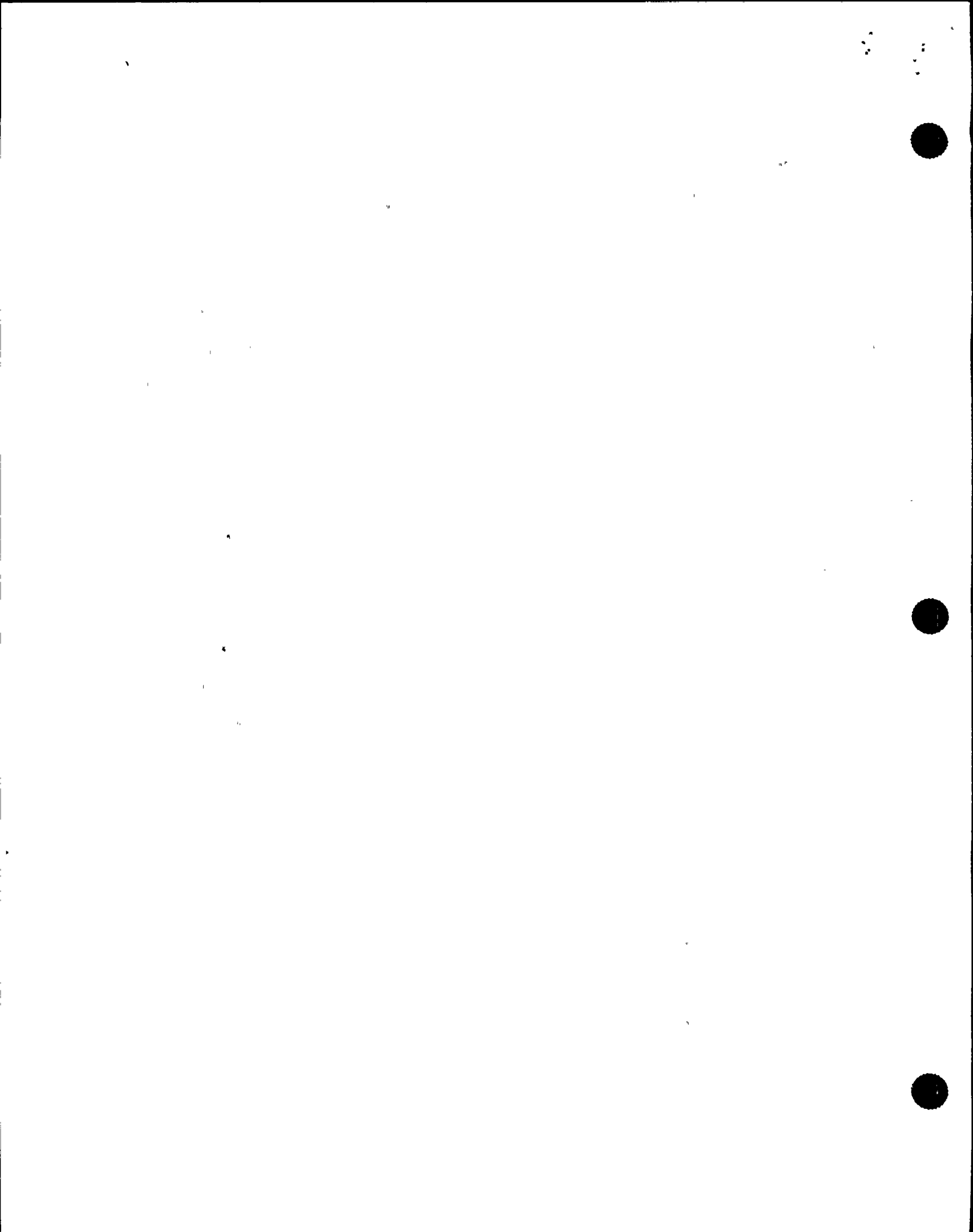
17 MR. ASHE: Is there a second one, a second
18 significant --

19 MR. CRENSHAW: No.

20 MR. STONER: I believe that you said earlier that
21 a ground fault on the low voltage winding would not have
22 been detected with the protection system that is installed.

23 Could you expand on that?

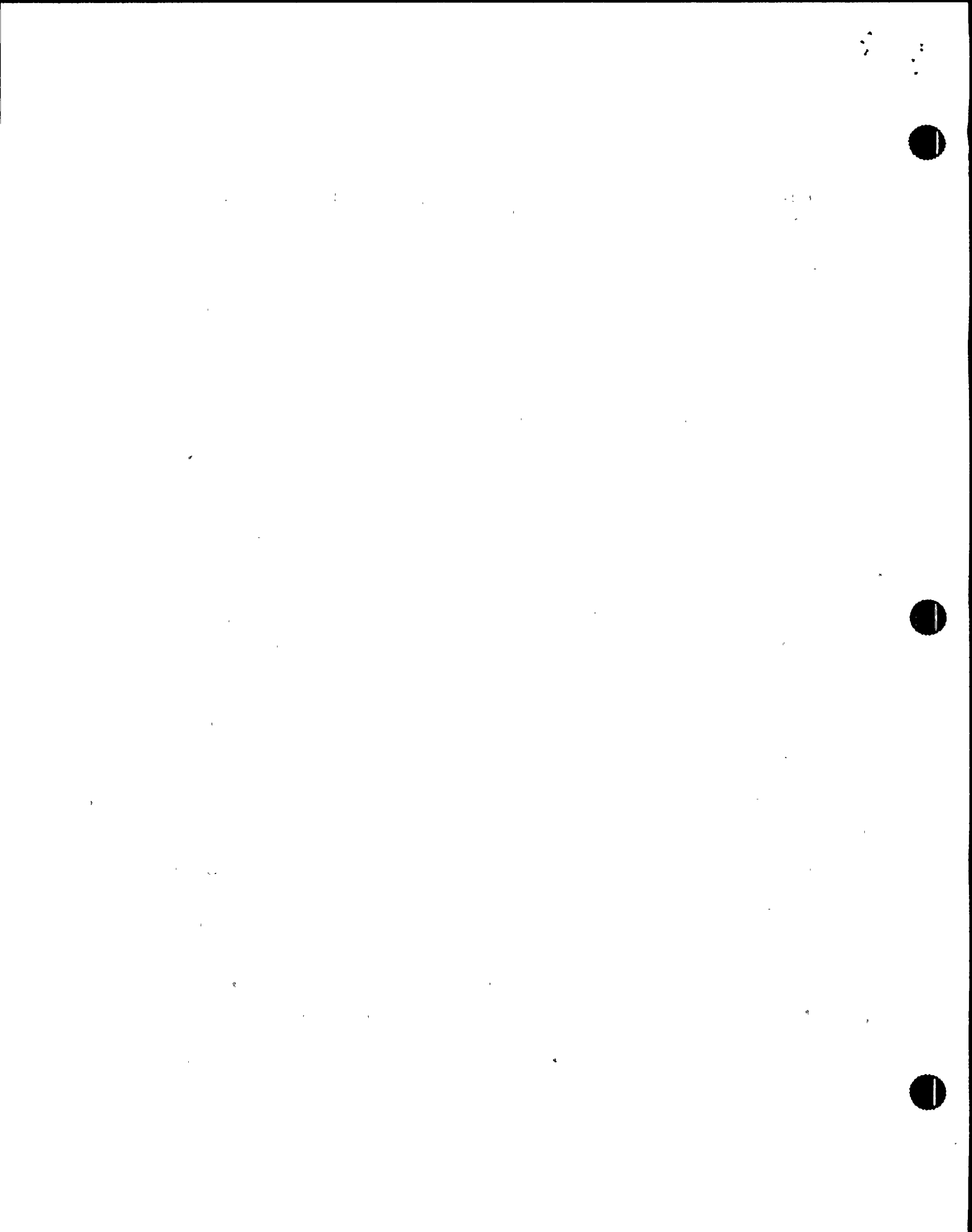
24 MR. CRENSHAW: The protective system follows the
25 IEEE standard recommended for generator protective relaying,



1 which suggests that in order to protect generator-ground
2 relaying from damage, since it is a very sensitive relay and
3 during a severe fault can be subjected to a number of -- a
4 multiple of its continuous duty rating, the generator ground
5 protective relaying was removed from service by the
6 generator lockup relay. That means that once -- and the
7 generator ground relay is not an instantaneous acting
8 device so that once the overall, the unit differential and
9 overall differential relays had detected the fault virtually
10 within a few cycles of its initiation, the ground relaying
11 was disconnected as the system had been designed and it was
12 no longer monitoring the generator ground.

13 MR. ASHE: In your assessment of the grounding
14 system, could the ground potential have increased during
15 this -- during or subsequent to this faulting condition?

16 MR. CRENSHAW: It appears very unlikely, since the
17 ground current in the transformer, around 6800 to 6900
18 amperes, was being supplied essentially by the power system
19 and the generator contribution to ground current as long as
20 the grounding equipment is intact, which it has not to my
21 knowledge been verified as of yet, but with that grounding
22 equipment intact the generator contributes only 15 amperes
23 of ground current into the grid or into the connection
24 within the plant, so I would see no reason to expect the
25 plant grounding system to be elevated.



1 MR. STONER: Do you anticipate that any RF signals
2 which may have been generated during this event would have
3 been propagated or attenuated within the plant?

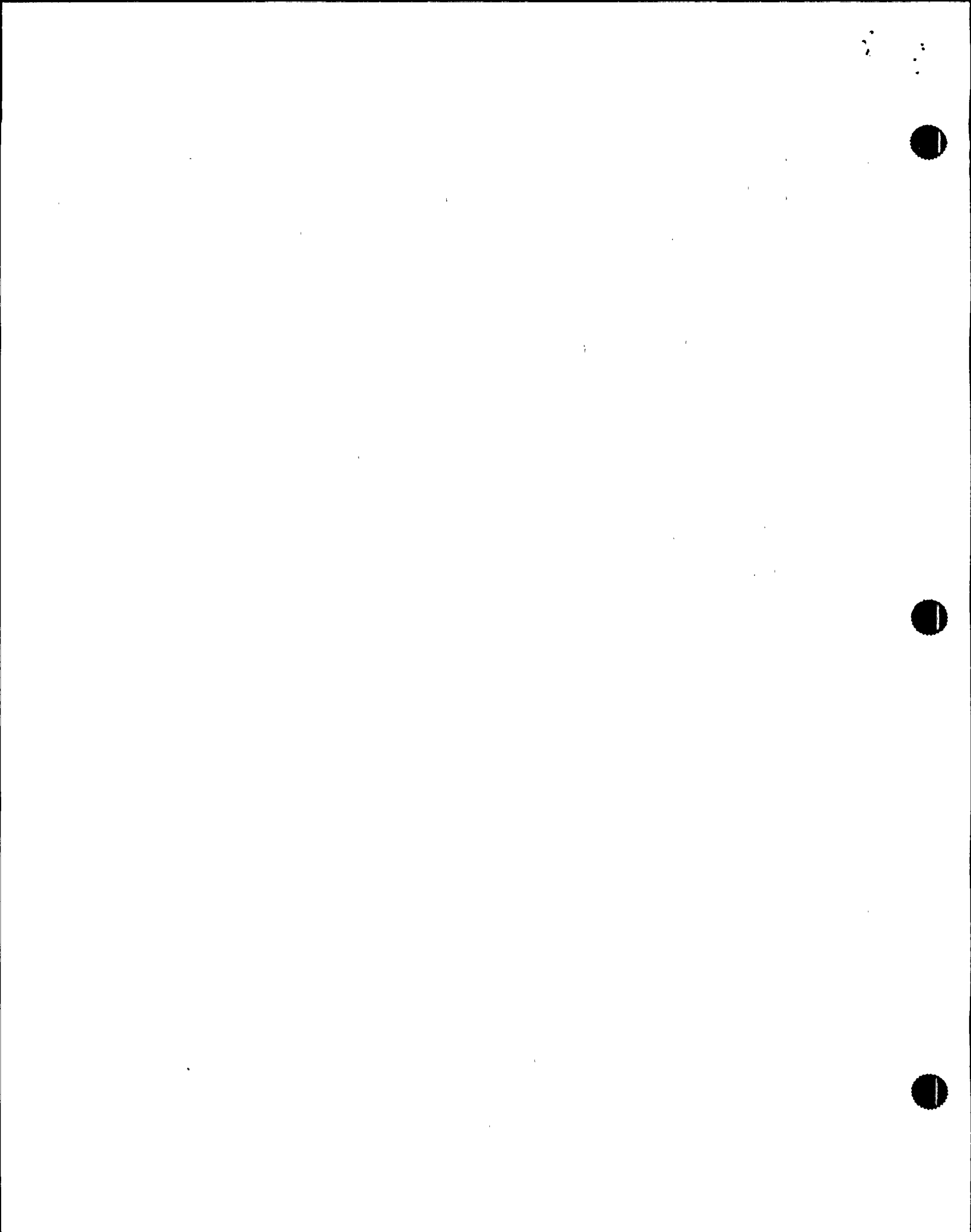
4 MR. CRENSHAW: Our experience in RF propagation
5 through transformers is somewhat limited to the testing that
6 is done on transformers to verify the integrity of the
7 windings.

8 For example, during an induced test where a
9 relatively high frequency, high voltage is applied to a
10 transformer and corona measurements are made, if corona is
11 detected, testing is frequently done to determine if in fact
12 the observed evidence of corona is a true one within the
13 transformer or is coming from the testing device that
14 energizes the transformer.

15 To verify this, tests are made in accordance with
16 IEEE standards to measure the attenuation or the transfer if
17 you will from the high side to the low side of the
18 transformer.

19 Our experience in measuring power transformer
20 attenuation shows that the one megahertz signal which is
21 the standard used by IEEE, the one megahertz signals the
22 attenuation is frequently in the ballpark of at least 1000
23 to 1, perhaps tens of thousands to 1, depending on the
24 transformer design.

25 The attenuation of one megahertz signals occurring



1 on one side of a transformer and transferred through it
2 depends a lot on the transformer design.

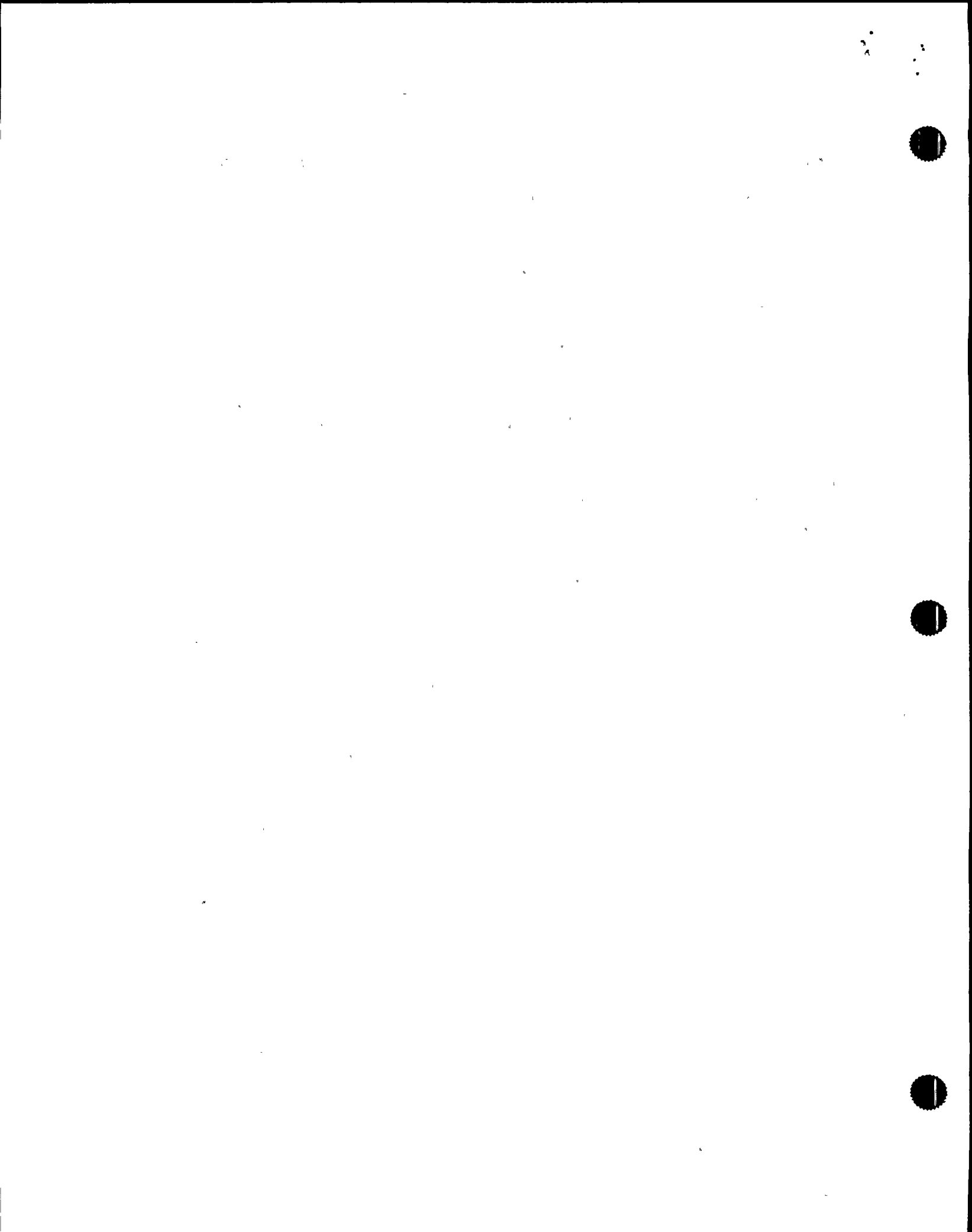
3 MR. ASHE: Based on your review of the
4 transformer and the in-house electrical distribution system,
5 do you feel that maintenance played, or the lack of
6 maintenance played, any type of role in the occurrence of
7 this event?

8 MR. CRENSHAW: I don't have a detailed knowledge
9 of the maintenance that would have been performed on the
10 transformer that failed. I have not seen any of the
11 maintenance records, and I am not really qualified to
12 comment on that.

13 MR. ASHE: Based on this event, in-plant
14 monitoring of the distribution system, would that yield
15 helpful information for other reasons, other than event
16 analysis?

17 MR. CRENSHAW: Certainly recordings of
18 disturbances and the voltages in various circuits can yield
19 information concerning the status of equipment connected to
20 those circuits. In addition to simply acting as an event
21 record of what happened, it can also tell you, perhaps, the
22 status of the connected equipment. It could prove useful,
23 yes.

24 MR. STONER: Are there any other things which you
25 looked at or considerations which you have made or



1 conclusions which you have drawn that we have not asked that
2 you feel are pertinent as the result of this event?

3 MR. CRENSHAW: Not to the best of my knowledge.

4 MR. ASHE: Is there anything else that you'd like
5 to say, for whatever reason?

6 MR. CRENSHAW: Nothing that I can really add,
7 beyond what I have said.

8 MR. ASHE: Okay. That's it.

9 [Whereupon, at 8:46 a.m., the taking of the
10 interview was concluded.]

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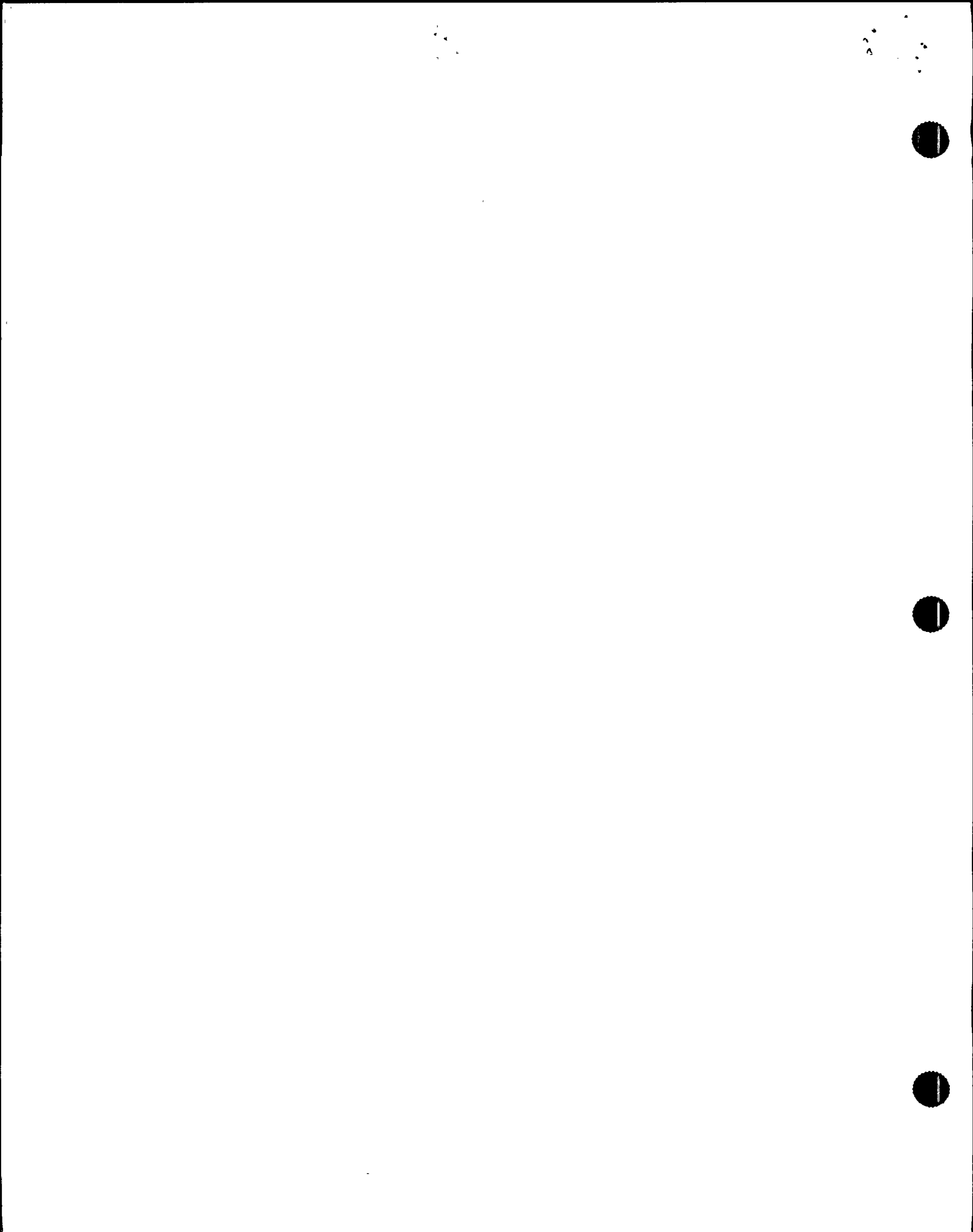
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REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission

in the matter of:

NAME OF PROCEEDING: Int. of MELVIN L. CRENSHAW

DOCKET NUMBER:

PLACE OF PROCEEDING: Scriba, N.Y.

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.



IAN ROTHROCK

Official Reporter
Ann Riley & Associates, Ltd.

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