

THE DOW CHEMICAL COMPANY

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DEPARTMENT	Safety & Loss Prevention	DATE	May 21, 1971
AUTHOR	R. G. Vaughn	PROJECT NUMBER	

Evaluation of environmental noise exposures in the CA #2 Plant, Plaquemine, Louisiana

INFORMATIVE SUMMARY WITH CONCLUSIONS

An environmental noise survey was conducted at the CA #2 Plant, Plaquemine, Louisiana. The noise exposure of the Power Area Senior Operating Technician exceeded the standards for occupational exposures as set forth by federal regulations under the Walsh-Healey Act. The Dow profile for the Power Area SOT is "C". All other job classifications are within the federal criteria and are profiled "B" under the Dow noise exposure profile system.

Problem

A request was made by supervision to evaluate the noise exposures of personnel in CA #2 plant (Chlorine-Caustic), Louisiana Division, Plaquemine, Louisiana. The evaluation was made according to criteria set forth by the United States Department of Labor under the Walsh-Healey Act, as well as the Dow noise exposure profile system.

Conclusion

1. The noise exposures, as measured by A-scale readings, indicate that the job classification of Senior Operating Technician in the Power Area exceeds federal criteria for acceptable noise exposures. Federal regulations according to the Walsh-Healey Act require that feasible engineering noise control be exercised and ear protection considered MANDATORY until noise control can reduce exposures.
2. All other job classifications in the CA #2 plant are within acceptable levels as determined by the Walsh-Healey Act.
3. The noise exposures as determined by the Dow noise profile system are as follows:

<u>Job Classification</u>	<u>Dow Profile</u>	<u>Ear Protection</u>
Power Area SOT	C	Mandatory
Caustic Area SOT	B	Not Needed
Chlorine Area SOT	B	Not Needed
O.S. "A" Shift	B	Not Needed
Chlorine Area OT	B	Not Needed

4. A baseline audiogram is needed for all personnel in the CA #2 plant. Periodic follow-up audiograms are necessary for those individuals profiled "C". These individuals should be informed of the hazards of high noise levels and made aware of the possible individual loss of hearing.

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PRESENTATION OF DATA

I. Hearing Conservation Data

In the interest of providing a satisfactory method for helping supervision and the Safety and Medical Departments to properly place employees in noisy jobs, hearing conservation criteria have been developed which provide for the profiling of job classifications.

All job classifications within departments are to be profiled A, B, B-, C, or D, with the following requirements.

Jobs Profiled D

Extra noisy job, 10% or more of time is spent in noise that exceeds the basic damage risk noise levels.

A. Before Job Placement

1. Base line audiogram record.
2. Medical evaluation of hearing.

B. Follow Up

1. Periodic audiogram records.
2. Medical reevaluation of hearing.

C. Ear Protection

MANDATORY; noise exposure exceeds acceptable level as defined by the Walsh-Healey Act Federal regulations.

Jobs Profiled C

Noisy job, <10% of time is spent in noise that exceeds the basic damage risk noise levels, but 10% or more of time is spent in noise within a 10 db range below these basic levels.

A. Before Job Placement

1. Base line audiogram record.
2. Medical evaluation of hearing.

B. Follow Up

1. Periodic audiogram records.
2. Medical reevaluation of hearing.

C. Ear Protection

MANDATORY; noise exposure exceeds acceptable levels as defined by the Walsh-Healey Act Federal regulations.

Jobs Profiled B-

All jobs which would be profiled C, except that they are within acceptable noise levels as defined by the Walsh-Healey Act Federal regulations.

A. Before Job Placement

Base line audiogram record.

B. Ear Protection

RECOMMENDED.

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Jobs Profiled B

Quiet job within a noisy department, <10% of time is spent in noise approaching the basic damage risk noise levels.

A. Before Job Placement

Base line audiogram record.

Jobs Profiled A

Quiet job within a quiet department. NO HEARING CONSERVATION NEEDED.

No employees working in jobs profiled C, B-, B, or A should be allowed to change to a job profiled D without first obtaining the approval of the Medical Department.

Where the term ear protection RECOMMENDED is used, it means that the noise exposure is such that a few individuals could have some loss of hearing after a period of time due to the noise exposure.

II. Noise Measurement and Job Profiling

A General Radio, Type 1558-BP, octave band noise analyzer was used to make noise measurements in the various work areas. Several readings were taken in each area and the noise levels determined for octave bands ranging from 20 cycles per second to 20,000 cycles per second.

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III. Federal Supply Contracts Safety and Health Standards,
Part 50-204.10, Occupational Noise Exposure

The Walsh-Healey regulations, as published in the FEDERAL REGISTER on May 20, 1969, and effective on that date, prescribe a maximum permissible steady (or equivalent) noise level in the work environment at 90 decibels as measured on the A-scale of a standard sound level meter at slow response. If noise levels exceed the maximum permissible (or equivalent) level, a continuing effective hearing conservation program shall be administered.

The regulations are interpreted to mean in all cases feasible engineering controls must first be determined and implemented. If the noise levels cannot be restricted within the maximum permissible (or equivalent) level by such methods, employee hearing shall be safeguarded by adequate personal protective equipment.

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The table of permissible noise exposures* is as follows.

<u>Duration/Day</u> <u>(minutes)</u>	<u>Sound Level</u> <u>(db A)</u>
480	90
418	91
364	92
317	93
276	94
240	95
209	96
182	97
158	98
139	99
120	100
104	101
91	102
79	103
69	104
60	105
52	106
45	107
40	108
34	109
30	110
26	111
23	112
20	113
17	114
15	115

*When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} \dots \frac{C_n}{T_n}, \text{ exceeds unity, then the mixed exposure should be}$$

considered to exceed the limit value. C_n indicates the total time of exposure at a specified noise level, and T_n indicates the total time of exposure permitted at that level. Where the noise is below 90 db A, no fraction of time is included.

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IV. Evaluating Noise Exposures Using the Federal Regulations
Criteria

In addition to octave band analysis of the noise, readings were taken with a sound level meter on the A weighting scale at slow response. From permitted time values provided in Table I of the regulations, composite equivalent exposure ratios were calculated to determine acceptable ratings.

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IV Cont

Charts 0-39 show the noise levels at various work areas in the CA #2 Plant using both octave band analysis and overall readings of A-Scale and C-Scale weightings.

Tables 1-5 indicate the approximate time spent by plant personnel in each work area. The Dow noise exposure profile is designed as is the equivalent exposure ratios from A-Scale readings. The need for ear protection is indicated as well as the type of protection which will attenuate the noise to safe levels.

Figure 1 indicates the locations of noise level readings.

11-24-71/lv

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CHART #0

CA# 2

Control Room

OVERALL: 72 DB(C) 64 DB(A)

April 16, 1971 +
May 21, 1971

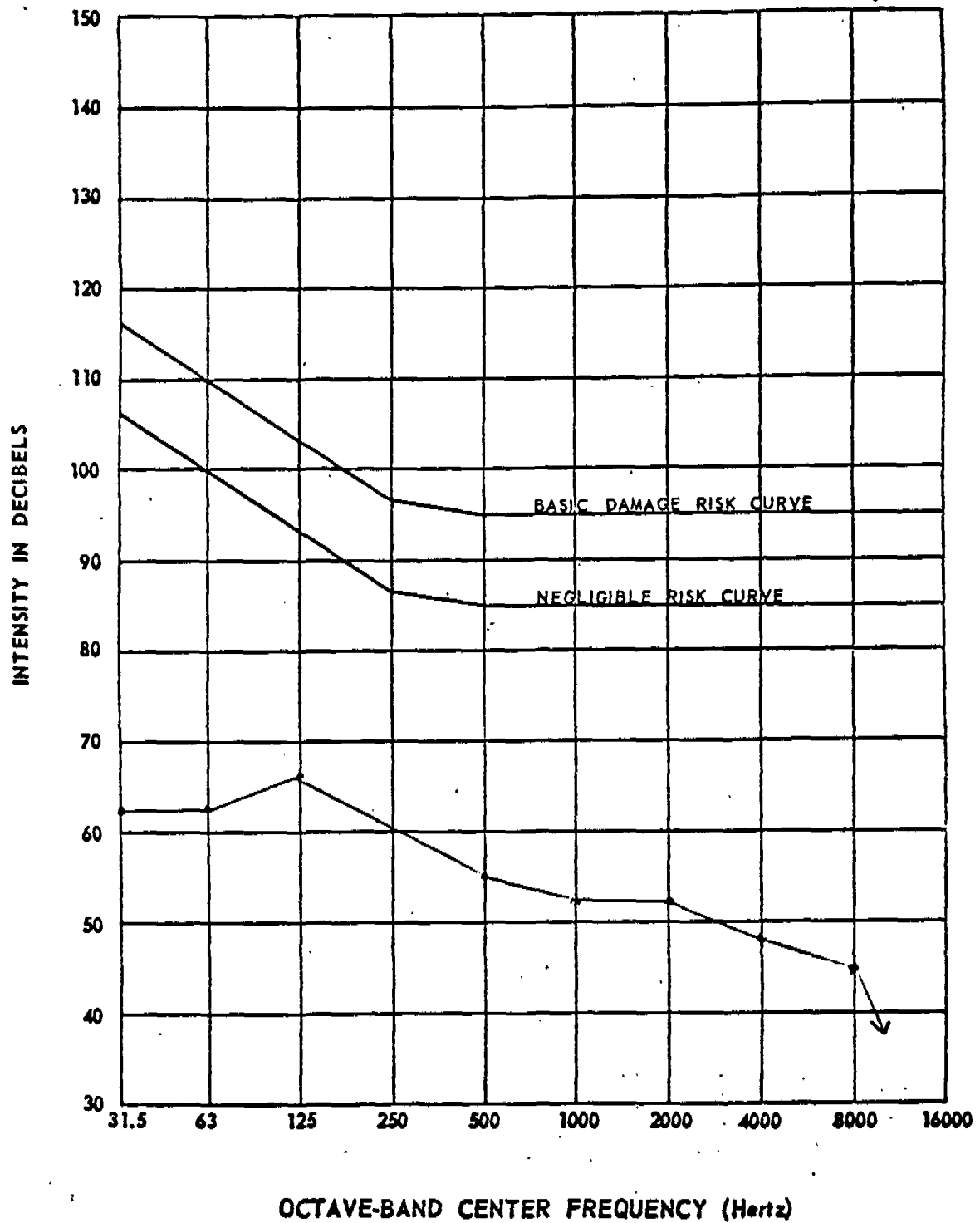


CHART 1

OVERALL: 86 DB(C) 80 DB(A)

①
EV-303

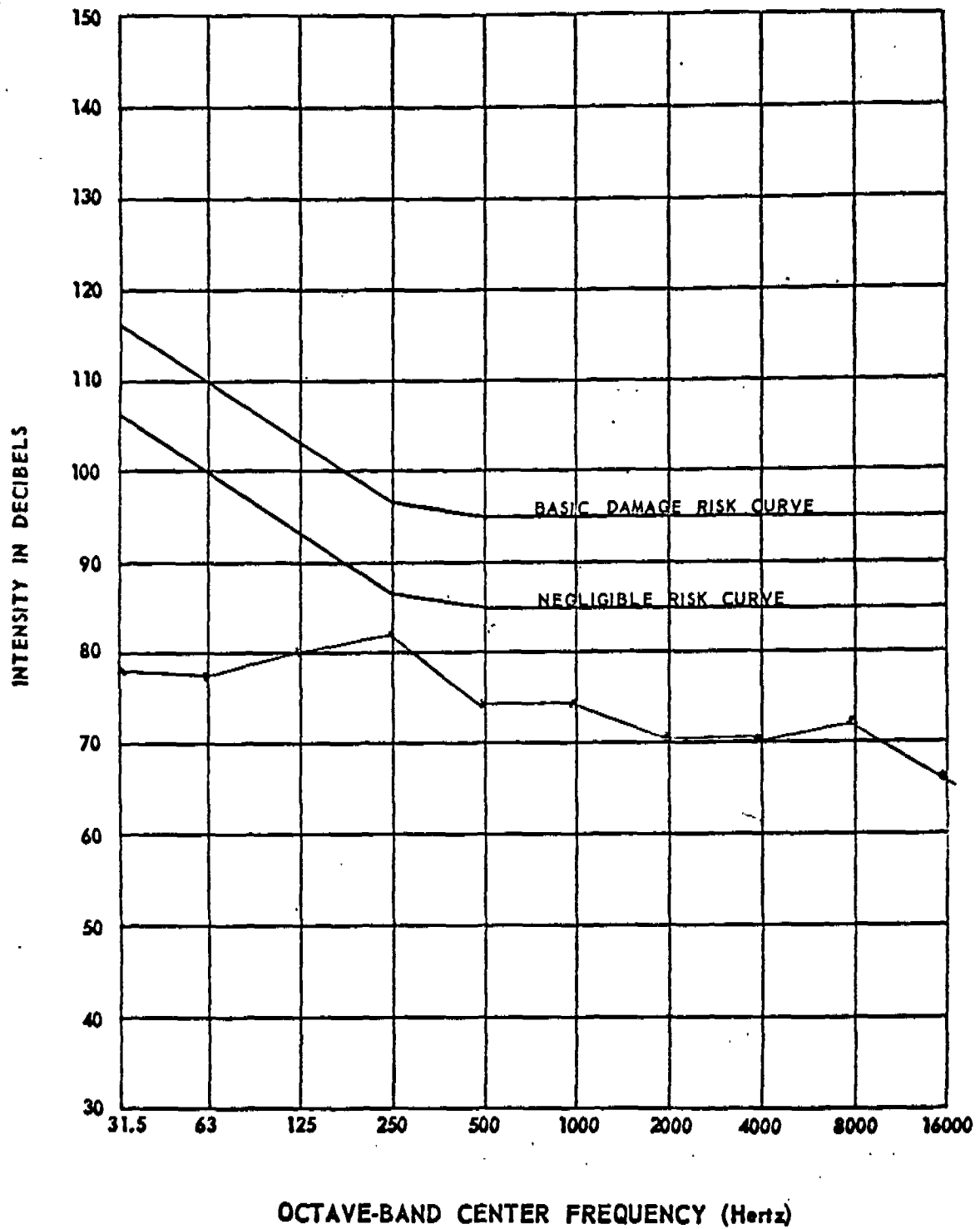


CHART 2

OVERALL: 88 DB(C) 78 DB(A)

(2)

D-3126m7

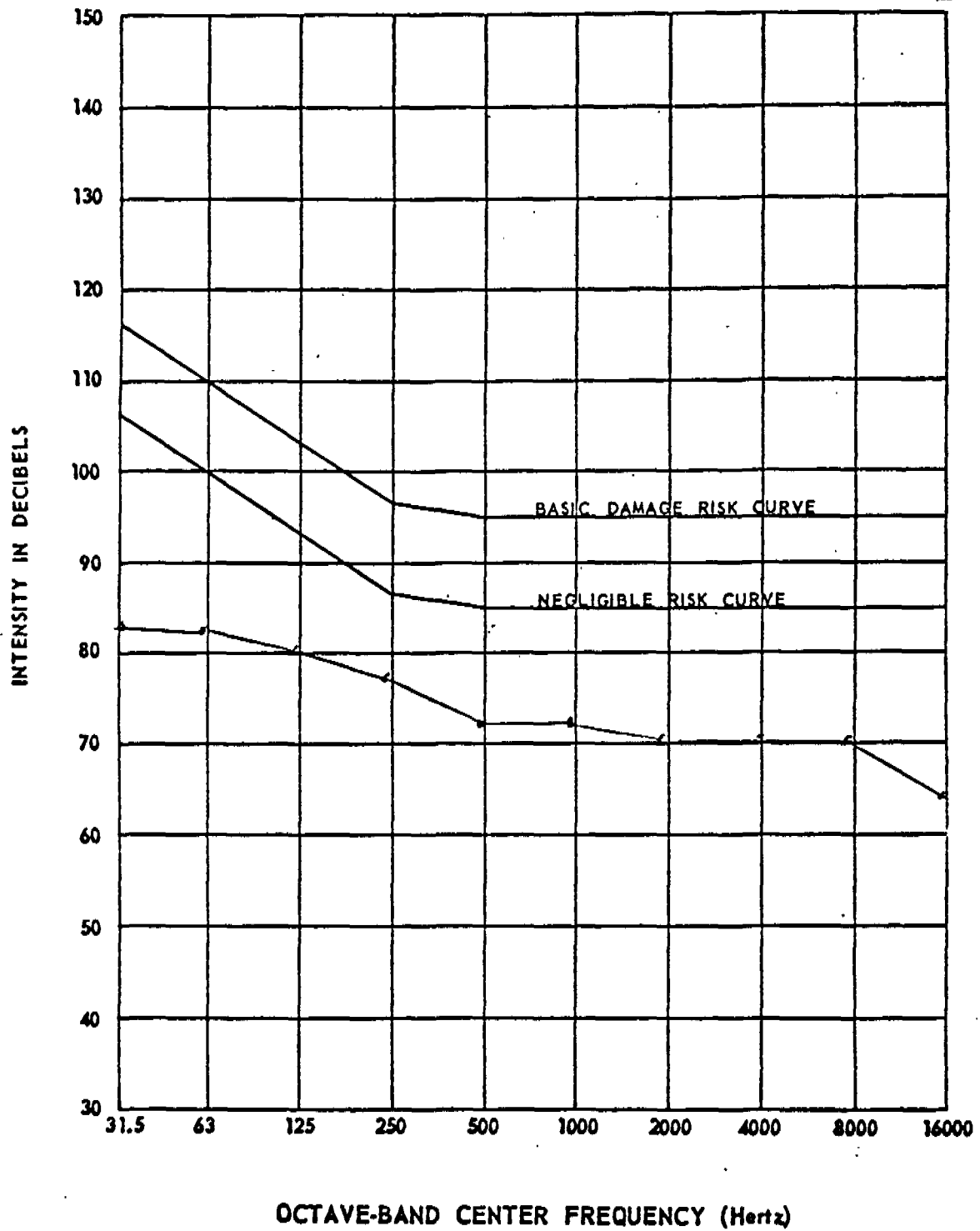


CHART 3

OVERALL: 90 DB(C) 82 DB(A)

(3)

5-201 (West)

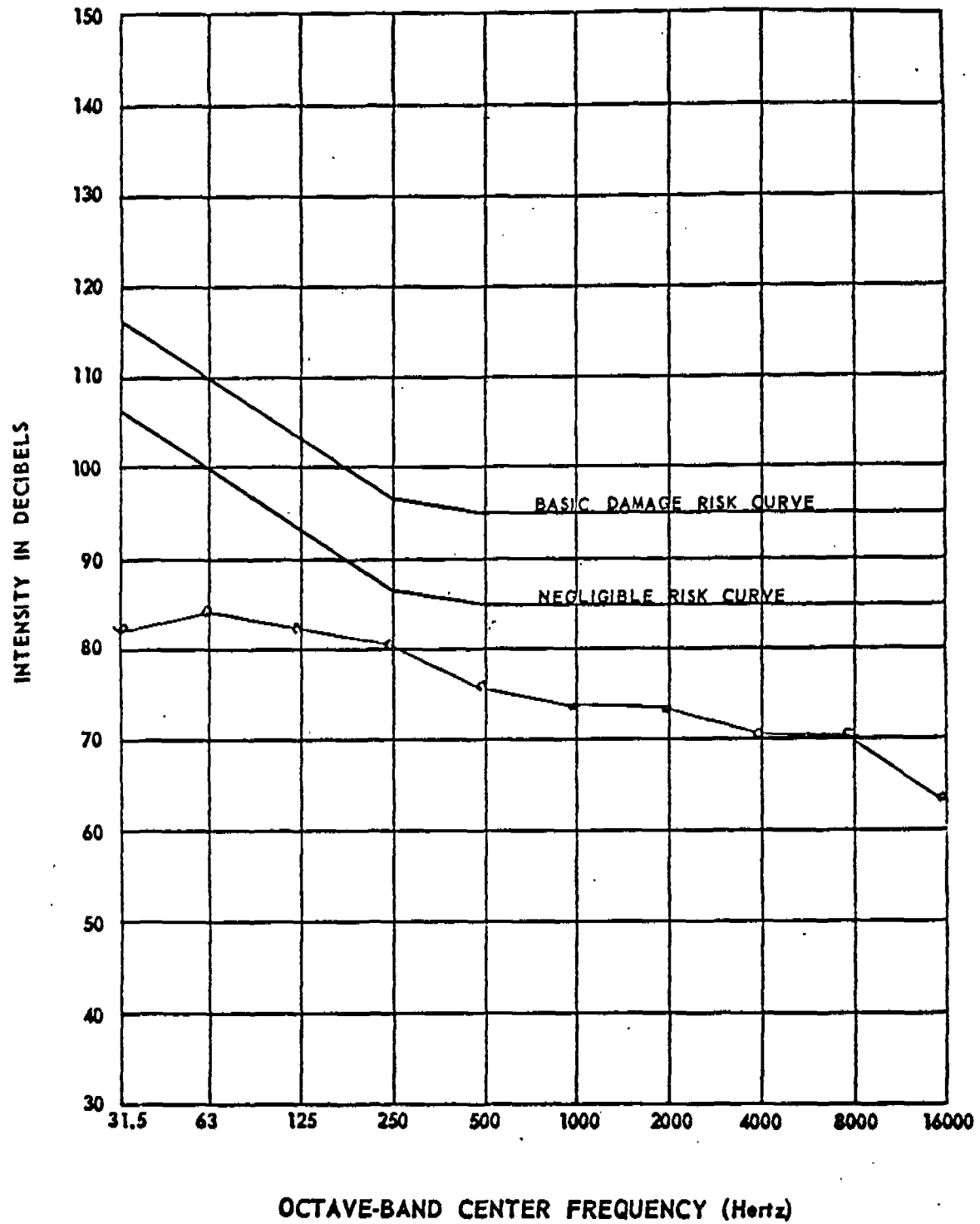


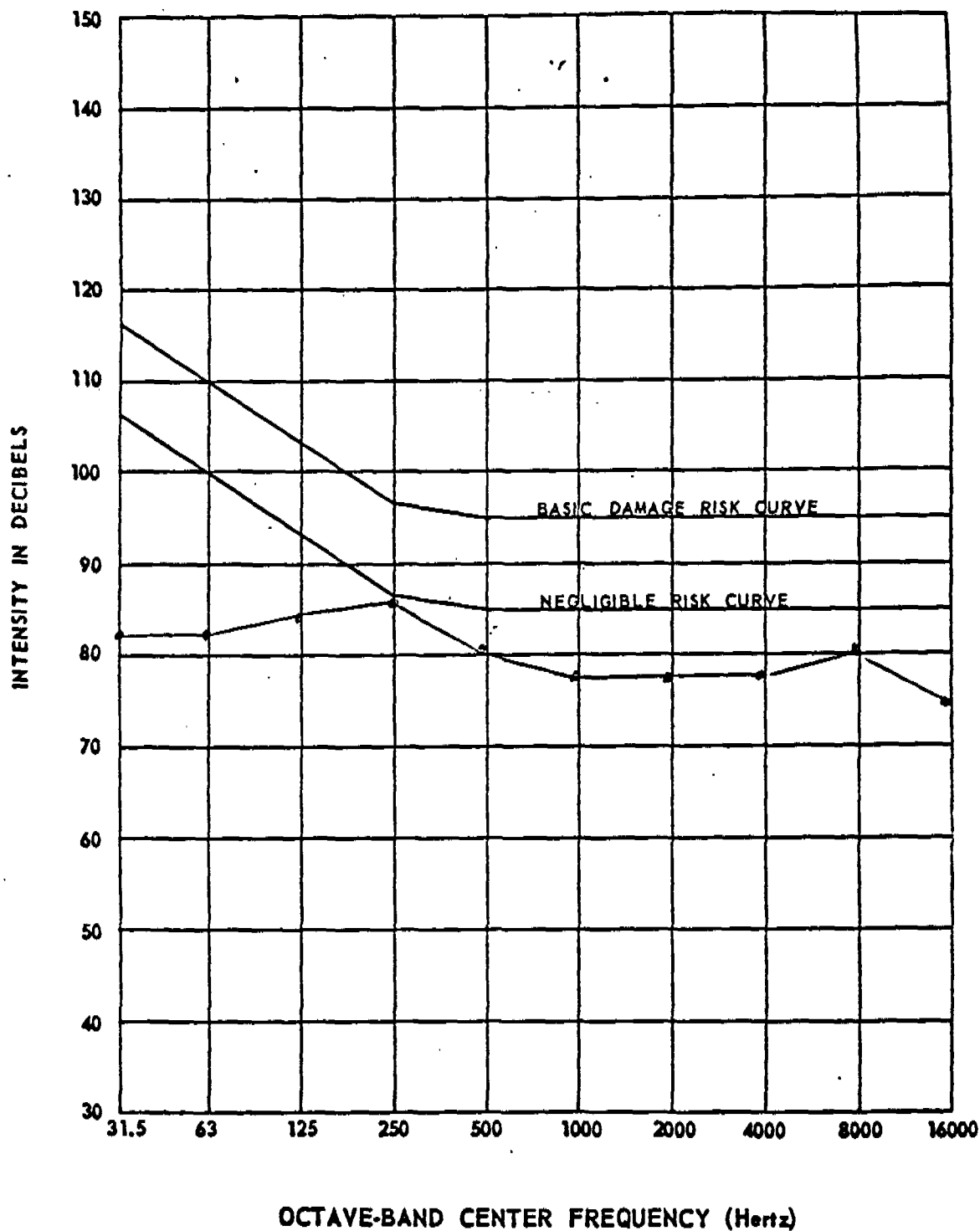
CHART 4

OVERALL: 92 DB(C)

88 DB(A)

④

T-E (SMT)



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CHART 5

OVERALL: 92 DB(C) 86 DB(A)

(5)

Between 2000 Hz - 2000 Hz

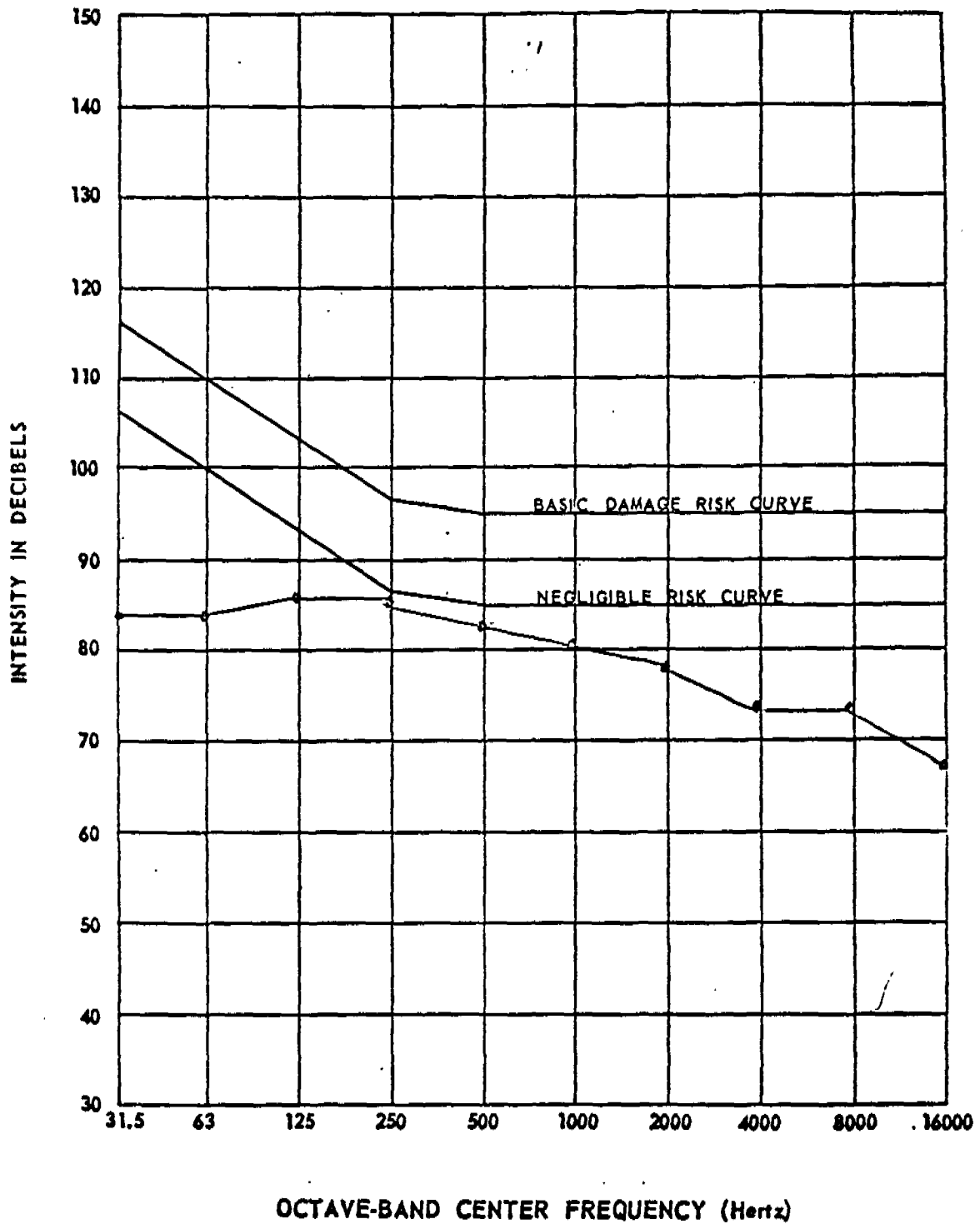
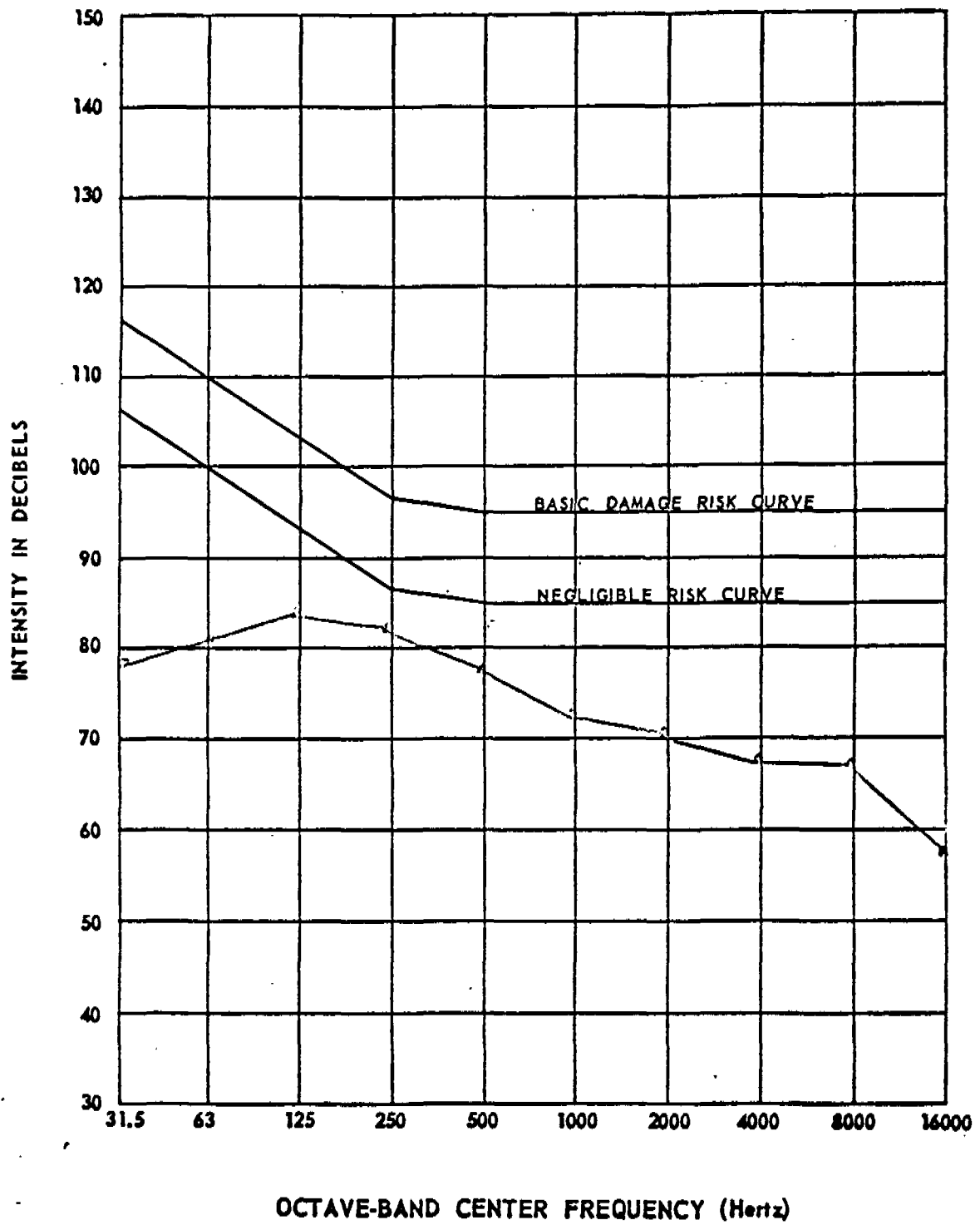


CHART 6

OVERALL: 90 DB(C) 90 DB(A)

⑥
T₉ of E-



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CHART 7

OVERALL: 90 DB(C) 88 DB(A)

Top of EV-30

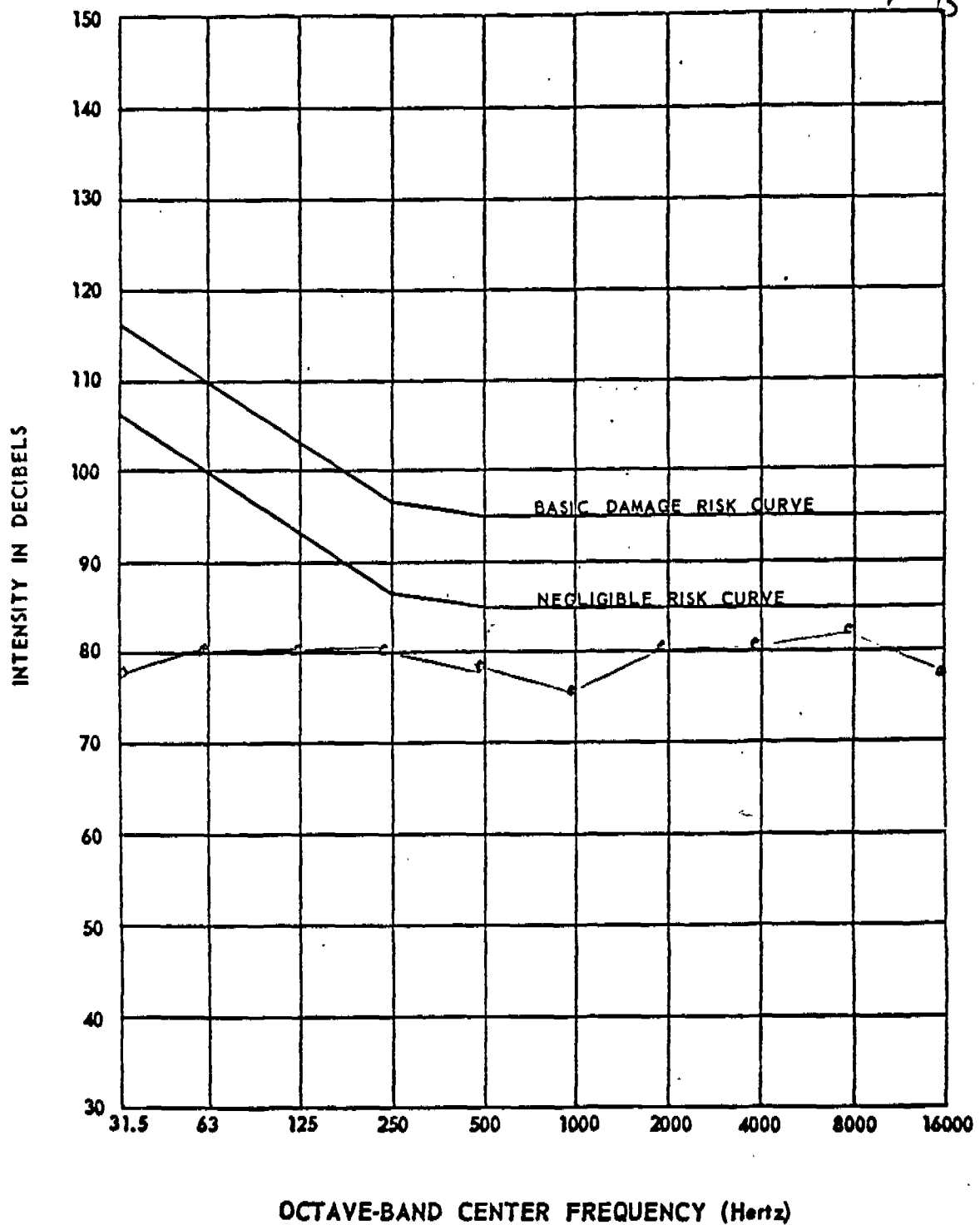


CHART 8

OVERALL: 92 DB(C) 88 DB(A)

⑧
Top of E -30

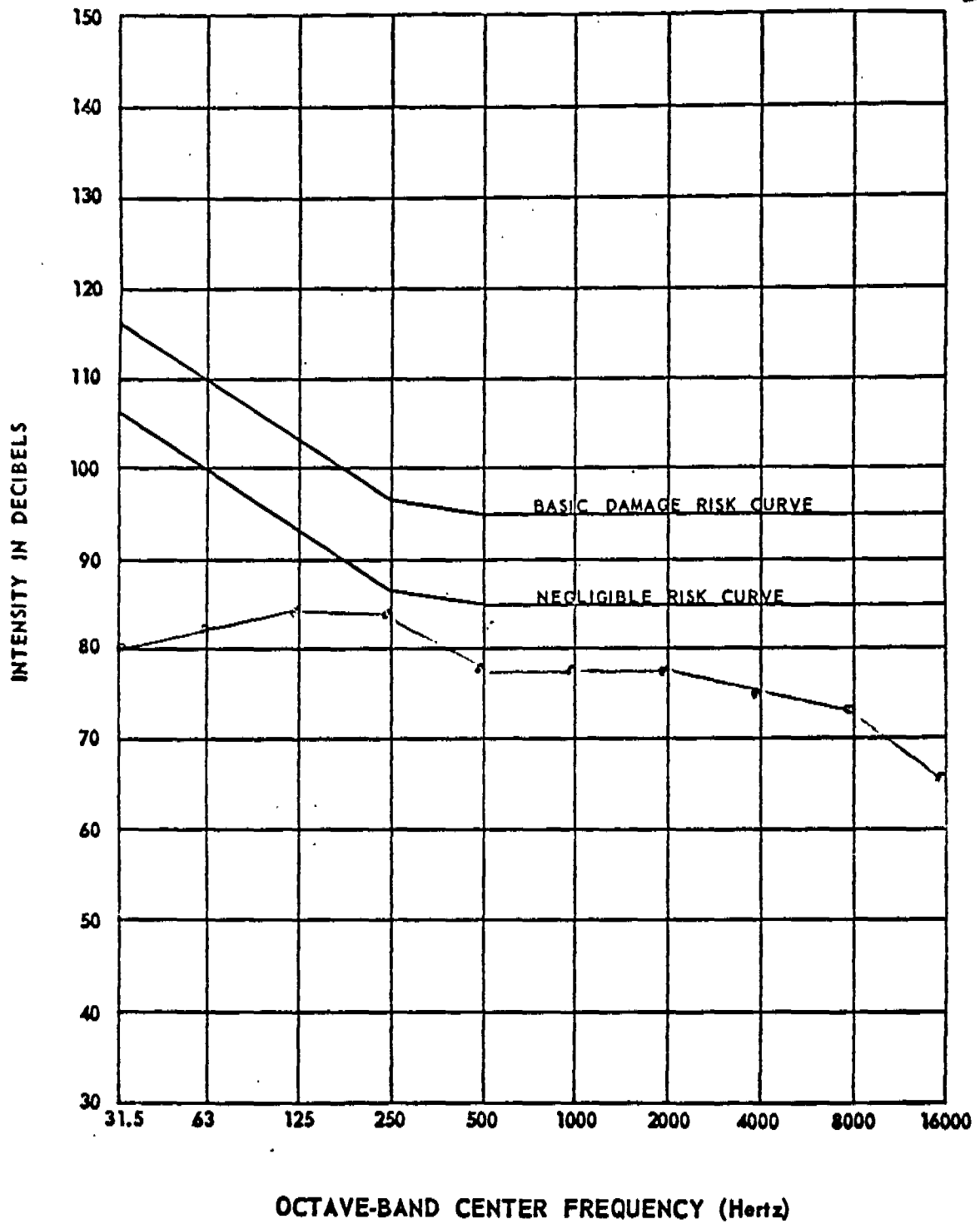


CHART 9

(A) Correct Steam Blowing
In Ditch (E-304)

9

OVERALL: 100 DB(C)

98 DB(A)

(B) After Connection

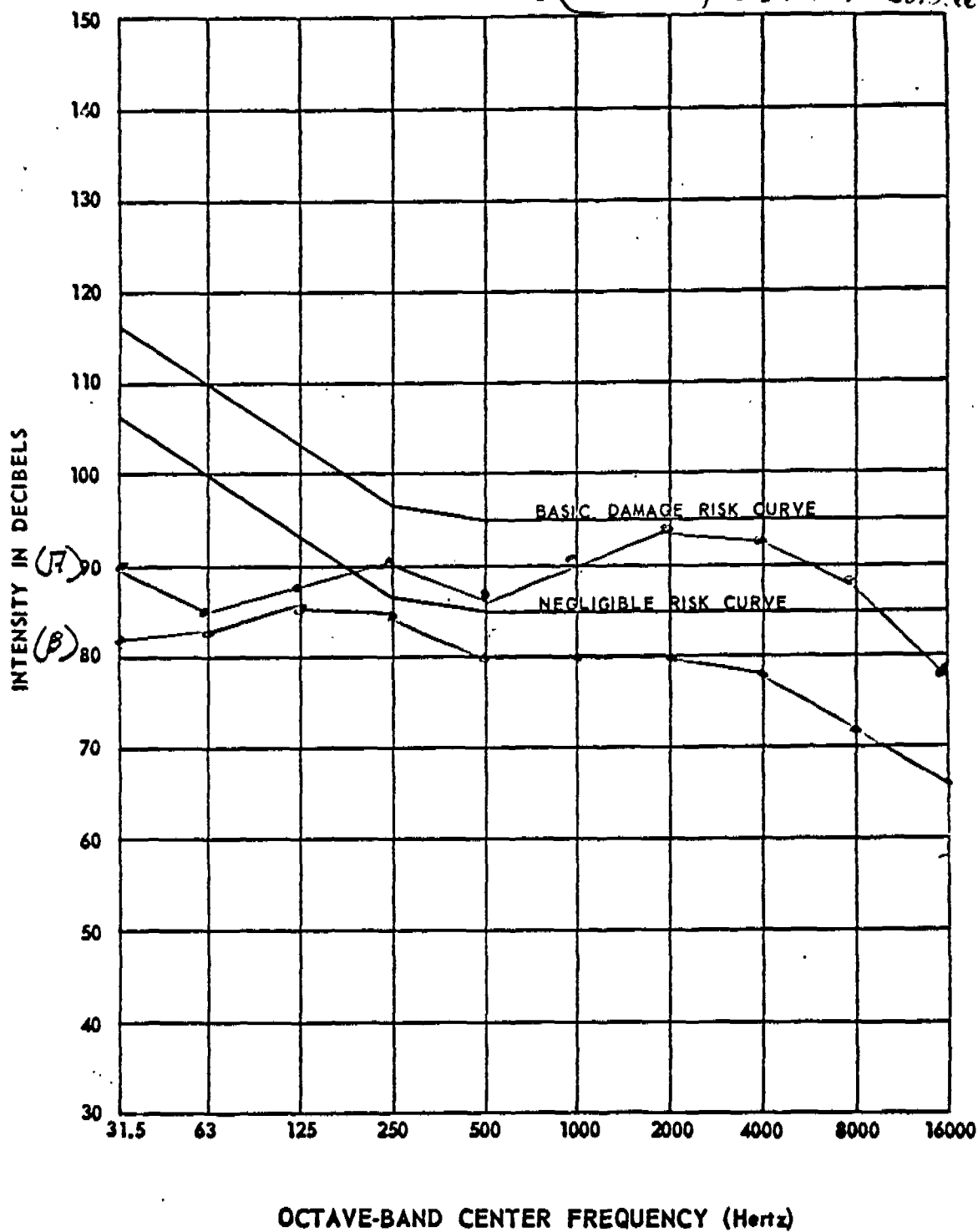


CHART 10

OVERALL: 95 DB(C)

92 DB(A)

(10)

D-305 (WEST)

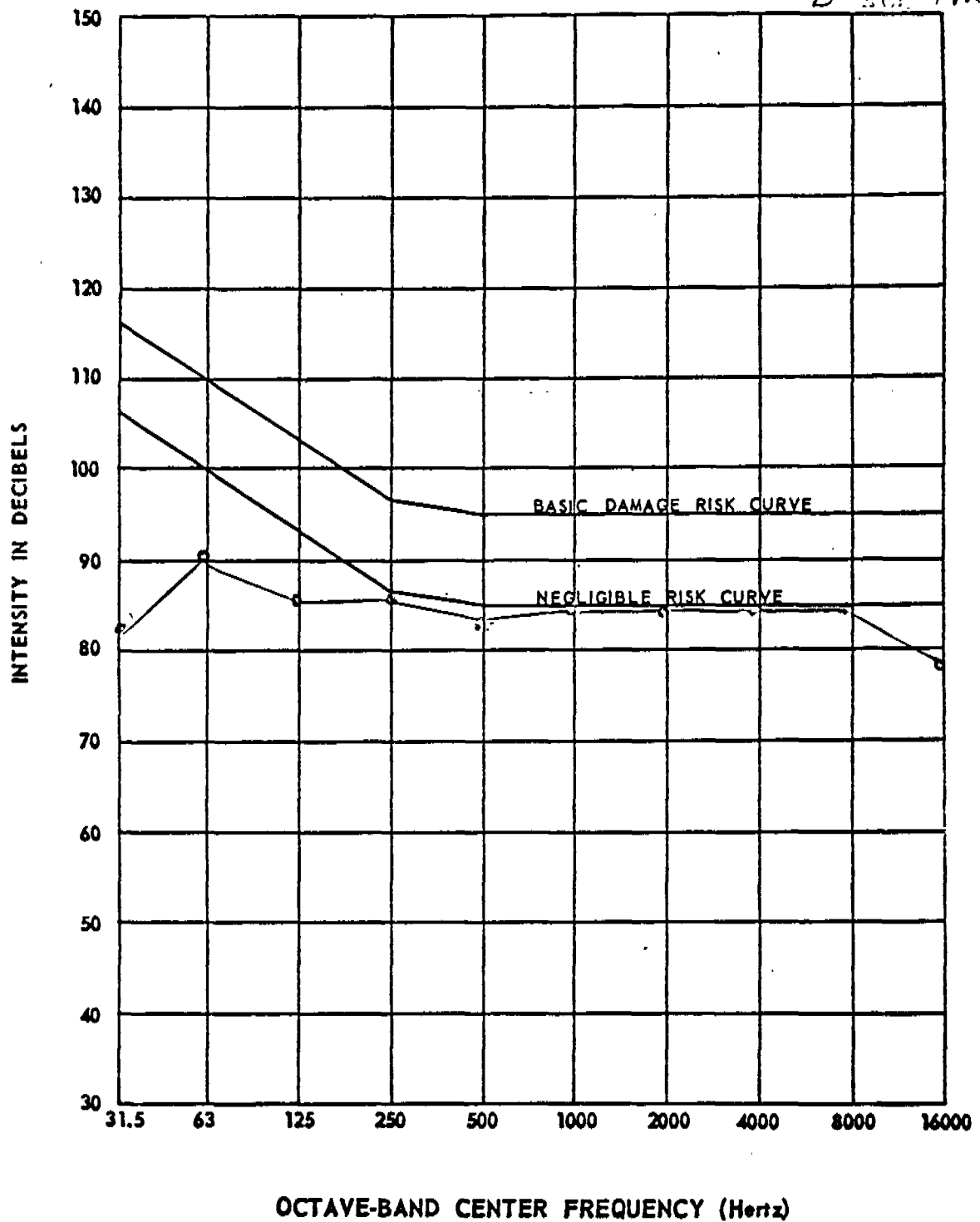


CHART II

Highway South of U-311

OVERALL: 90 DB(C)

84 DB(A)

(11)

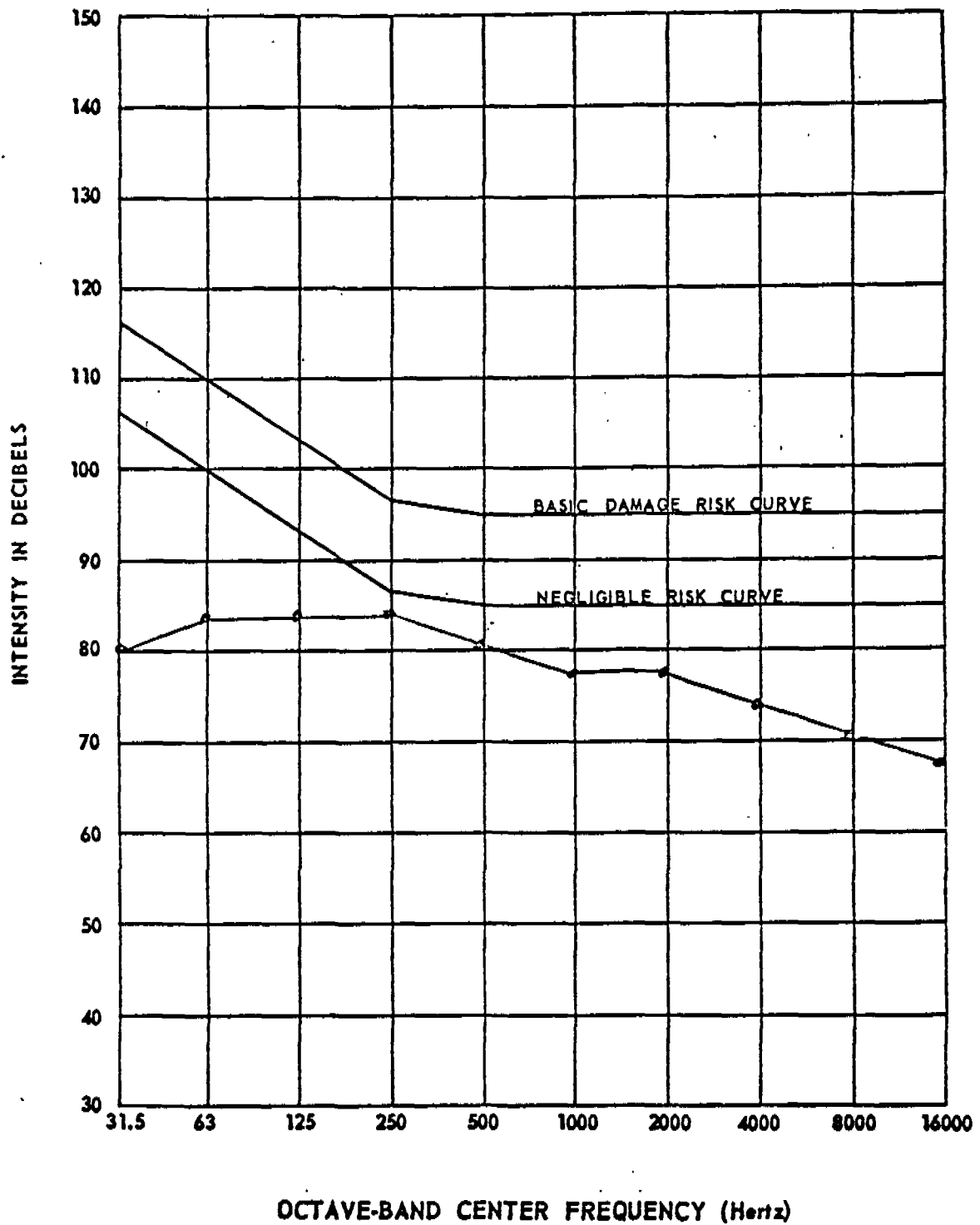
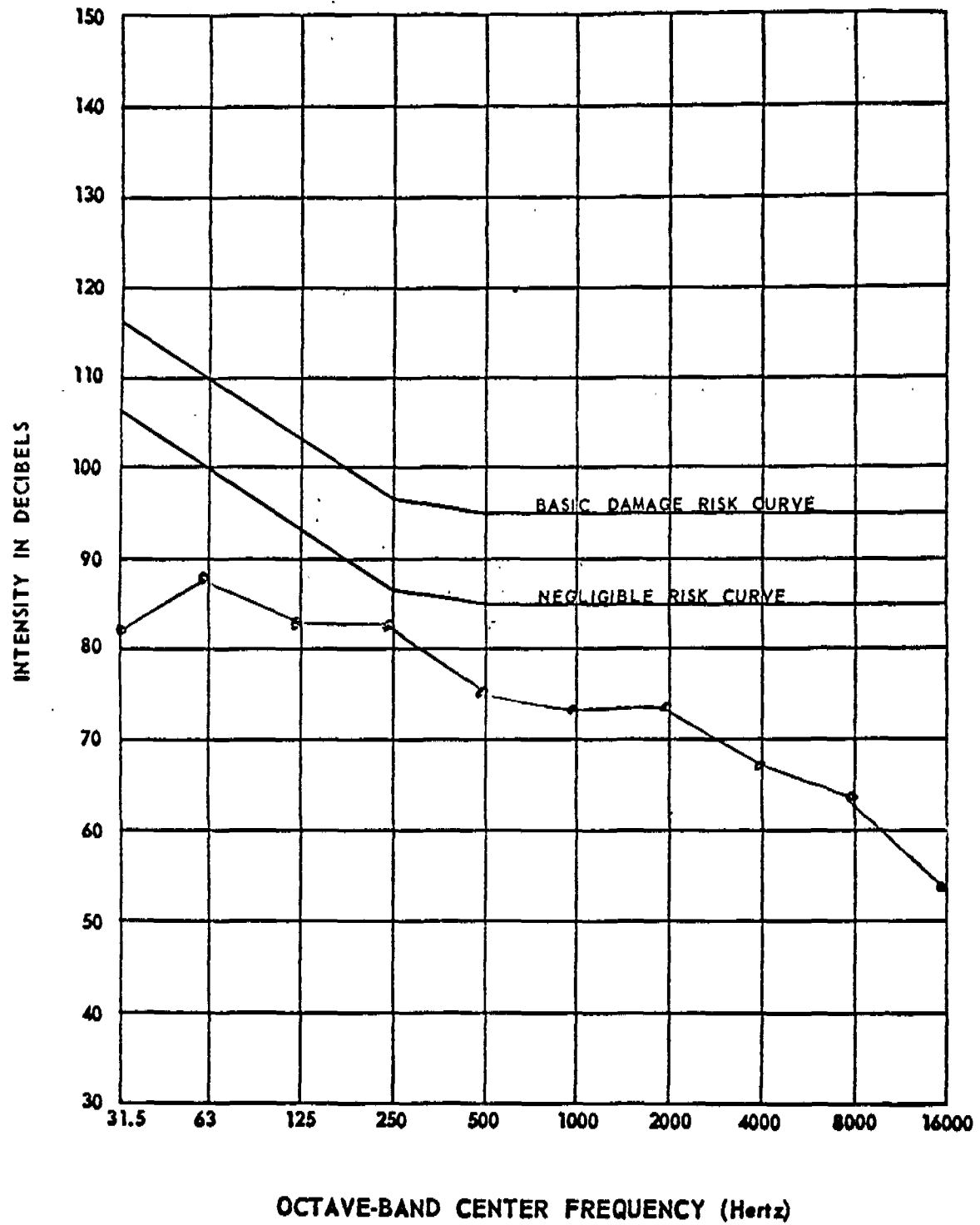


CHART 12

FL-302-F/B/c

OVERALL: 90 DB(C) 80 DB(A)

12



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S/21

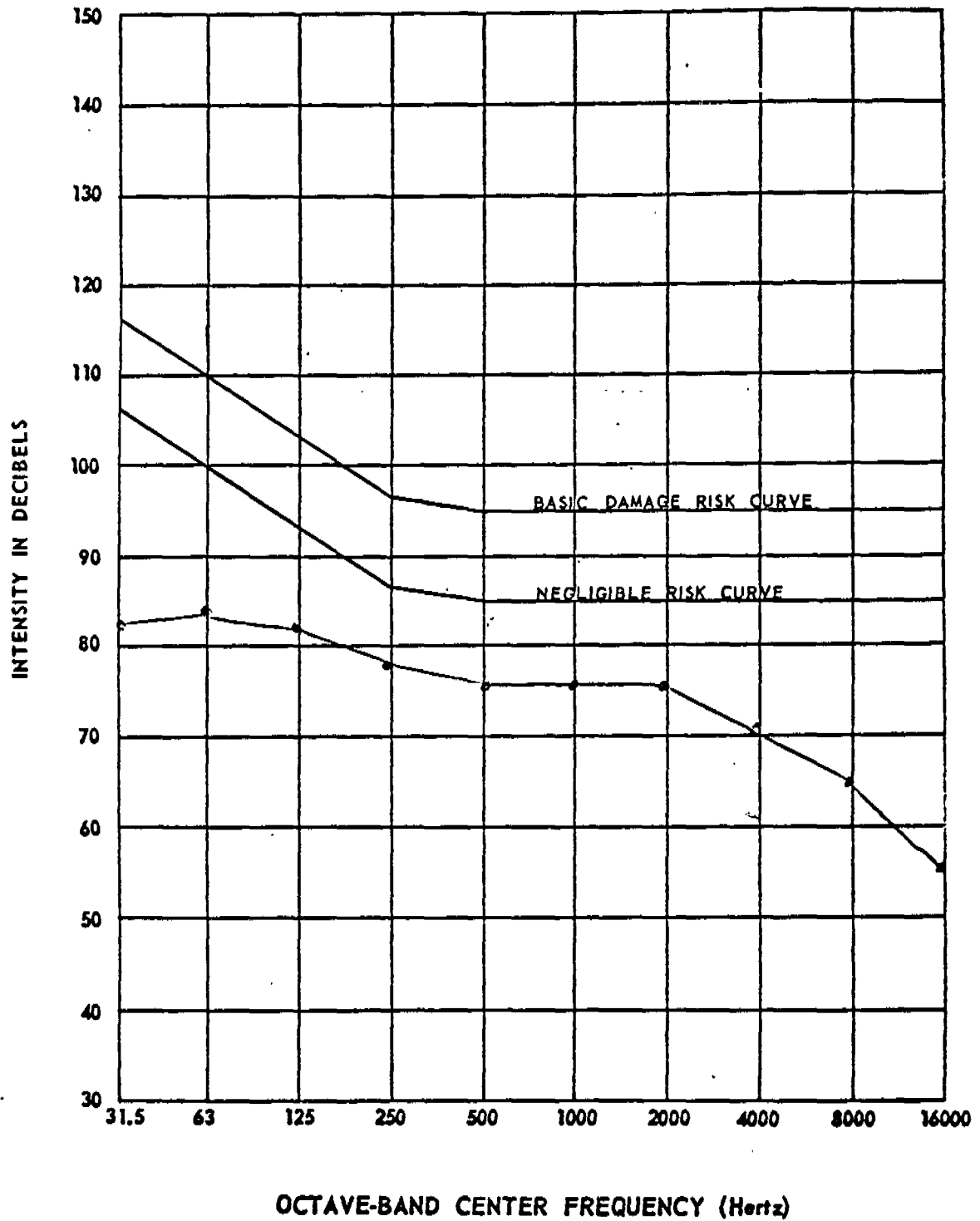
CHART 13

E-307 A/B/c

OVERALL: 88 DB(C)

82 DB(A)

13



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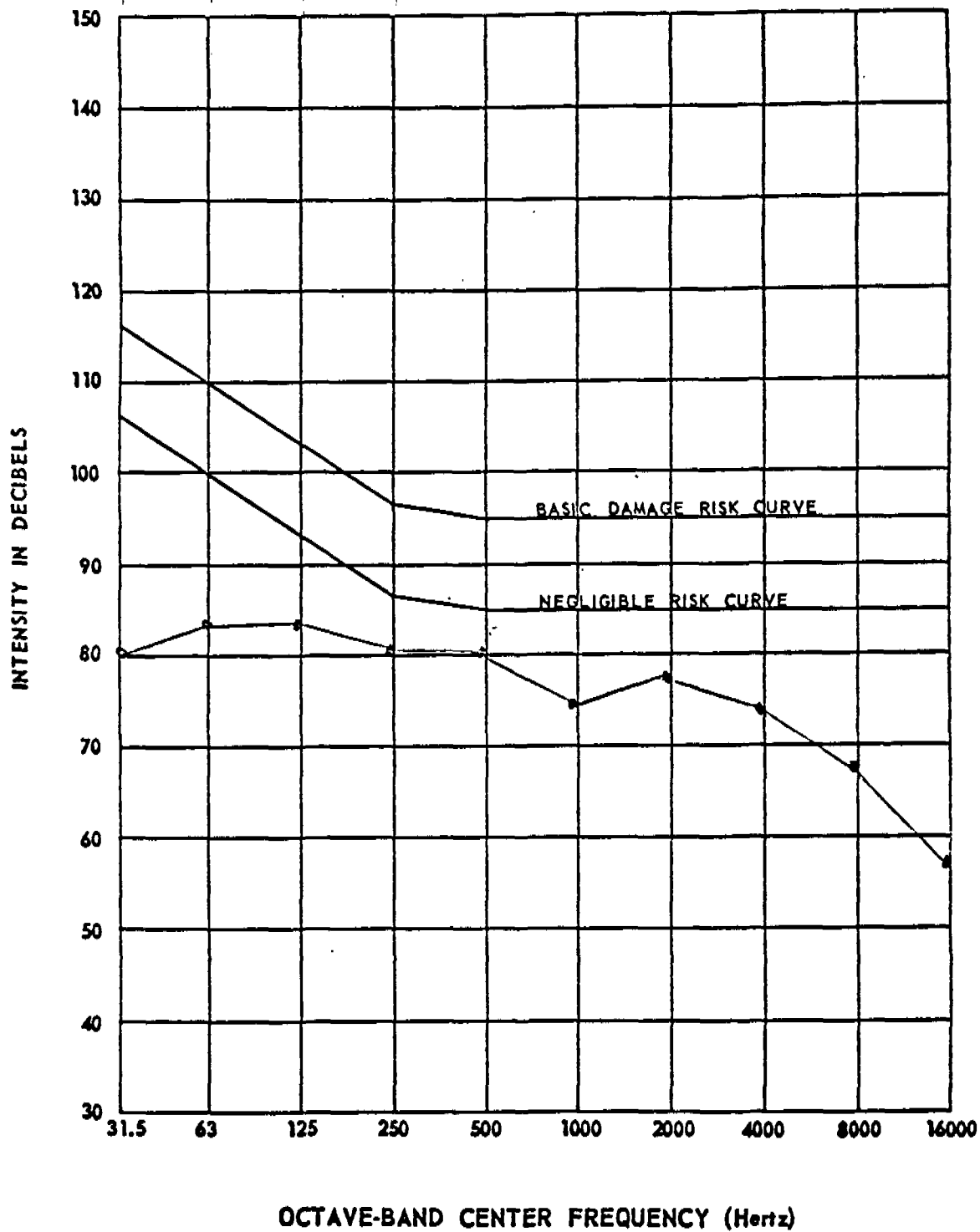
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CHART 14

P-331

OVERALL: 90 DB(C) 84 DB(A)

14



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CHART 15

CT-101 - 3ump

OVERALL: 96 DB(C)

92 DB(A)

15

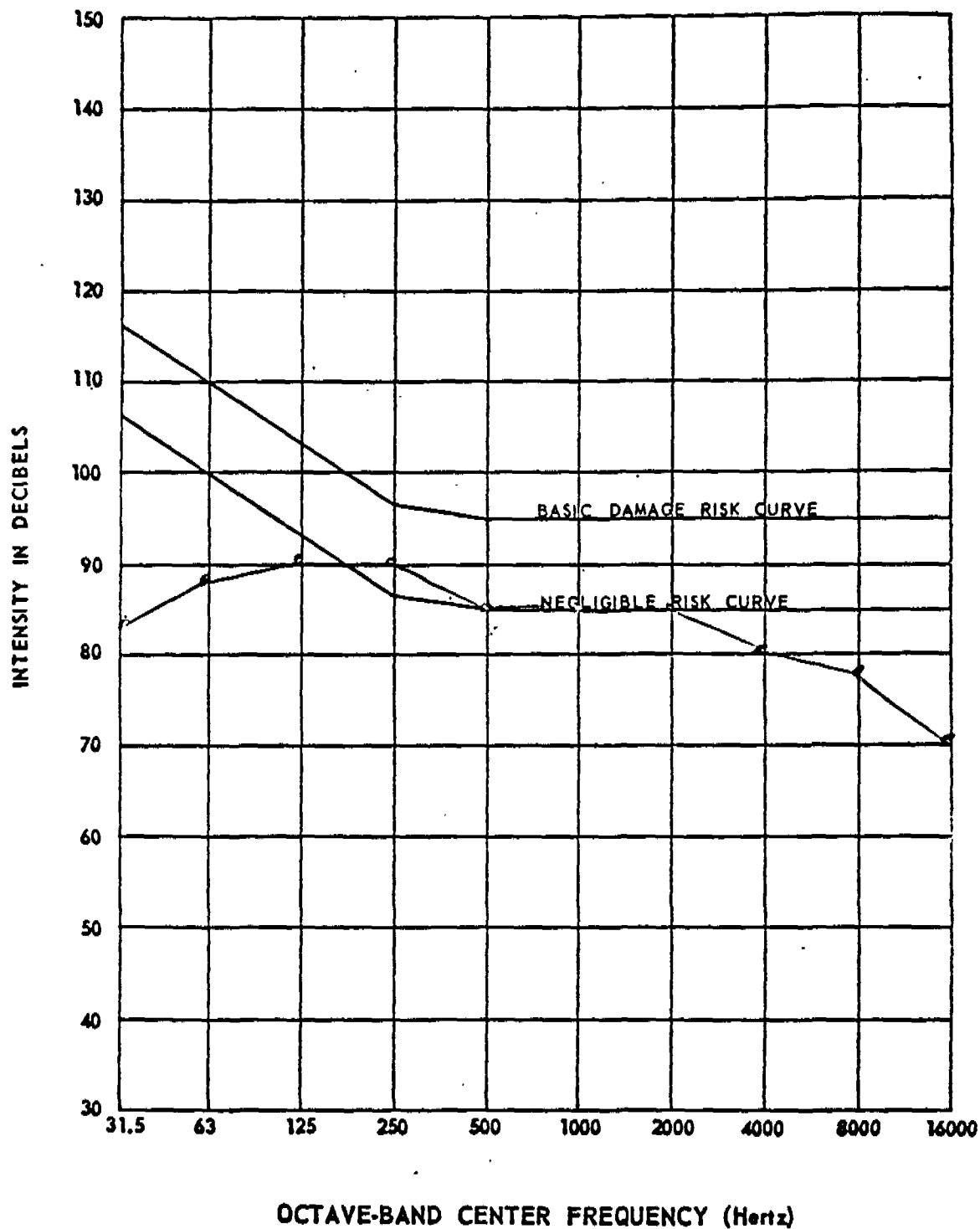


CHART 16

GT-101 (ENGINE)

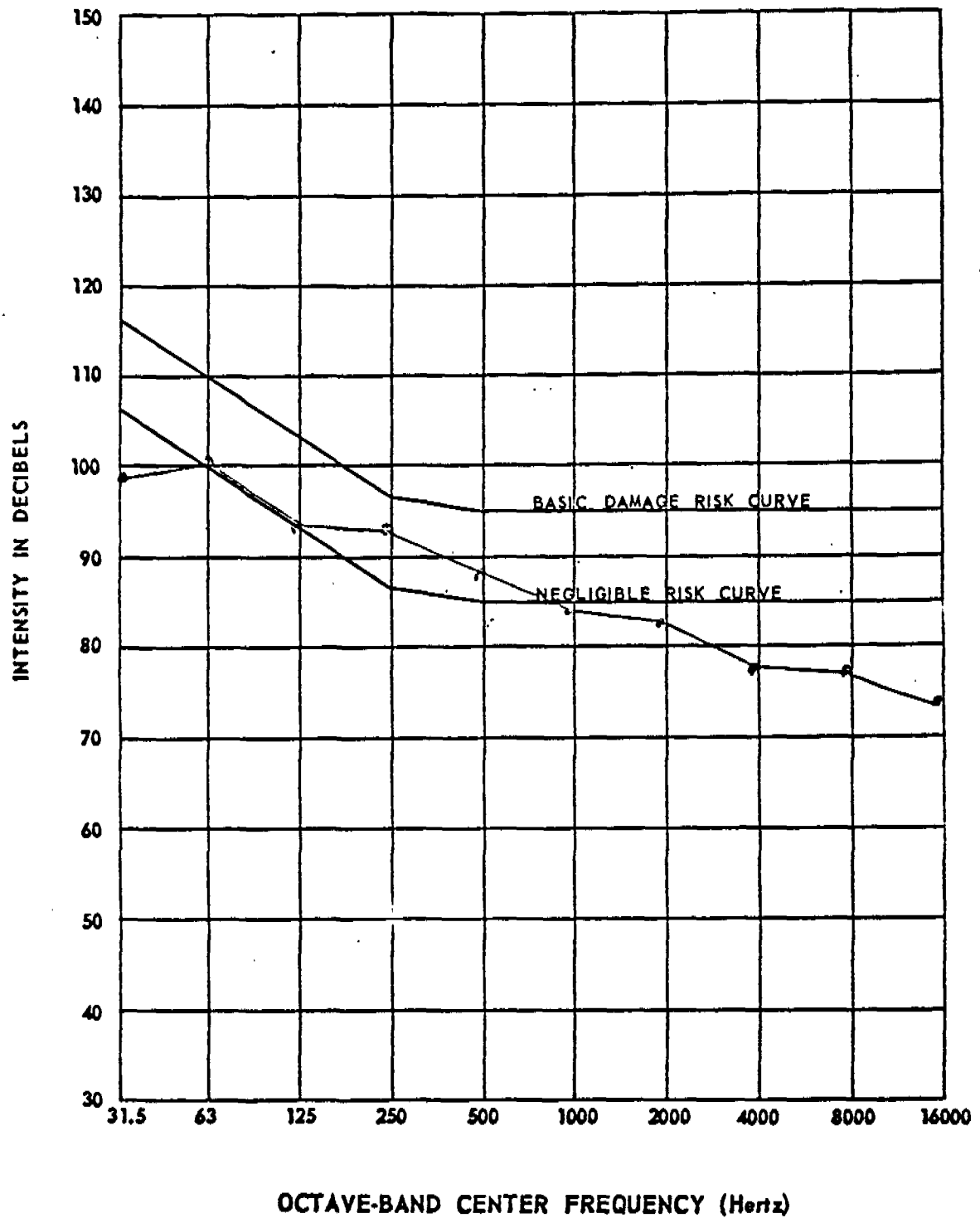
OVERALL: _____ DB(C)

102

_____ DB(A)

92

16



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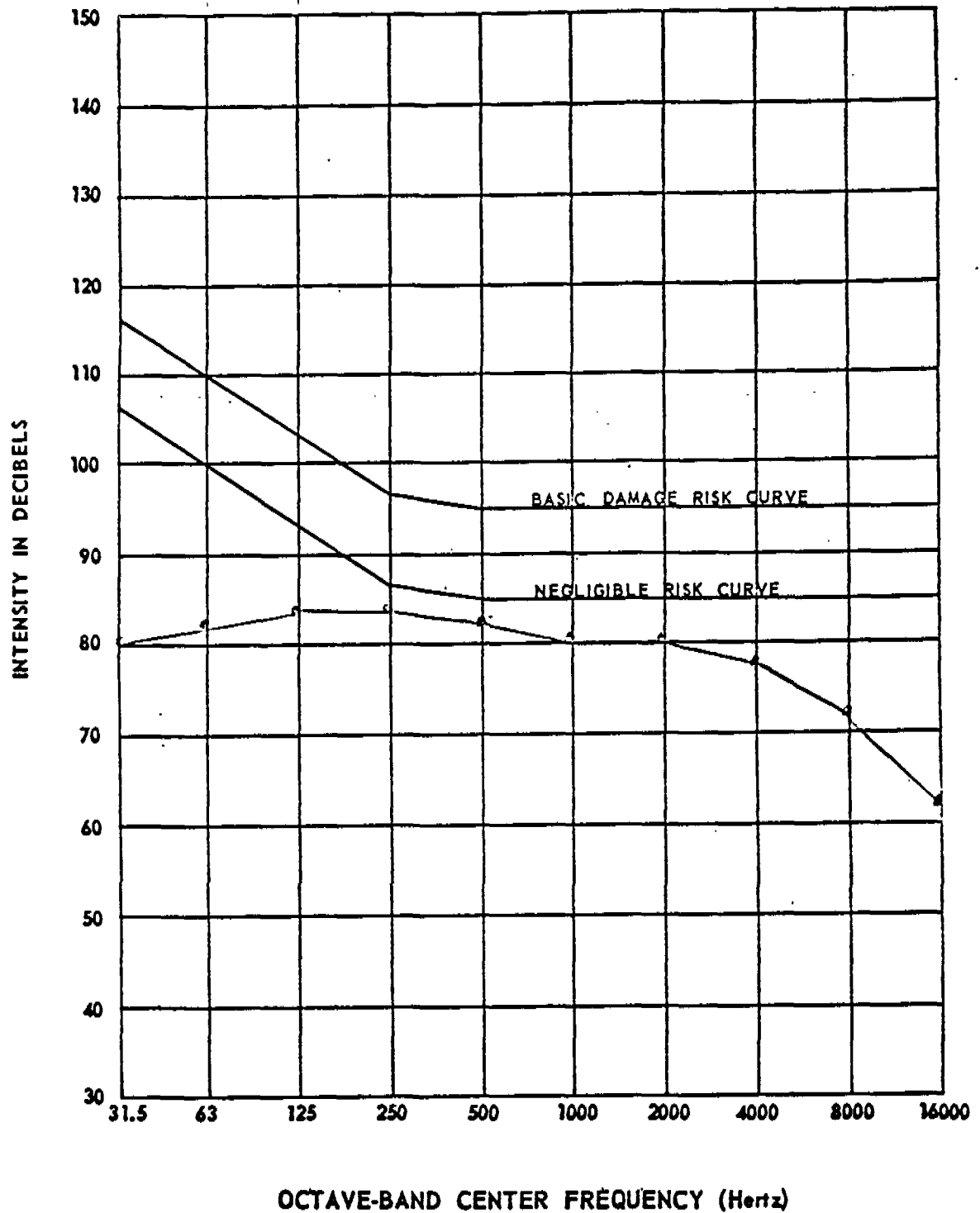
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CHART 17

D-311 (North)

OVERALL: 92 DB(C) 88 DB(A)

17



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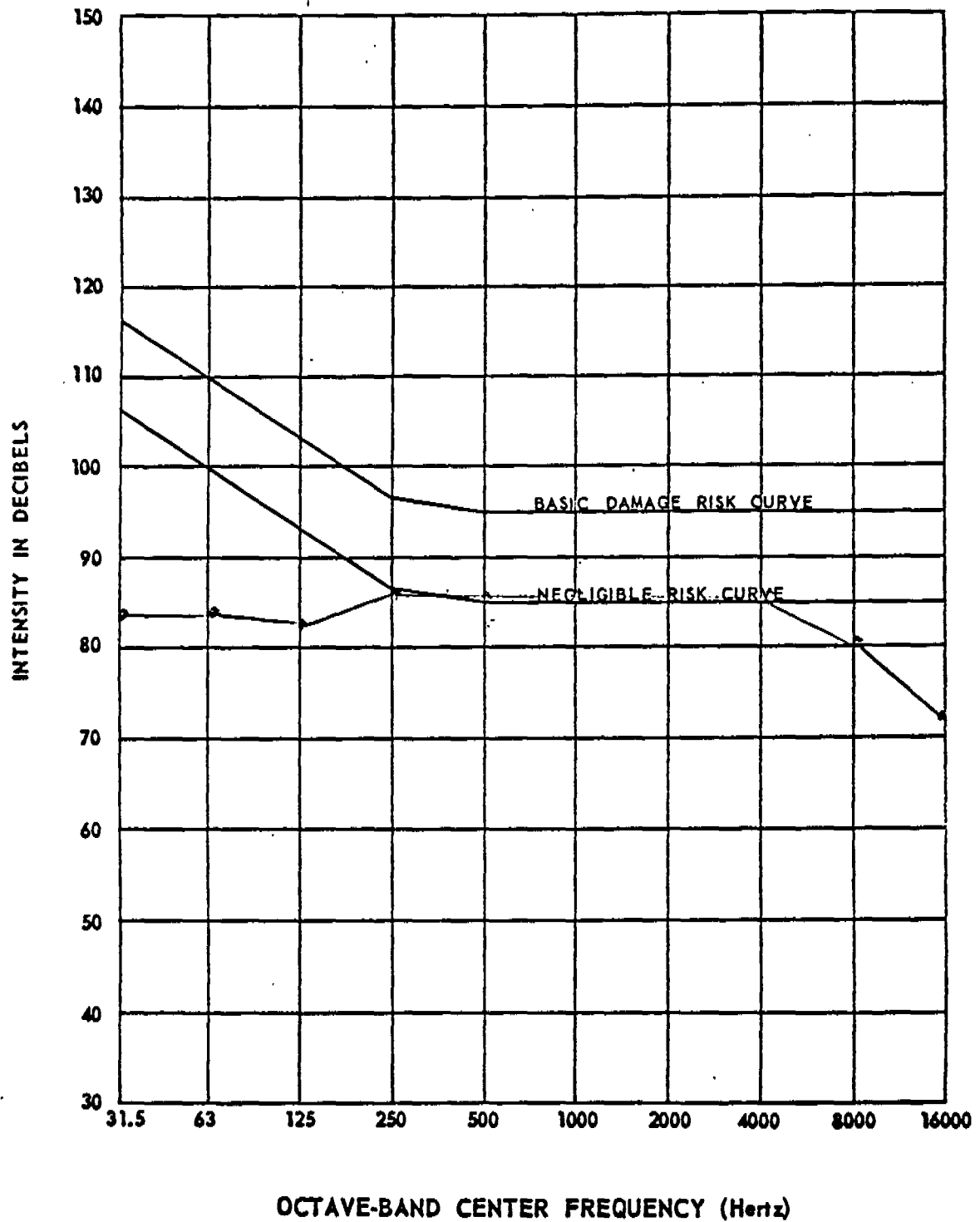
CHART 18

D-303 (Sample)
Ground Level

OVERALL: 94 DB(C)

92 DB(A)

18

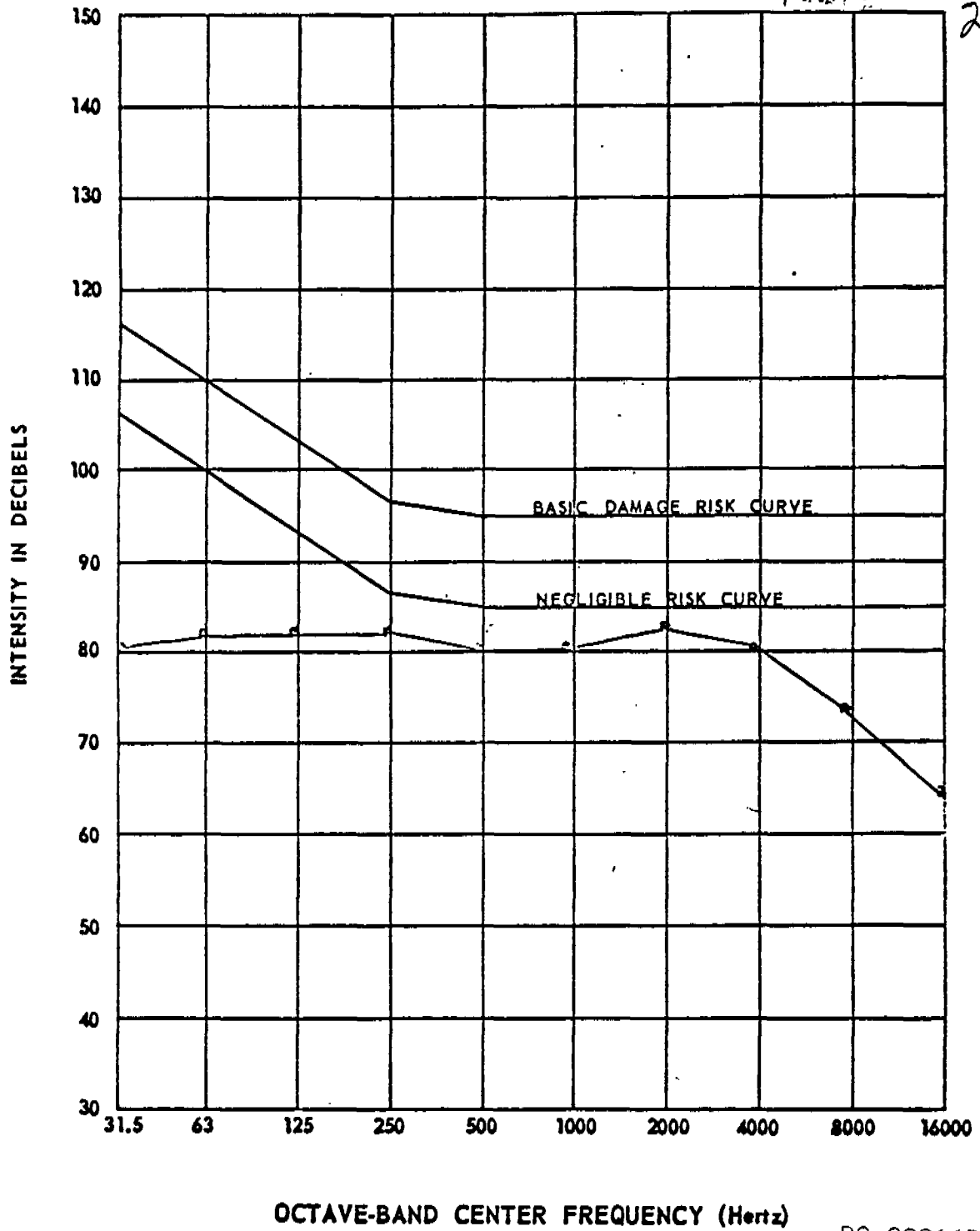


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CHART 19

OVERALL: 92 DB(C) 90 DB(A)

19
2nd Dec



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CHART 20

OVERALL: 90 DB(C) 86 DB(A)

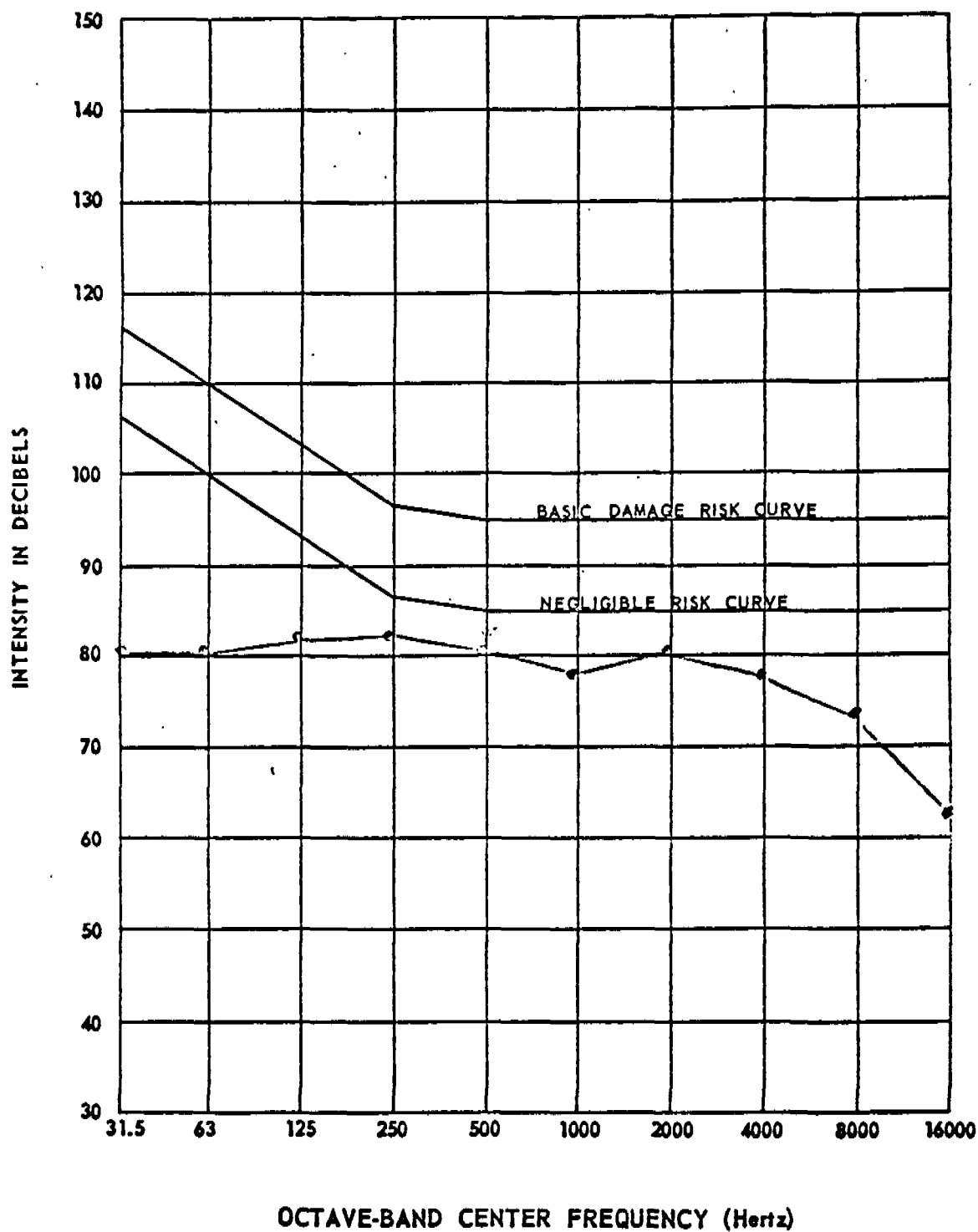
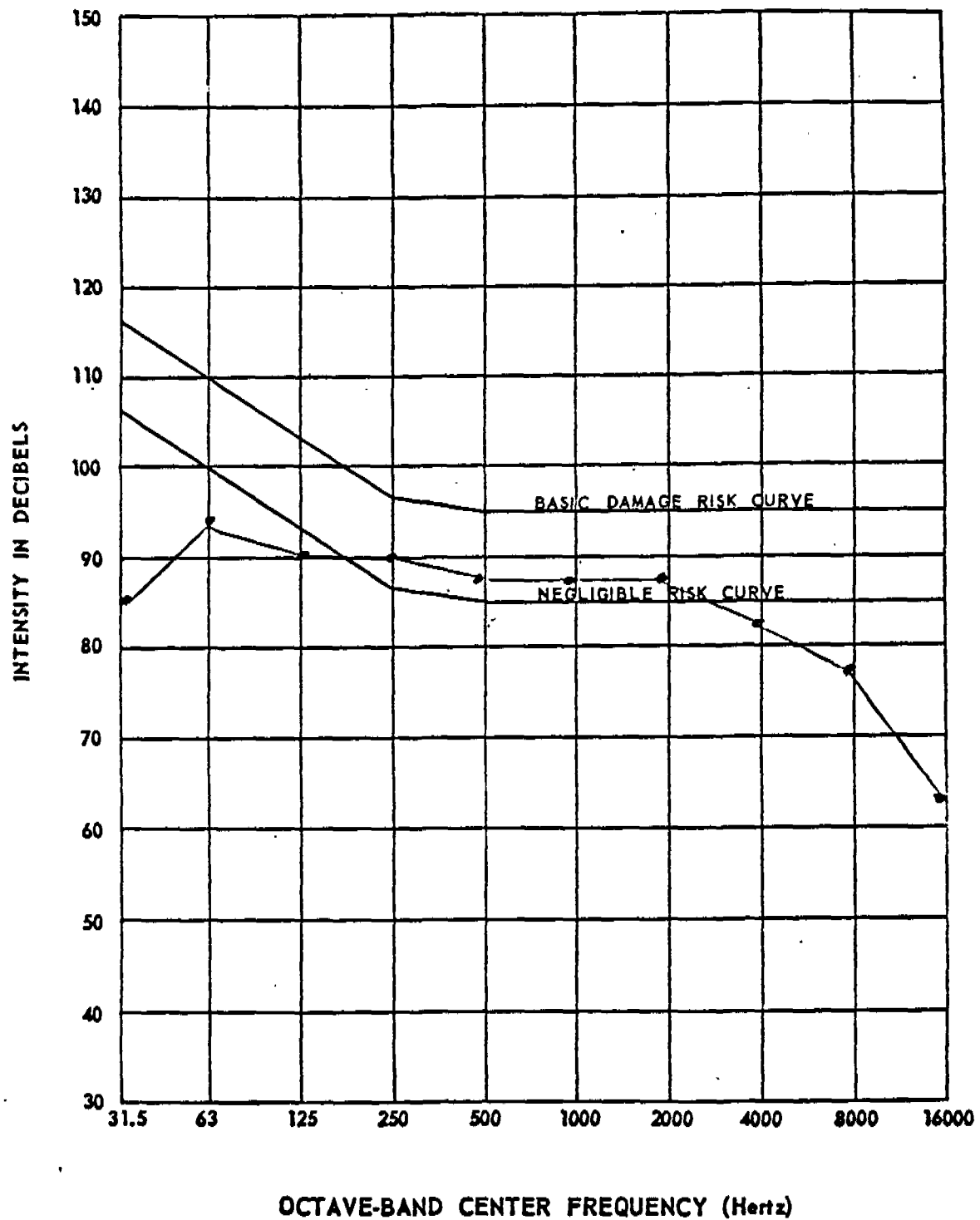


CHART 21

OVERALL: 98 DB(C) 92 DB(A)

2/
Turbine Deck
South



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CHART 22

22

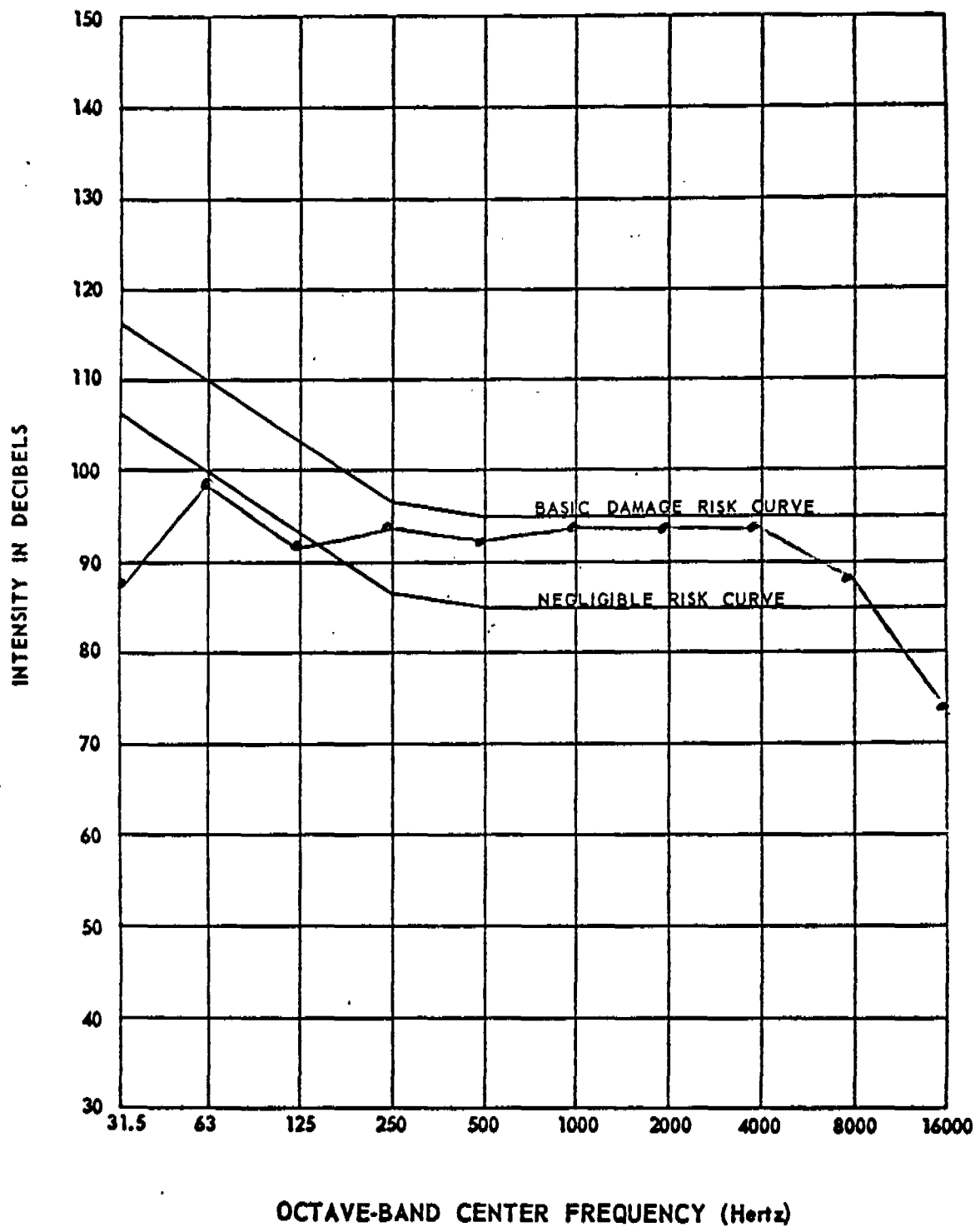
OVERALL: _____ DB(C)

102

_____ DB(A)

101

Turbine Deck
Canton



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CHART 23

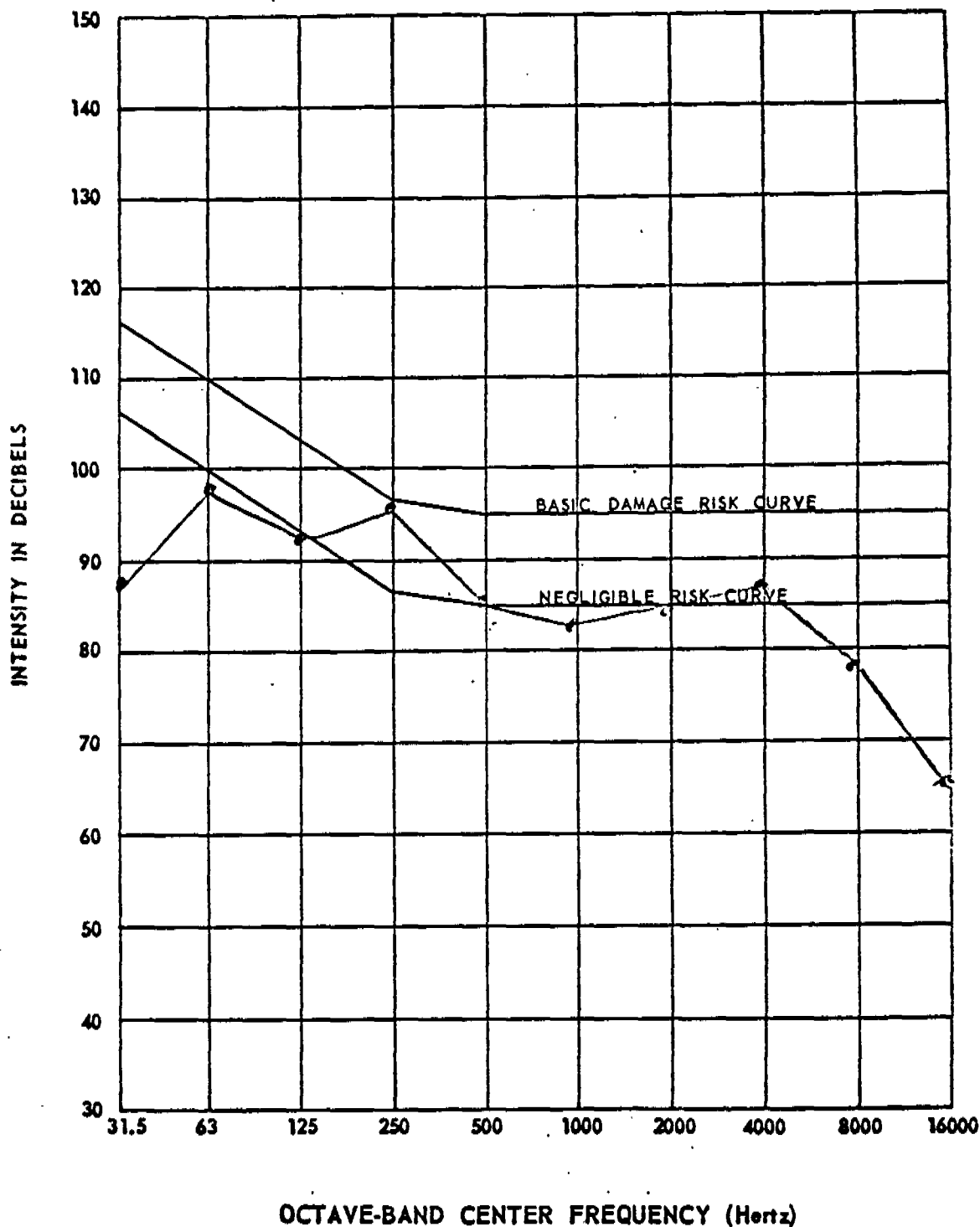
23

Turbine Dec
North

OVERALL: _____ DB(C) _____ DB(A)

100

96



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CHART 24

OVERALL: 98 DB(C) 96 DB(A)

(24)
Record line
Turbines
(North)

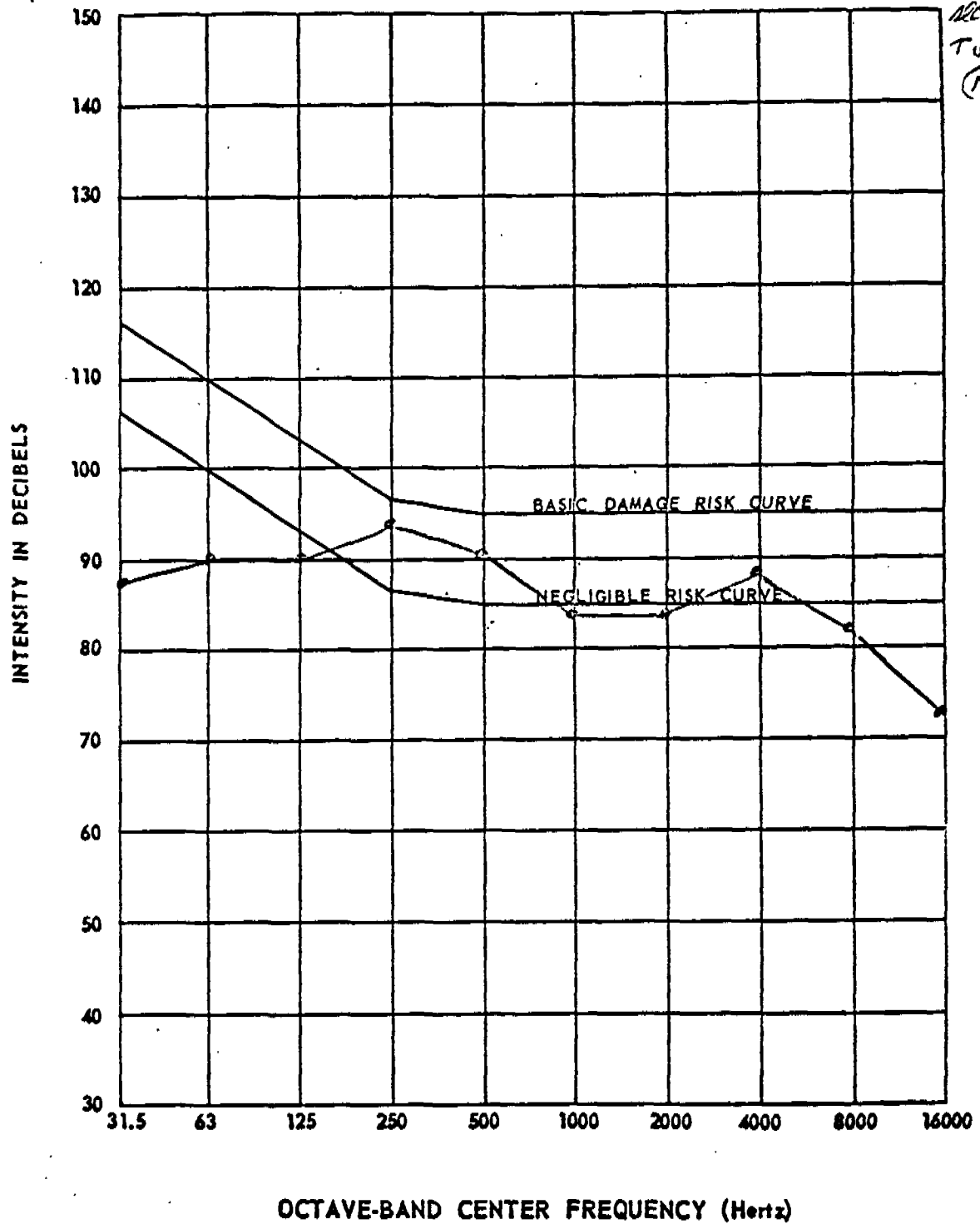


CHART 25

OVERALL: 102 DB(C) 96 DB(A)

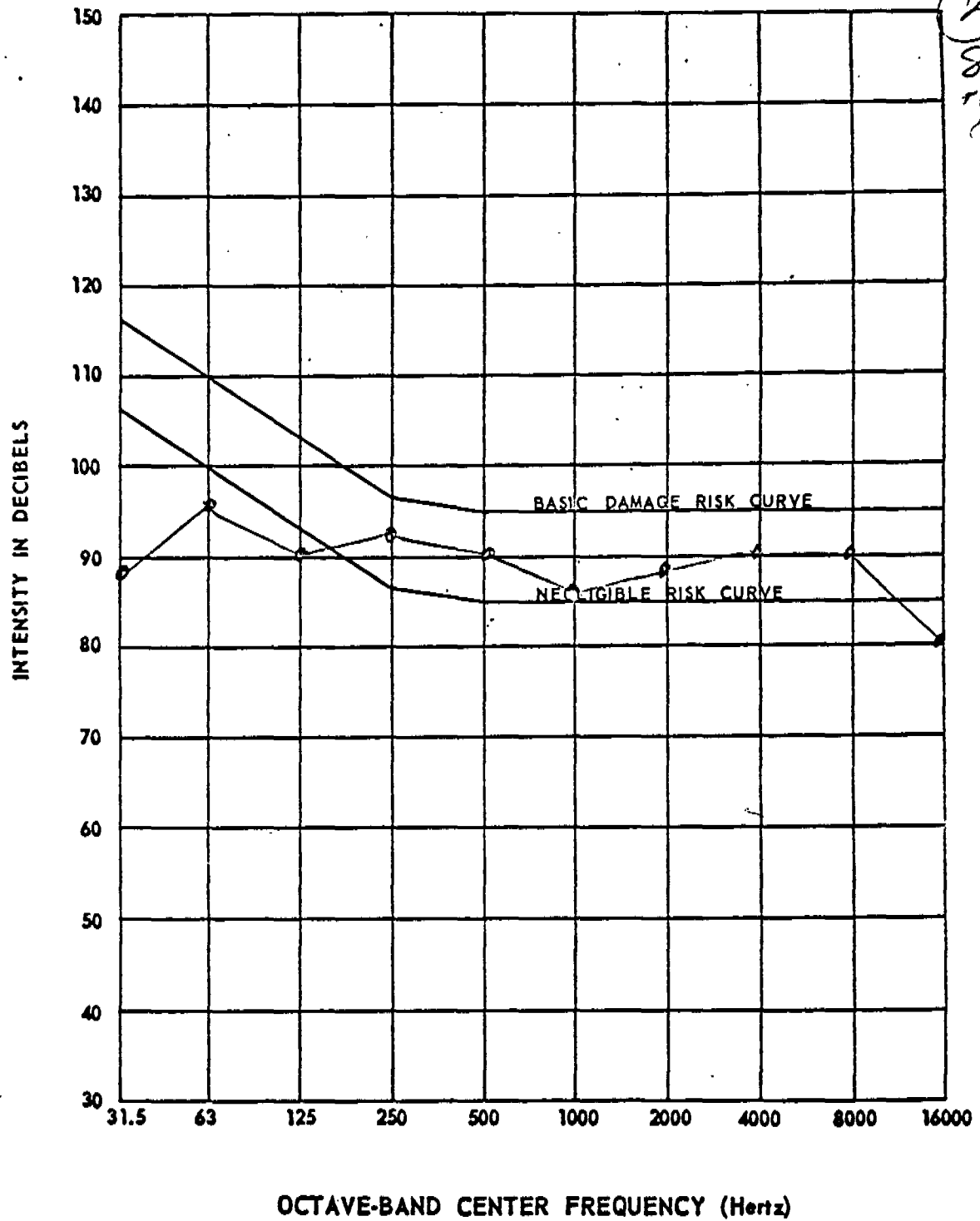
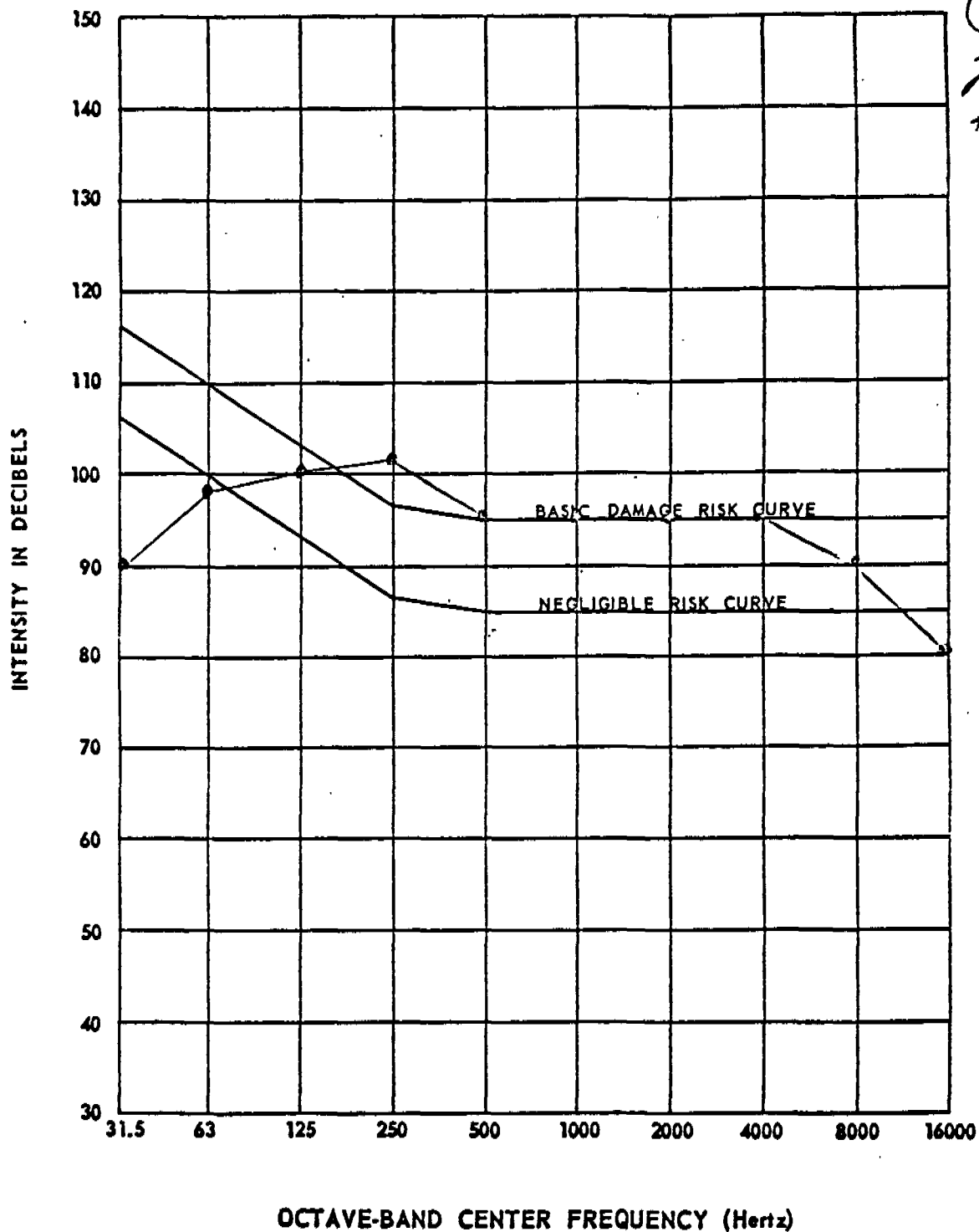


CHART 26

OVERALL: 108 DB(C) 104 DB(A)

(96)
7/18/69
Turbines
15000



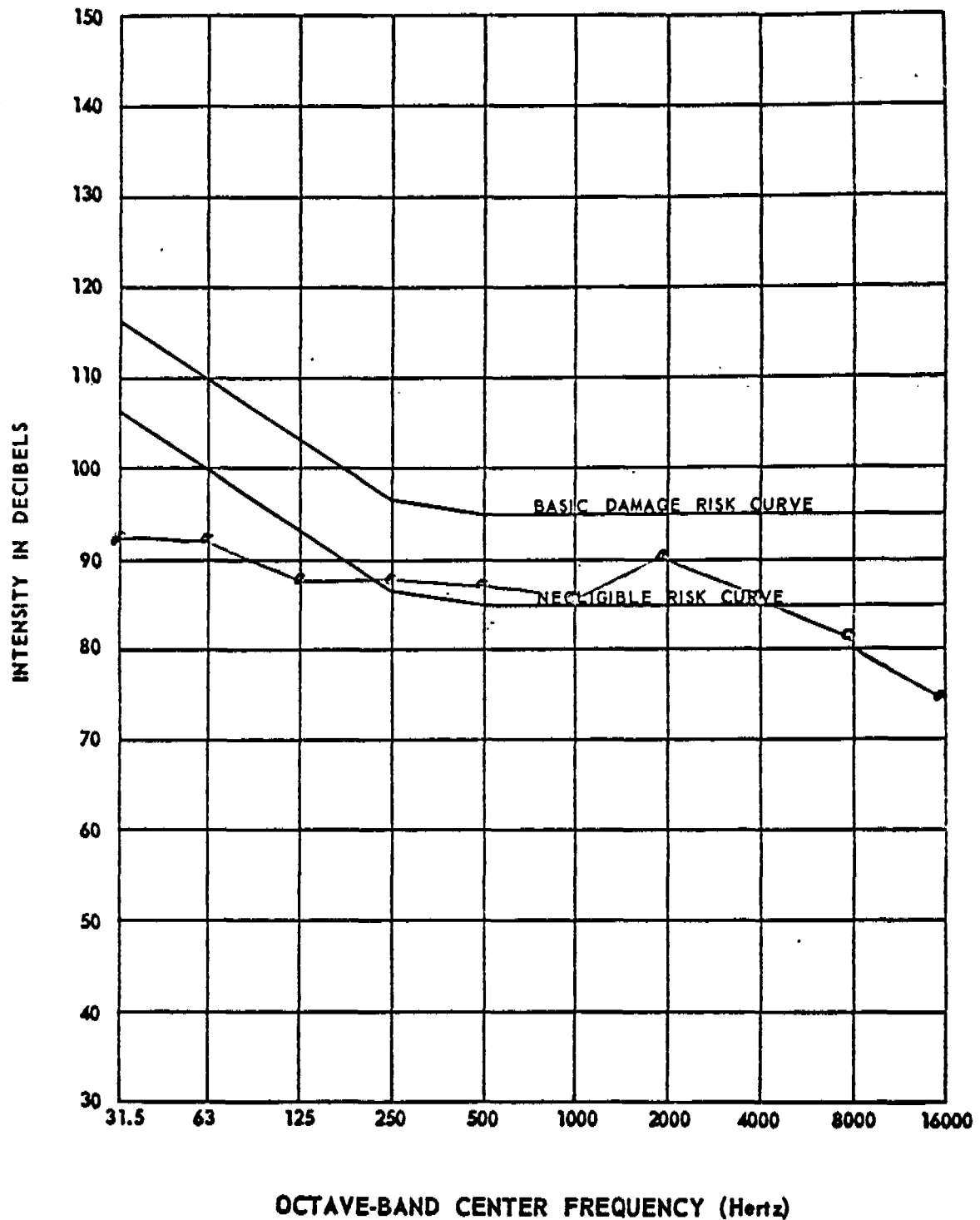
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CHART 27

OVERALL: 100 DB(C)

94 DB(A)

D-105 (WET)
27



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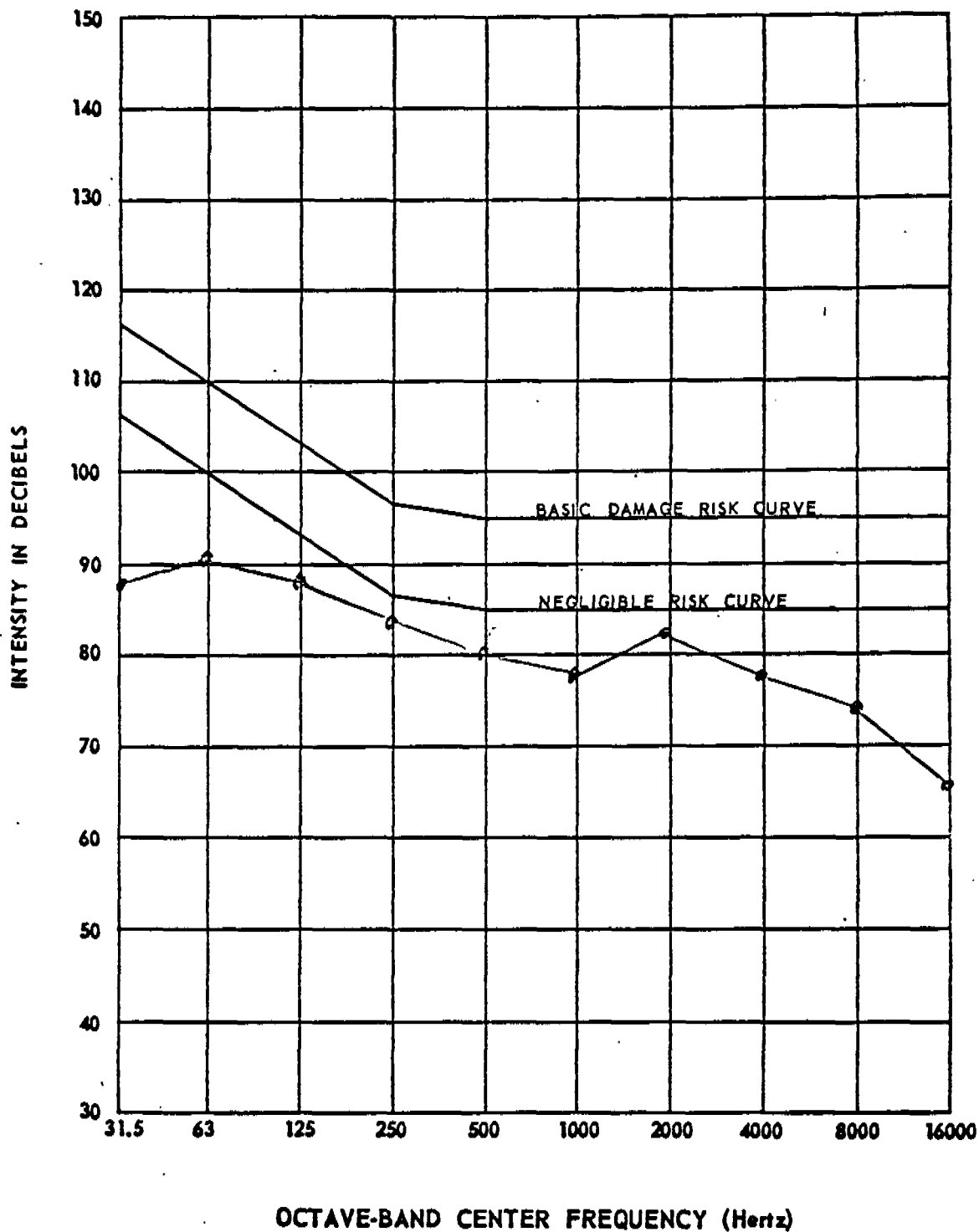
CHART 28

Roadway East of HRU-2

OVERALL: 96 DB(C)

88 DB(A)

28

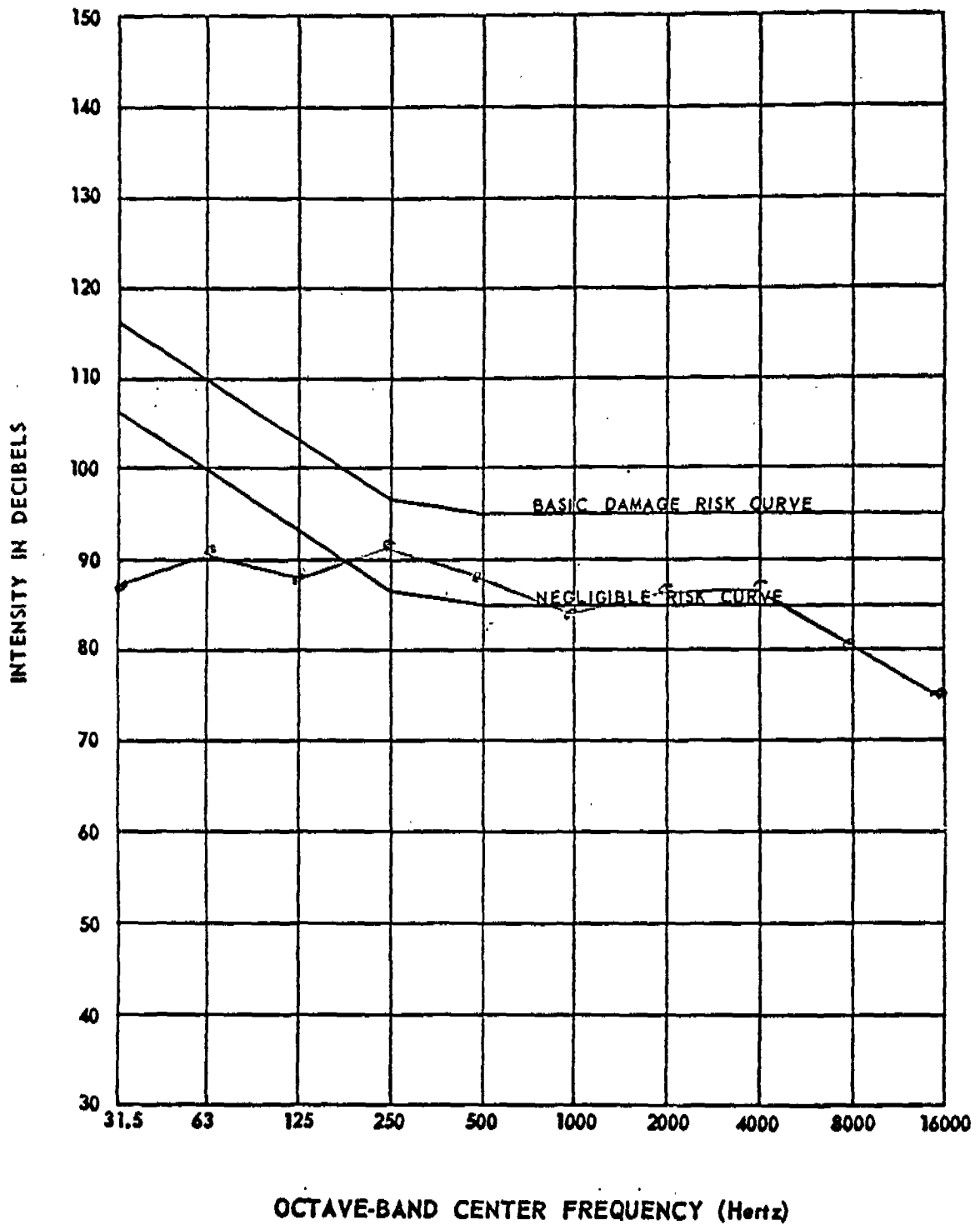


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CHART 29 Between HRU-2 & FWC-2

OVERALL: 98 DB(C) 92 DB(A)



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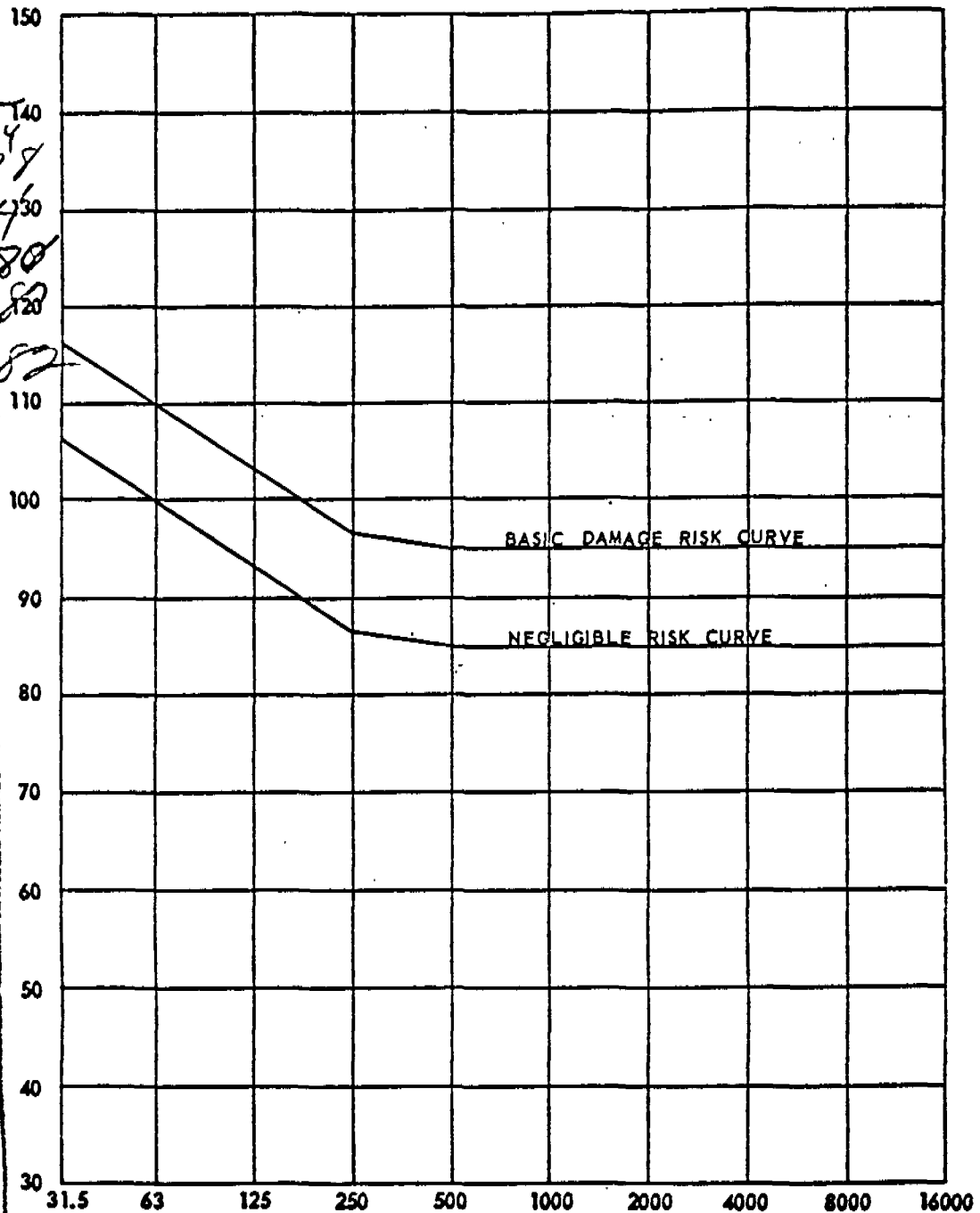
CHART 30 Cell Area

OVERALL: 91 DB(C) 84 DB(A)

30-35

	AP	AF
30-	90	84
31	86	78
32	84	74
33	84	80
34	86	82
35	88	82

INTENSITY IN DECIBELS



OCTAVE-BAND CENTER FREQUENCY (Hertz)

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CHART 36

[D-213-H]

OVERALL: 98 DB(C)

94 DB(A)

36

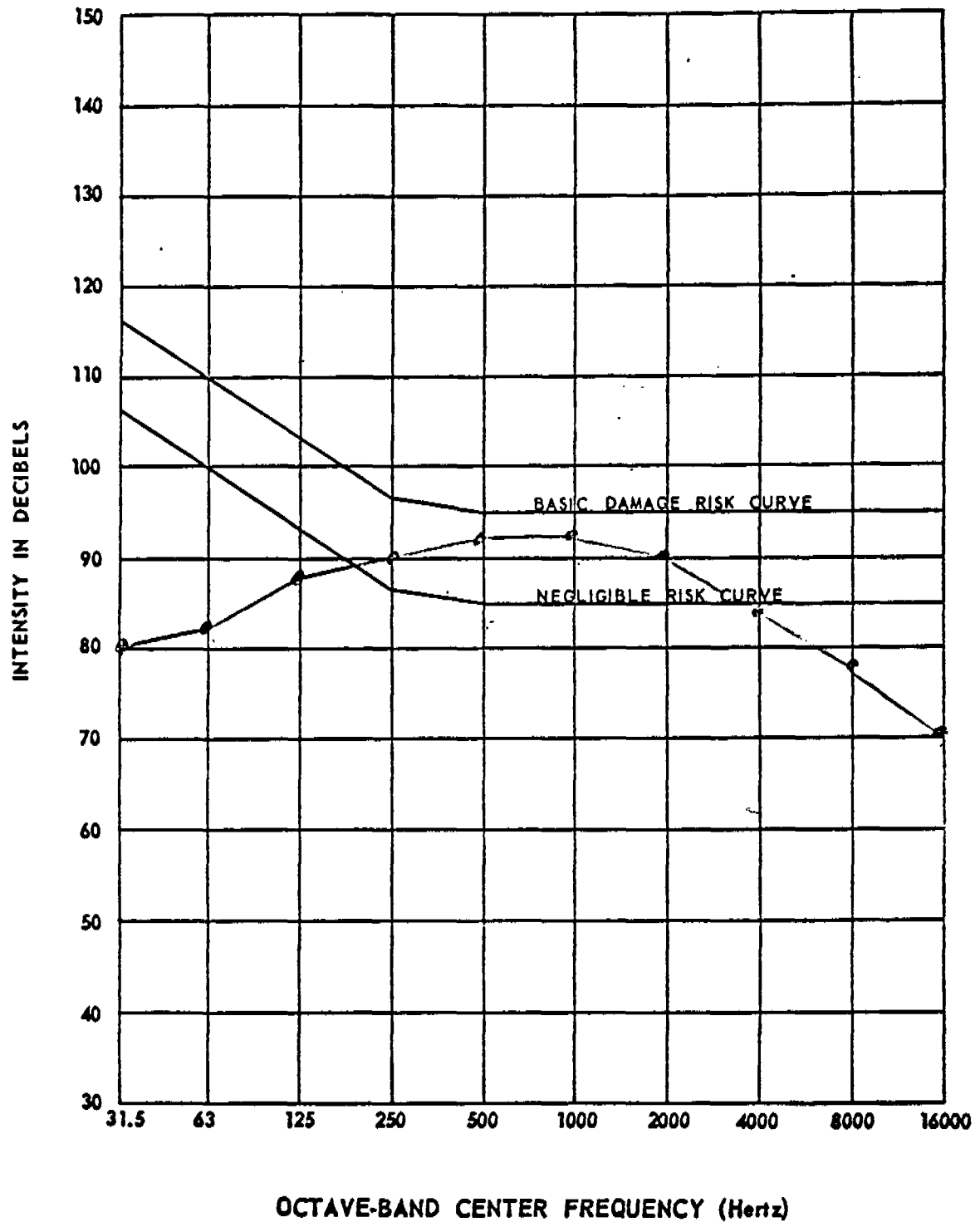


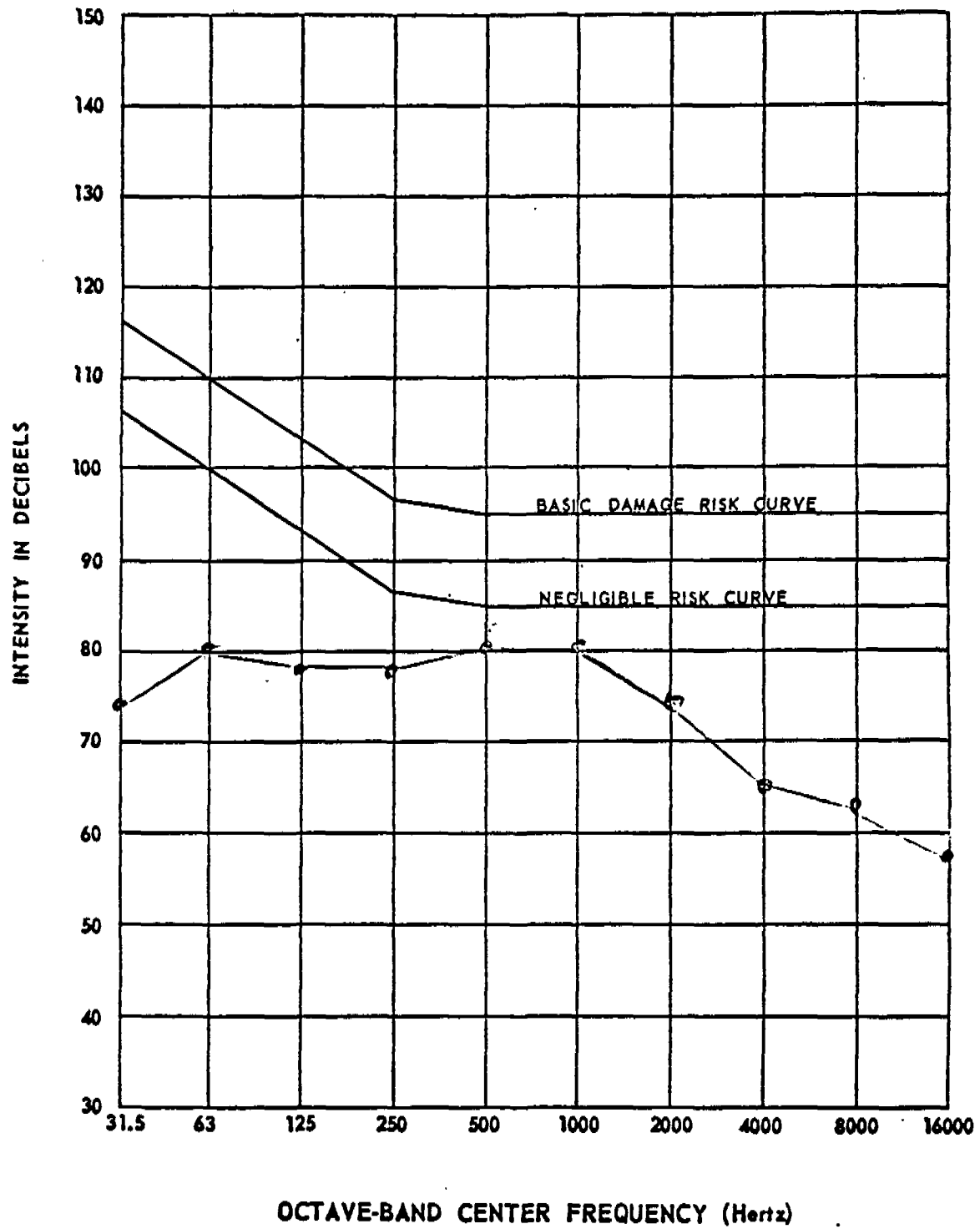
CHART 37

D-211 (NORTH)

OVERALL: 88 DB(C)

84 DB(A)

37



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CHART 38

Composite of 8 readings;
Area E 36-45

OVERALL: _____ DB(C) _____ DB(A)

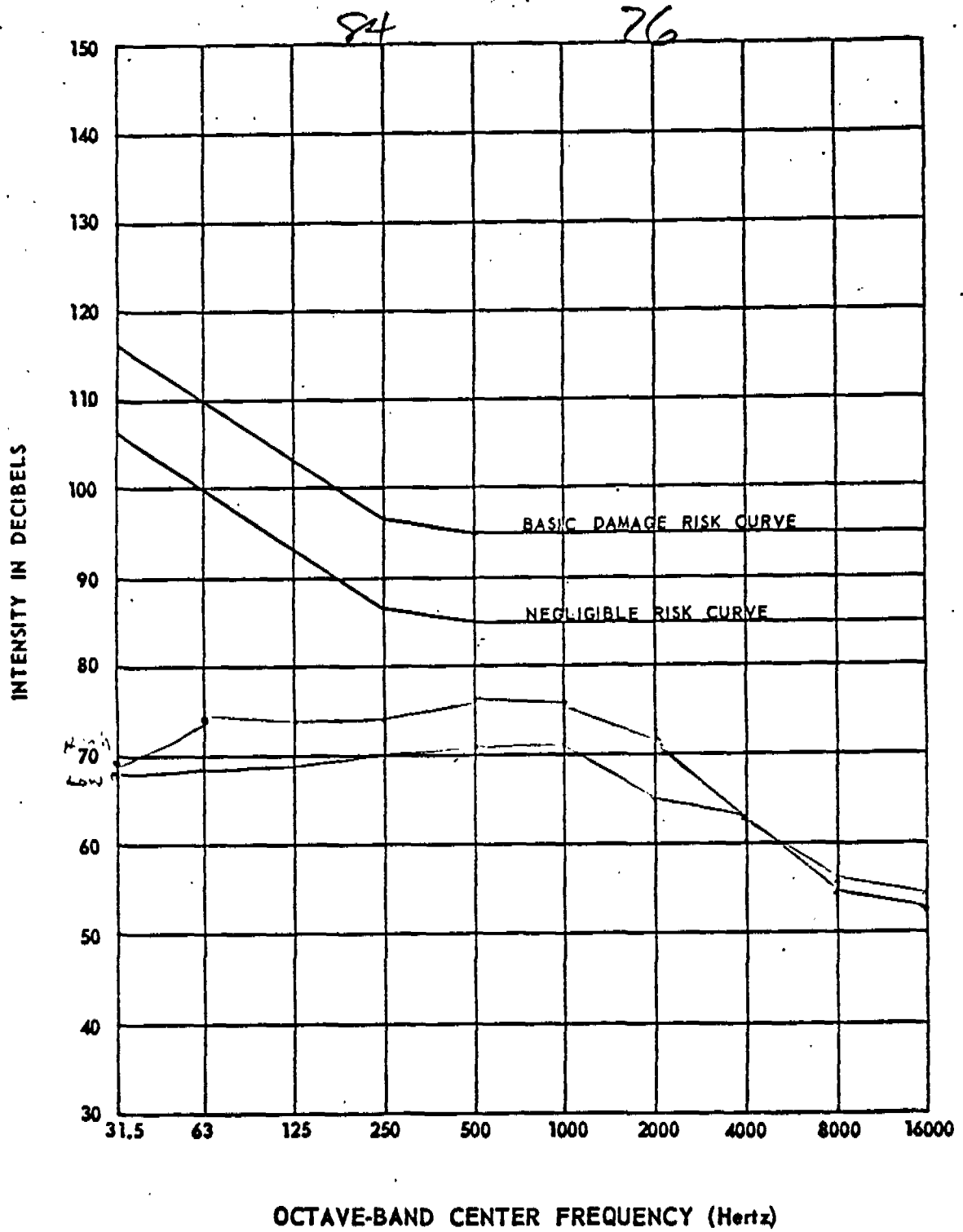


CHART 39

OVERALL: 74 DB(C) 68 DB(A)

(46)
shop

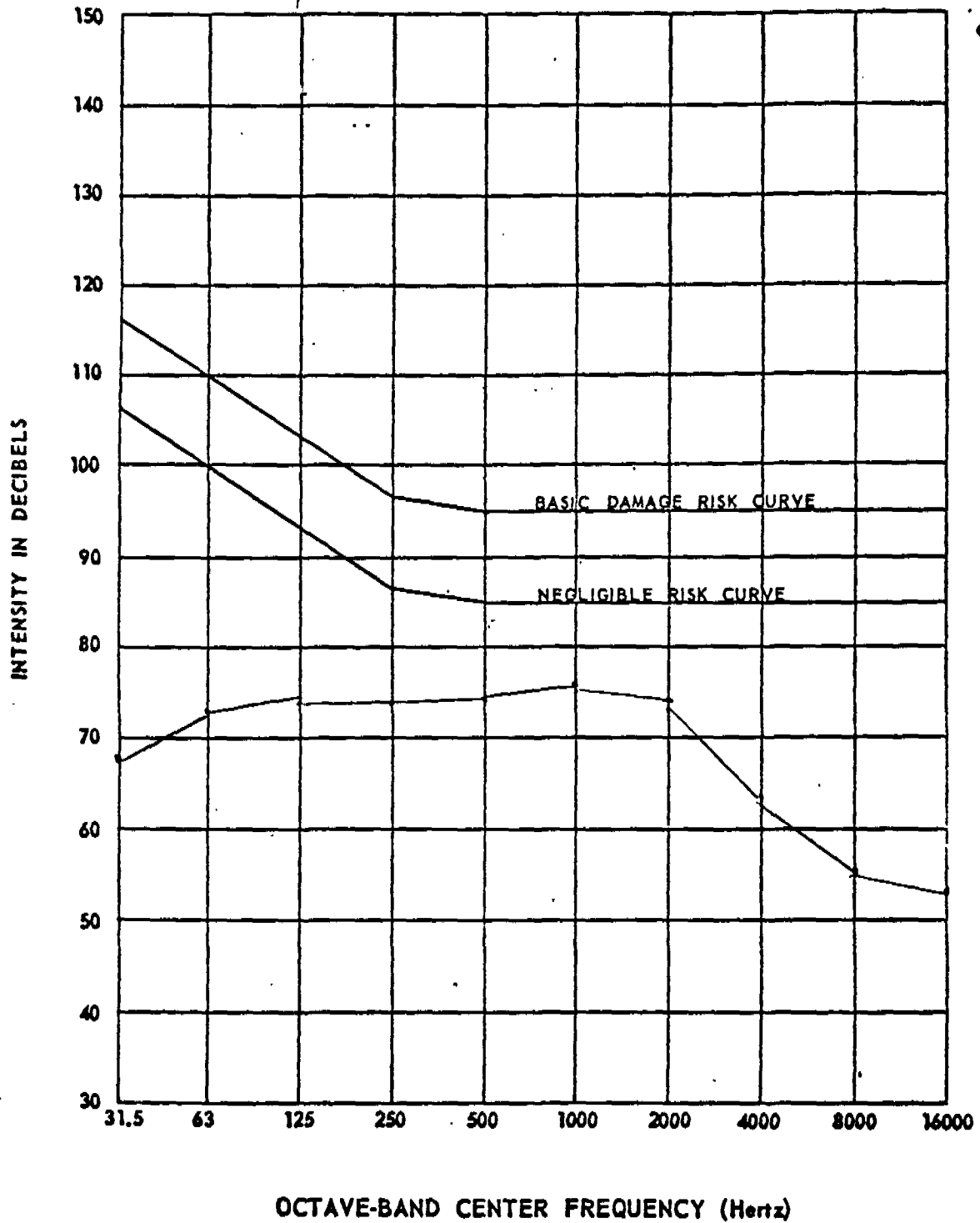


TABLE 1

Department - CA - #2

Job Classification - POWER AREA SOT

Ear Protection - MANDATORY

Type of Protection - DAVID CLARK E-800 EAR MUFF

Profile - C

Federal Regulation Rating - (90 db A/8 hours) combined equivalent exposures >1 are unacceptable

Work Area	Noise Description Charts	Exposure Time (min.)	Average dba	Equivalent Exposure Ratios
COOLING TOWER SUMP	15	30	92	0.14
COOLING TOWER INSIDE	16	30	92	0.14
TURBINE DECK (NORTH)	23	20	96	0.10
(CENTER)	22	20	101	0.19
(SOUTH)	21	65	92	0.18
TURBINE -				
SECOND LEVEL - (NORTH)	24	20	96	0.10
(CENTER)	25	20	96	0.10
(SOUTH)	26	20 -	104	0.29
AIR DRYER - D105	27	40	94	0.14
ROADWAY - E. OF HRU-2	28	20	88	0.00
Between HRU-2 & AWC-229		20	92	0.06
LUNCH + BREAKS (Control Room)	0	30	64	0.00
RUNNING SAMPLES + RELIEF (Control Room)	0	75	64	0.00
		<u>480</u>		<u>1.40</u>

TABLE 2

Department - CA - #2

Job Classification - CAUSTIC AREA SOT

Ear Protection - NOT NEEDED

Type of Protection - NONE

Profile - "Bm"

Federal Regulation Rating - (90 db A/8 hours) combined equivalent exposures >1 are unacceptable

Work Area	Noise Description Charts	Exposure Time (min.)	Average dba	Equivalent Exposure Ratios
NEAR EV303	1	15	80	0.00
N. OF D312	2	15	78	0.00
W. OF S301	3	15	82	0.00
S. OF T-3	4	60	88	0.00
	5	15	86	0.00
Between E-302 & E303	6	15	80	0.00
TOP OF E303	7	15	88	0.00
TOP OF EV302	8	15	88	0.00
TOP OF E301	9	15	88	0.00
W. OF EV304	10	15	92	0.04
W. OF R305	11	60	84	0.00
S. OF D311	12	30	80	0.00
NEAR FL302	13	60	82	0.00
NEAR E307 1/2	14	15	84	0.00
NEAR P-331	15	15	88	0.00
N OF D311	16	15	92	0.04
S OF D308	17	15	90	0.03
T-302 second Deck	18	15	86	0.00
T-302 third Deck	19	15	86	0.00
LOUVER & Break Condition	20	60	64	0.00
		480		0.11

TABLE 3

Department - CA-#2

Job Classification - CL2 AREA SOT

Ear Protection - NOT NEEDED

Type of Protection - NONE

Profile - B

Federal Regulation Rating - (90 db A/8 hours) combined equivalent exposures >1 are unacceptable

<u>Work Area</u>	<u>Noise Description Charts</u>	<u>Exposure Time (min.)</u>	<u>Average dba</u>	<u>Equivalent Exposure Ratios</u>
CELL AREA	30-35	300	<85	0.00
CONTROL ROOM	0	150	64	0.00
LUNCH + BREAKS (CONTROL ROOM)	0	30	64	0.00
		<u>480</u>		<u>0.00</u>
	TOTAL			

TABLE 4

Department - CA- #2

Job Classification - O.S. "A" SHIFT

Ear Protection - NOT NEEDED

Type of Protection - NONE

Profile - "B"

Federal Regulation Rating - (90 db A/8 hours) combined equivalent exposures >1 are unacceptable

<u>Work Area</u>	<u>Noise Description Charts</u>	<u>Exposure Time (min.)</u>	<u>Average dba</u>	<u>Equivalent Exposure Ratios</u>
CONTROL Room	0	480	64	0.00

TABLE 5

Department - CA #2

Job Classification - Ch Area - OT

Ear Protection - NOT NEEDED

Type of Protection - NONE

Profile - "B"

Federal Regulation Rating - (90 db A/8 hours) combined equivalent exposures >1 are unacceptable

<u>Work Area</u>	<u>Noise Description Charts</u>	<u>Exposure Time (min.)</u>	<u>Average dba</u>	<u>Equivalent Exposure Ratios</u>
CELL AREA	30-35	330	68	0.00
CONTROL ROOM	0	120	64	0.00
LUNCH (CONTROL ROOM)	0	30	64	0.00
TOTAL		480		0.00