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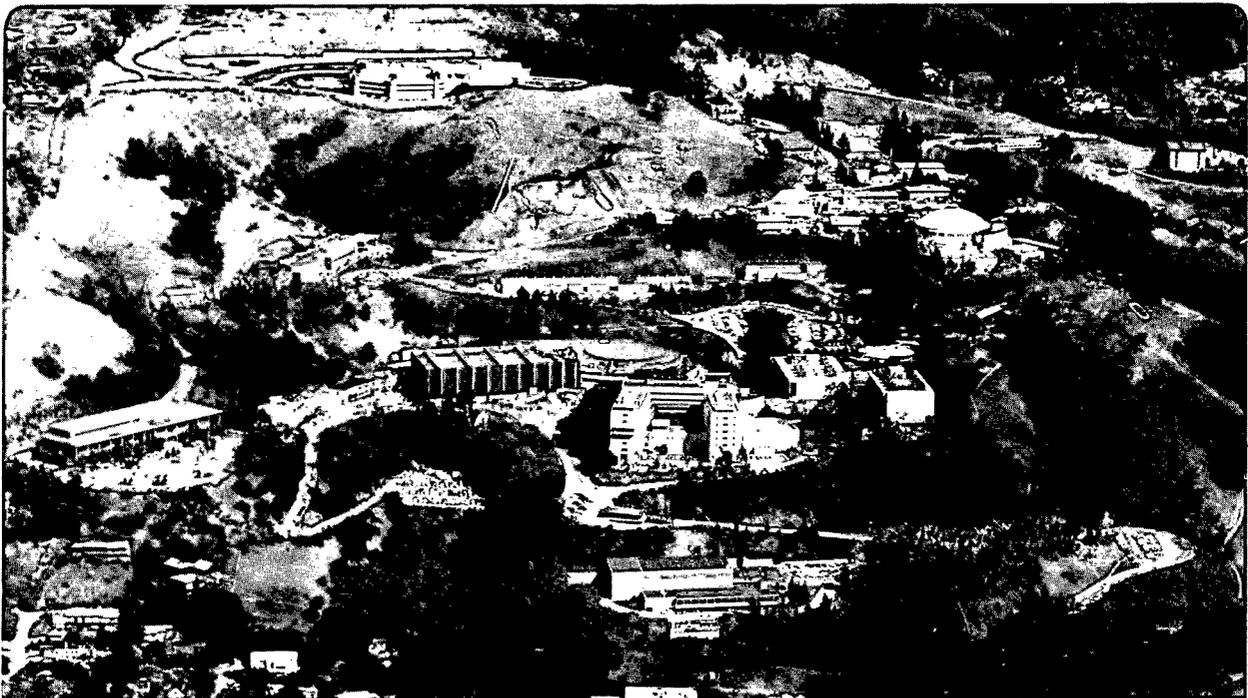
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ENGINEERING NOTE		AA0300	M5659	1 of 6
AUTHOR	DEPARTMENT	LOCATION	DATE	
GERD BEHRING	MECHANICAL	BERKELEY	JANUARY 28, 1981	
PROGRAM - PROJECT - JOB				
MECHANICAL DEPARTMENT				
MECHANICAL SAFETY COMMITTEE				
TITLE				
CALCULATED FLAMMABILITY LIMITS OF METHANE-ARGON GAS MIXTURES				

I. METHANE-ARGON MIXTURE WITH AIR CURVES

The flammable limits of methane-argon gas mixtures can be estimated from the limits of flammability of methane in air diluted by the addition of argon as shown in Figure 1. The peninsula-shaped curve for argon on the left hand side of the figure defines the flammable limits and indicates how much argon gas must be added before the mixture will not burn.

The methane-argon mixture with air curves are calculated from the relative gas volumes.

Air	Methane	Argon	<u>METHANE</u> Methane + Argon + Air	<u>Argon</u> Argon + Air
0	9	91	9.0	100
80	9	91	5.00	53.2
90	9	91	4.74	50.3
100	9	91	4.50	47.6
0	10	90	10	100
100	10	90	5	47.3
300	10	90	2.5	23.1
700	10	90	1.25	11.4
0	15	85	15	100
100	15	85	7.5	45.9
300	15	85	3.75	22.1
700	15	85	1.88	10.8
0	20	80	20	100
100	20	80	10	44.4
300	20	80	5	21.1
700	20	80	2.5	10.3

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2 OF 6

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Air	Methane	Argon	<u>METHANE</u> Methane + Argon + Air	<u>Argon</u> Argon + Air
0	30	70	30	100
100	30	70	15	41.2
300	30	70	7.5	18.9
700	30	70	3.75	9.1
0	40	60	40	100
100	40	60	20	37.5
300	40	60	10	16.7
700	40	60	5	7.9
0	60	40	60	100
100	60	40	30	28.6
300	60	40	15	11.8
700	60	40	7.5	5.4
1500	60	40	3.75	2.6
0	80	20	80	100
100	80	20	40	16.7
300	80	20	20	6.25
700	80	20	10	2.78
1500	80	20	5	1.32
0	90	10	90	100
100	90	10	45	9.1
300	90	10	22.5	3.23
700	90	10	11.25	1.41
1500	90	10	5.63	.66

METHANE-DILUENT-AIR

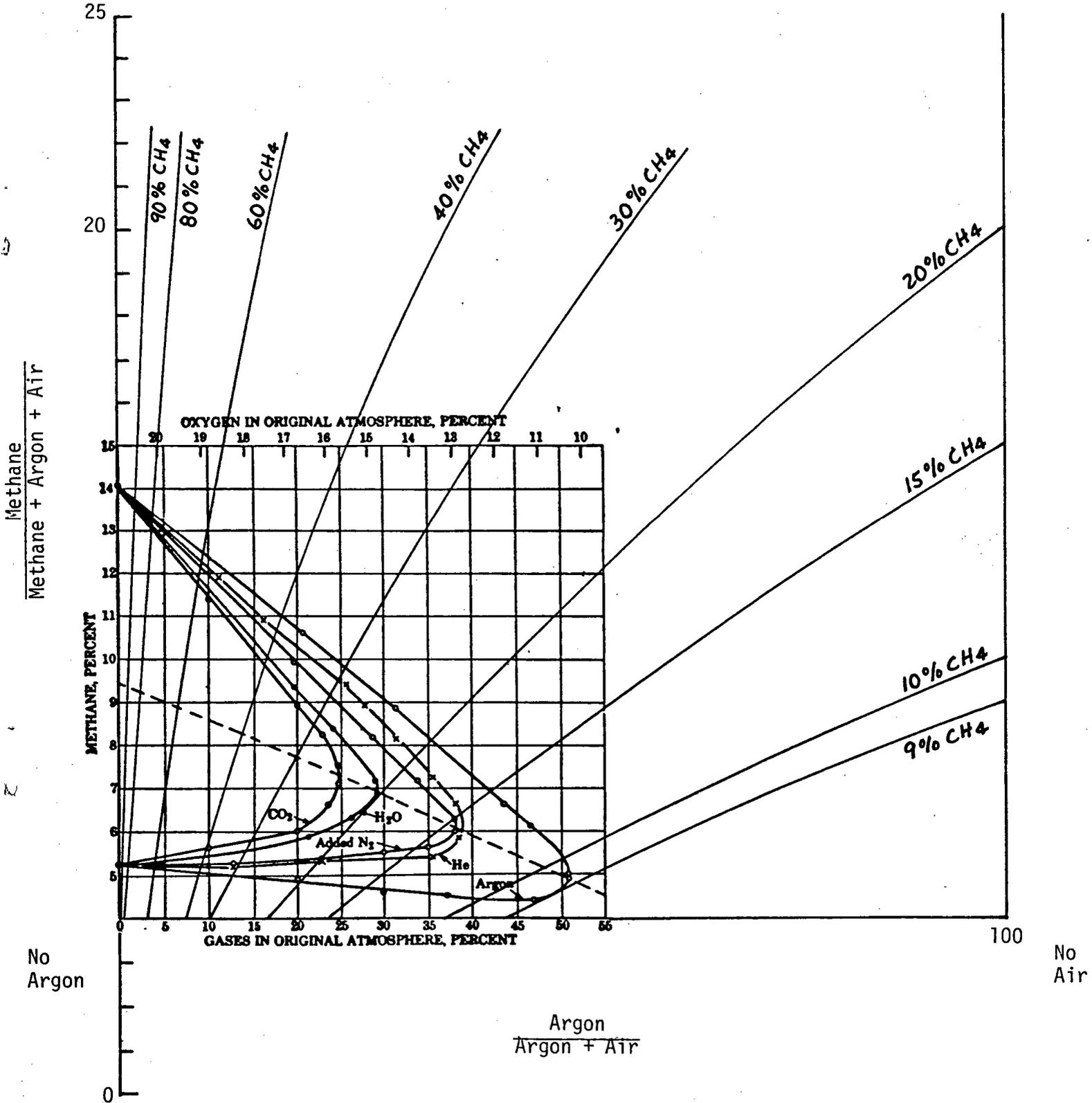


FIGURE 1 (Reference 1)

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II. FLAMMABILITY LIMITS CURVE

The flammability limits of the methane-argon gas mixtures are determined by the intersection of the methane-argon-air curves with the peninsula-shaped argon curve.

Gas Mixture		Flammability Limits	
Methane	Argon	Lower	Upper
9	91	NF	NF
10	90	4.4	5.4
15	85	4.7	6.9
20	80	4.9	8.1
30	70	5.0	9.8
40	60	5.1	11.0
60	40	5.2	12.5
80	20	5.3	13.4
90	10	5.3	13.7
100	0	5.3	14.0

Figure 2 shows the flammability limits in graphical form.

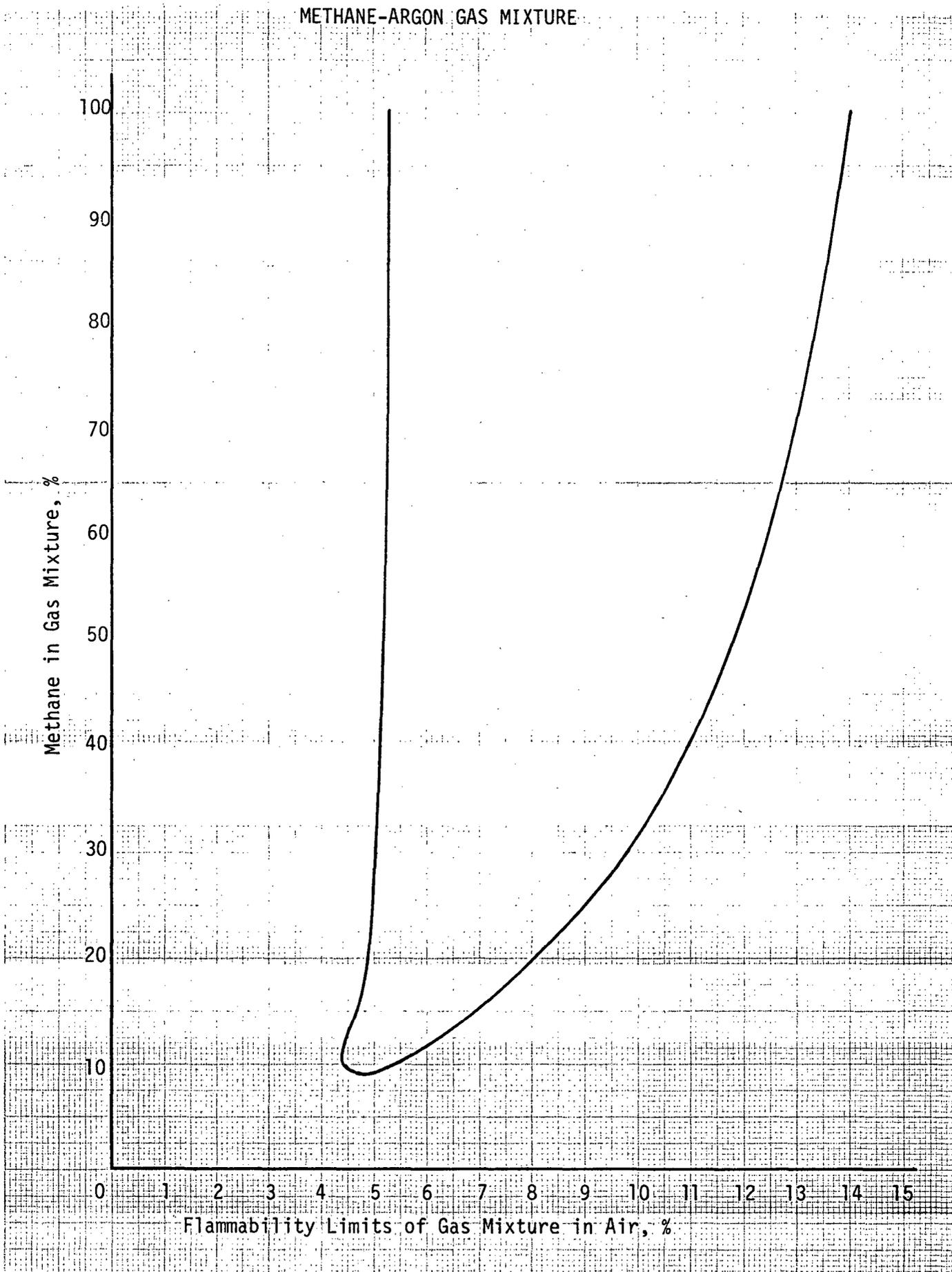


FIGURE 2

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PAGE

6 OF 6

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III. REFERENCES

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3. Zabetakis, M. G., Flammability Characteristics of Combustible Gases and Vapors, Bulletin 627, Bureau of Mines, 1965.

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