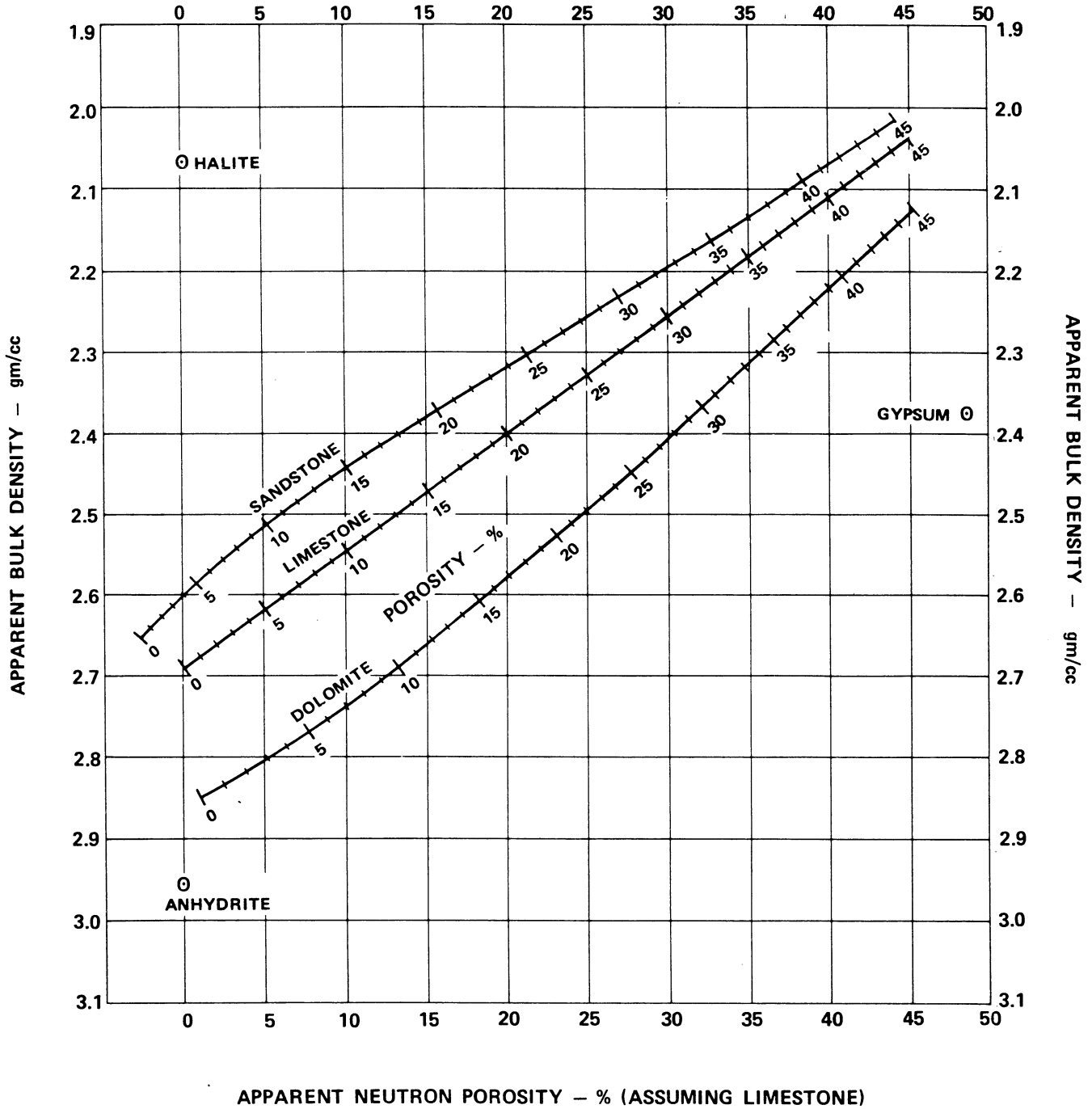


BULK DENSITY – NEUTRON CROSS PLOT

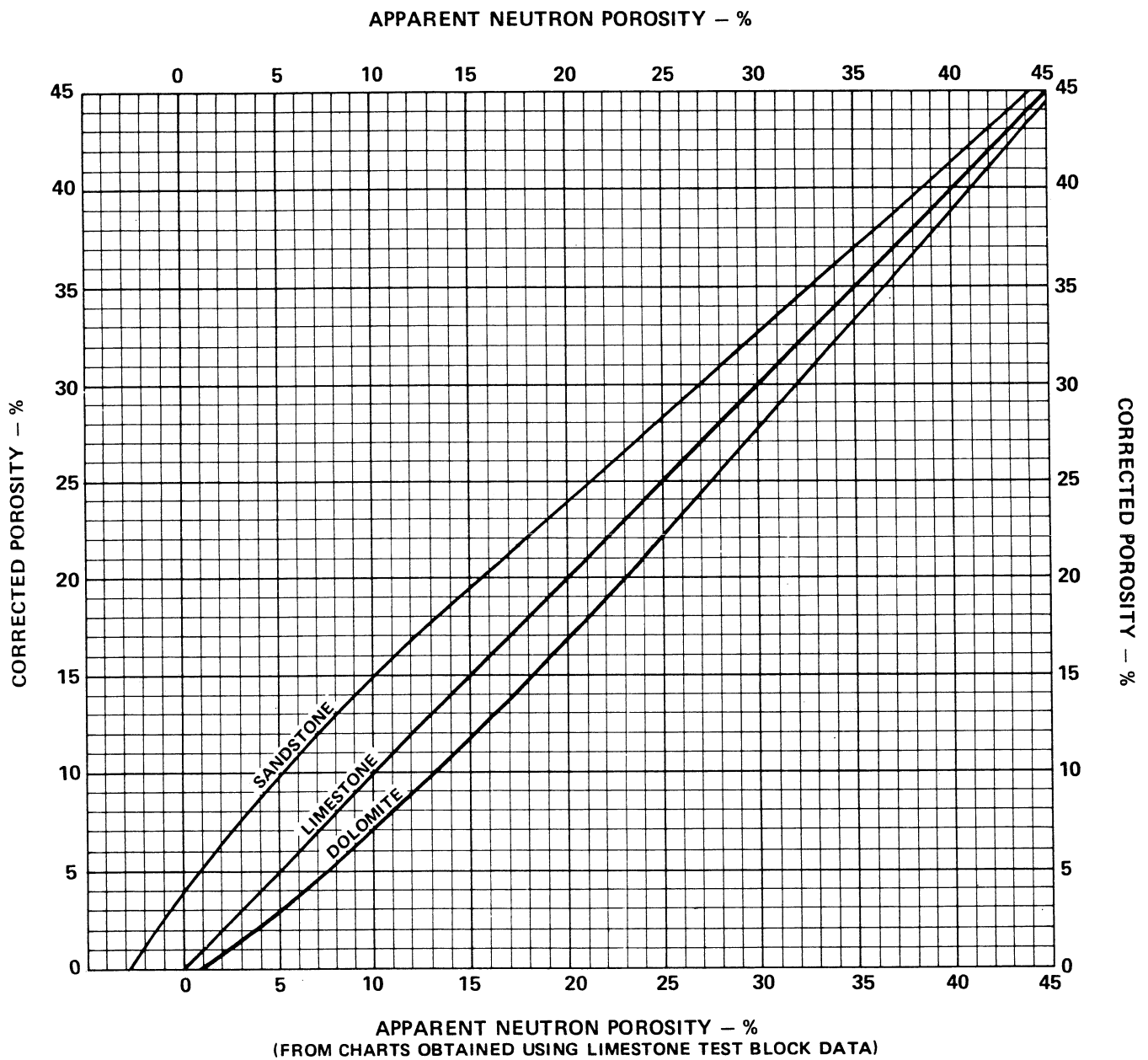
$$\rho_{fa} = 1.24 \text{ gm/cc}$$

(Density Log Calibration to $Z/A=0.5$)

APPARENT NEUTRON POROSITY – % (ASSUMING LIMESTONE)

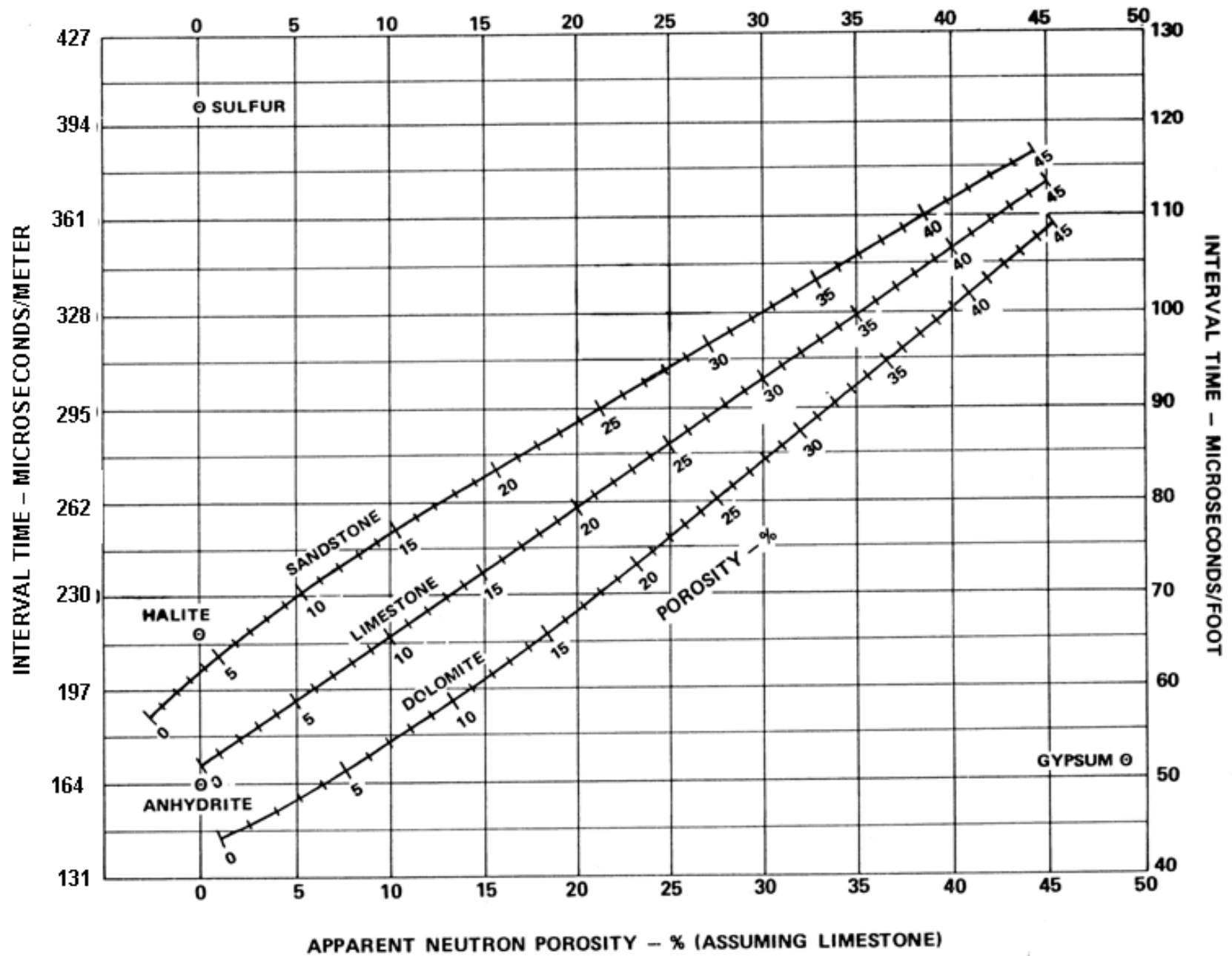


ESTIMATED NEUTRON CORRECTION
FOR FORMATION CHEMISTRY EFFECTS
(NEUTRON-NEUTRON LOGGING,
WATER FILLED HOLES)



SONIC - NEUTRON CROSS PLOT
 ($V_p = 5,300'$ /sec, Hydrogen Index of Pore Fluid=1)

APPARENT NEUTRON POROSITY - % (ASSUMING LIMESTONE)

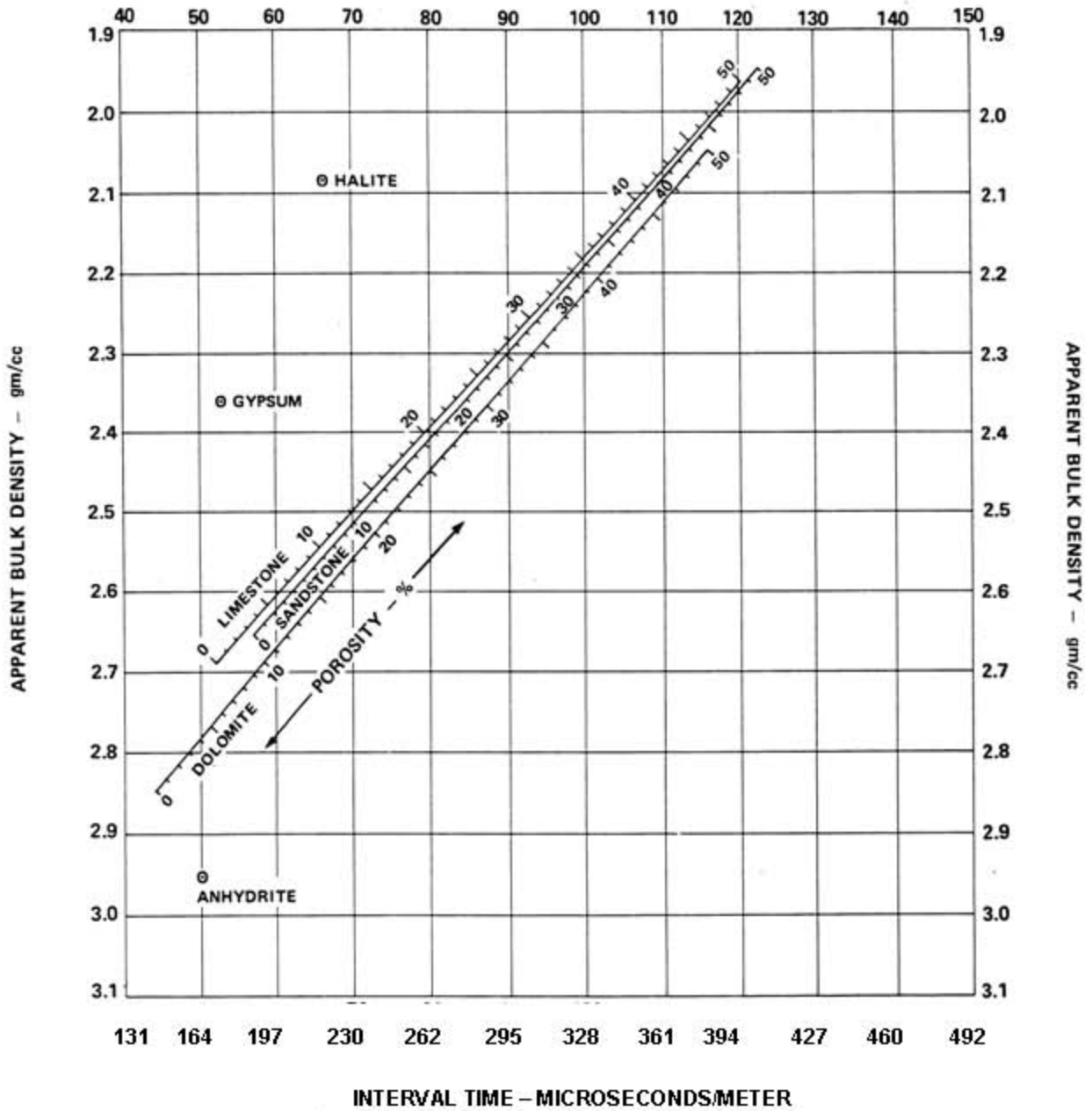


SONIC - DENSITY CROSS PLOT (COMMON)

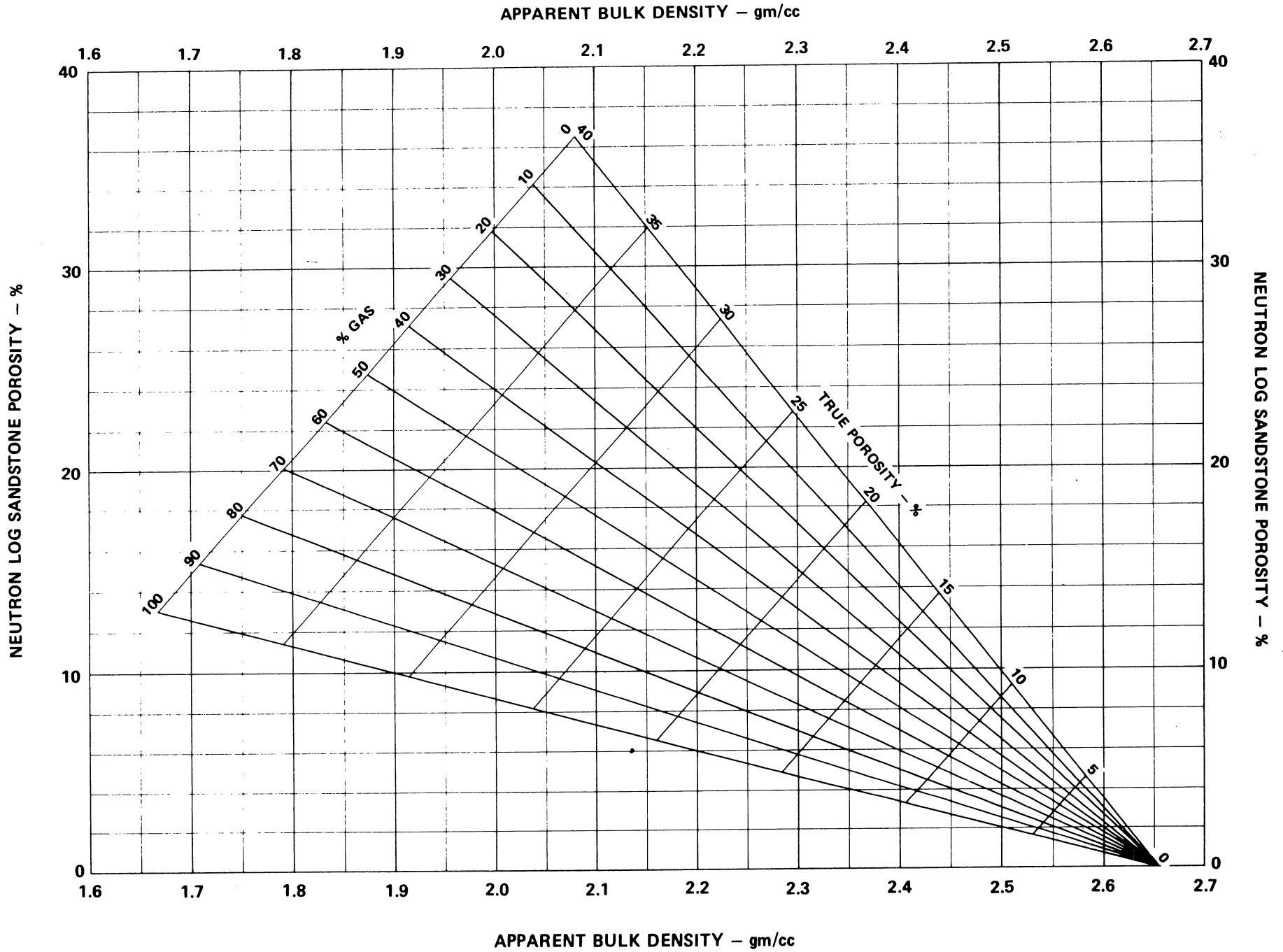
$\rho_{fa} = 1.24 \text{ gm/cc}, V_f = 5300' \text{ /sec}$

(Density Log Calibration to $Z/A=0.5$)

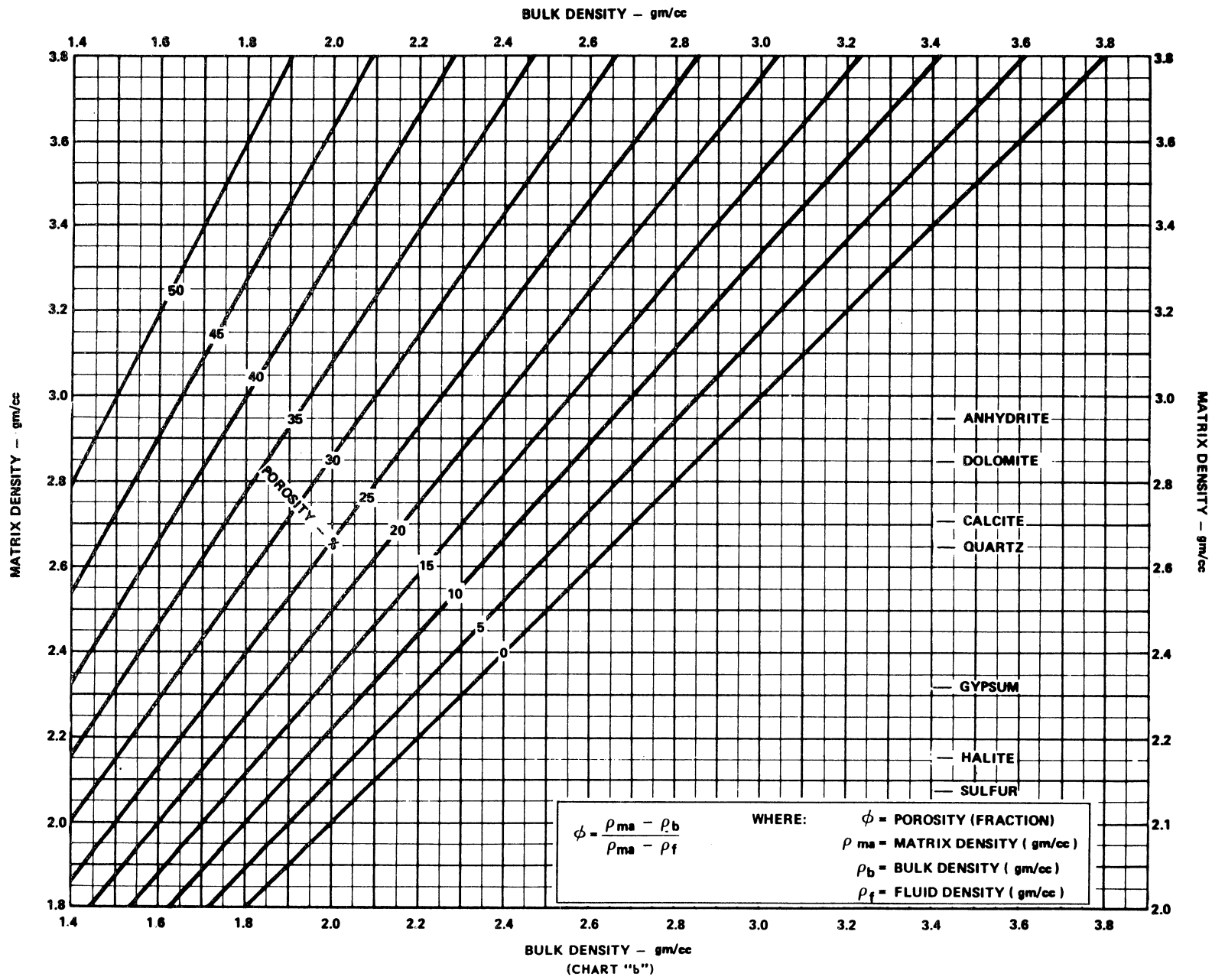
INTERVAL TIME - MICROSECONDS/FOOT



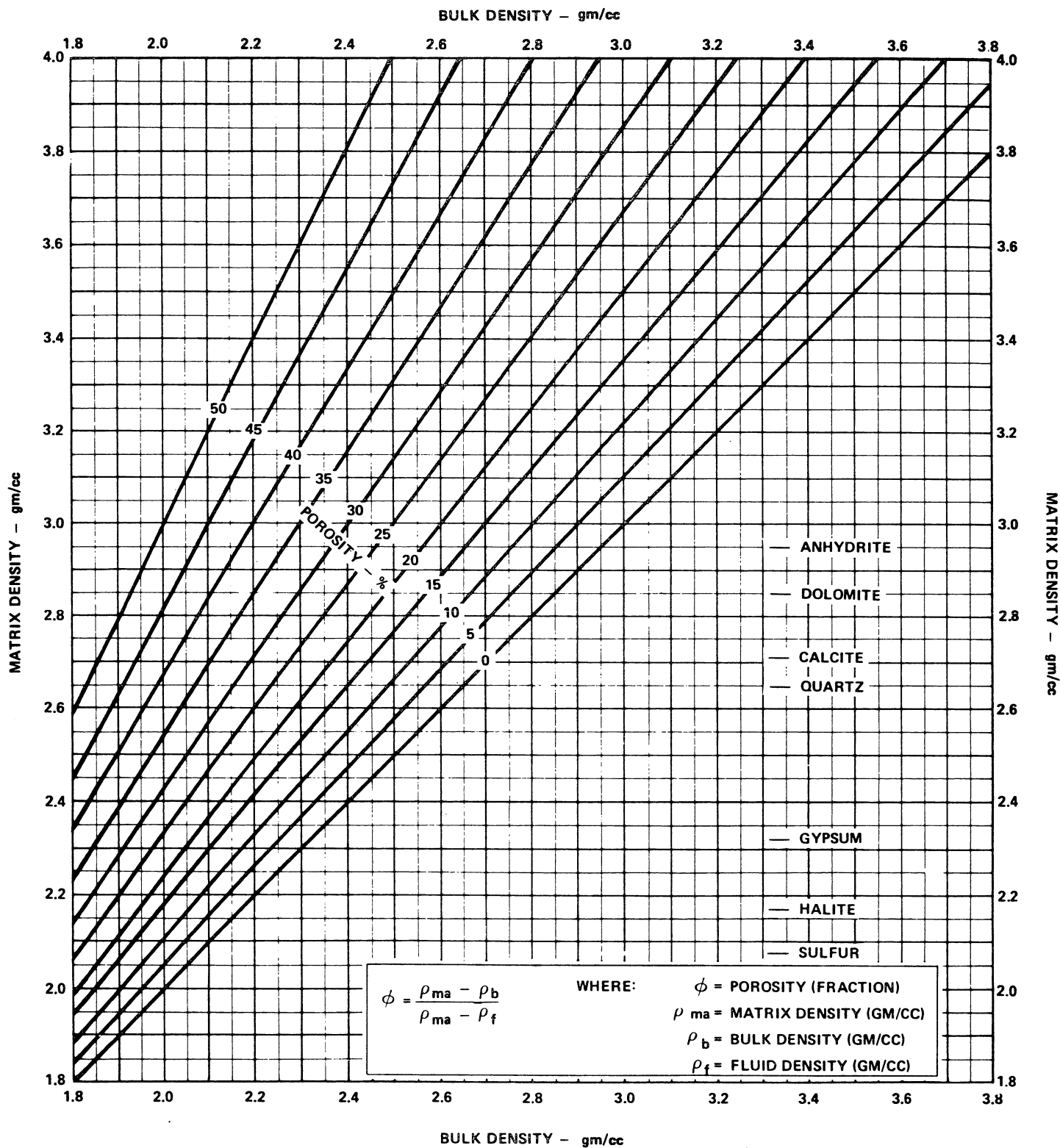
GAS DETECTION AND POROSITY DETERMINATION IN SANDS FROM DENSITY – NEUTRON LOG CROSS PLOTTING



CALCULATION OF POROSITY FROM BULK DENSITY (GAS FILLED HOLES, $\rho_f = 0$)

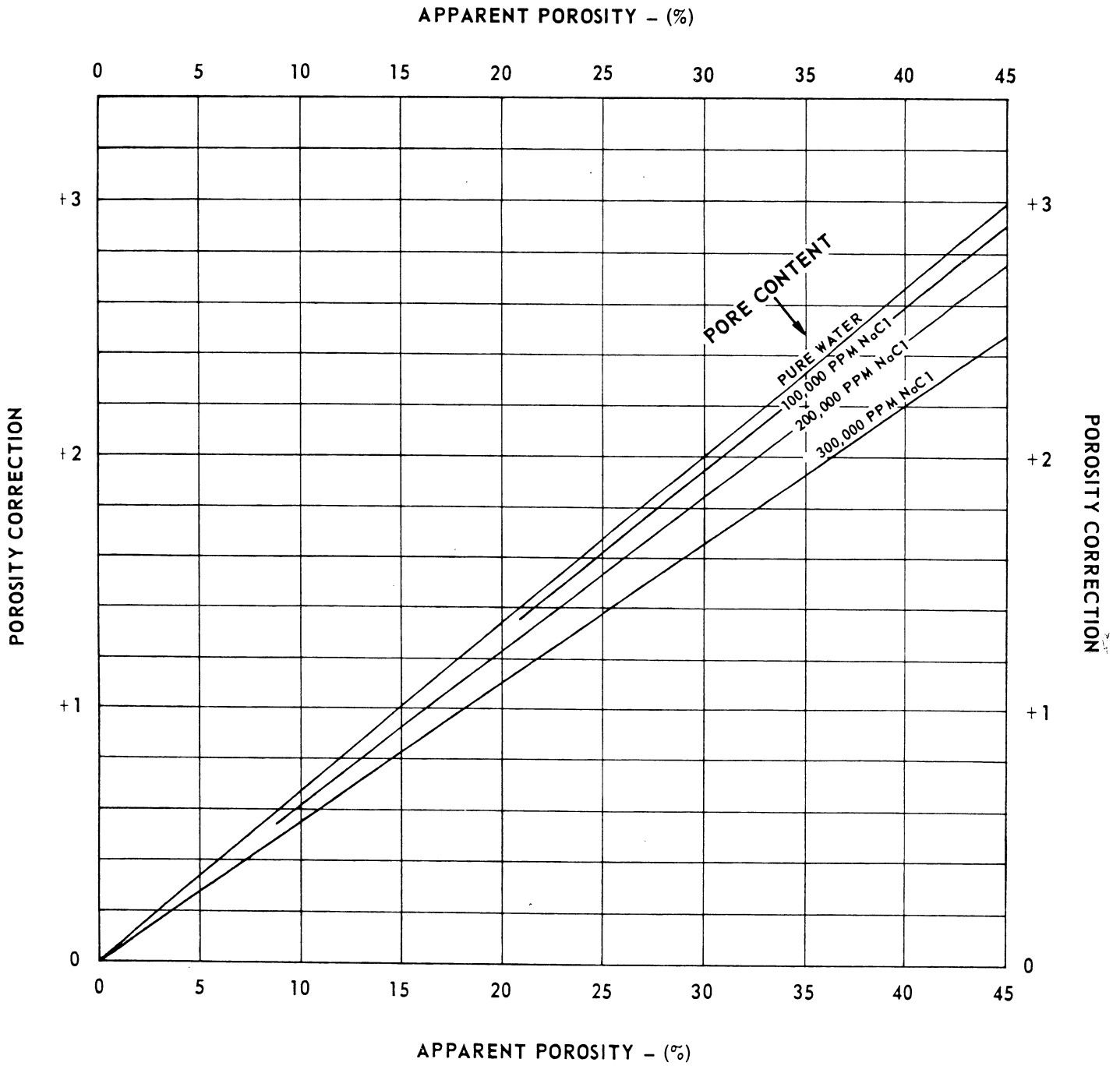


CALCULATION OF POROSITY FROM BULK DENSITY (WATER FILLED HOLES, $\rho_f = 1.0$)

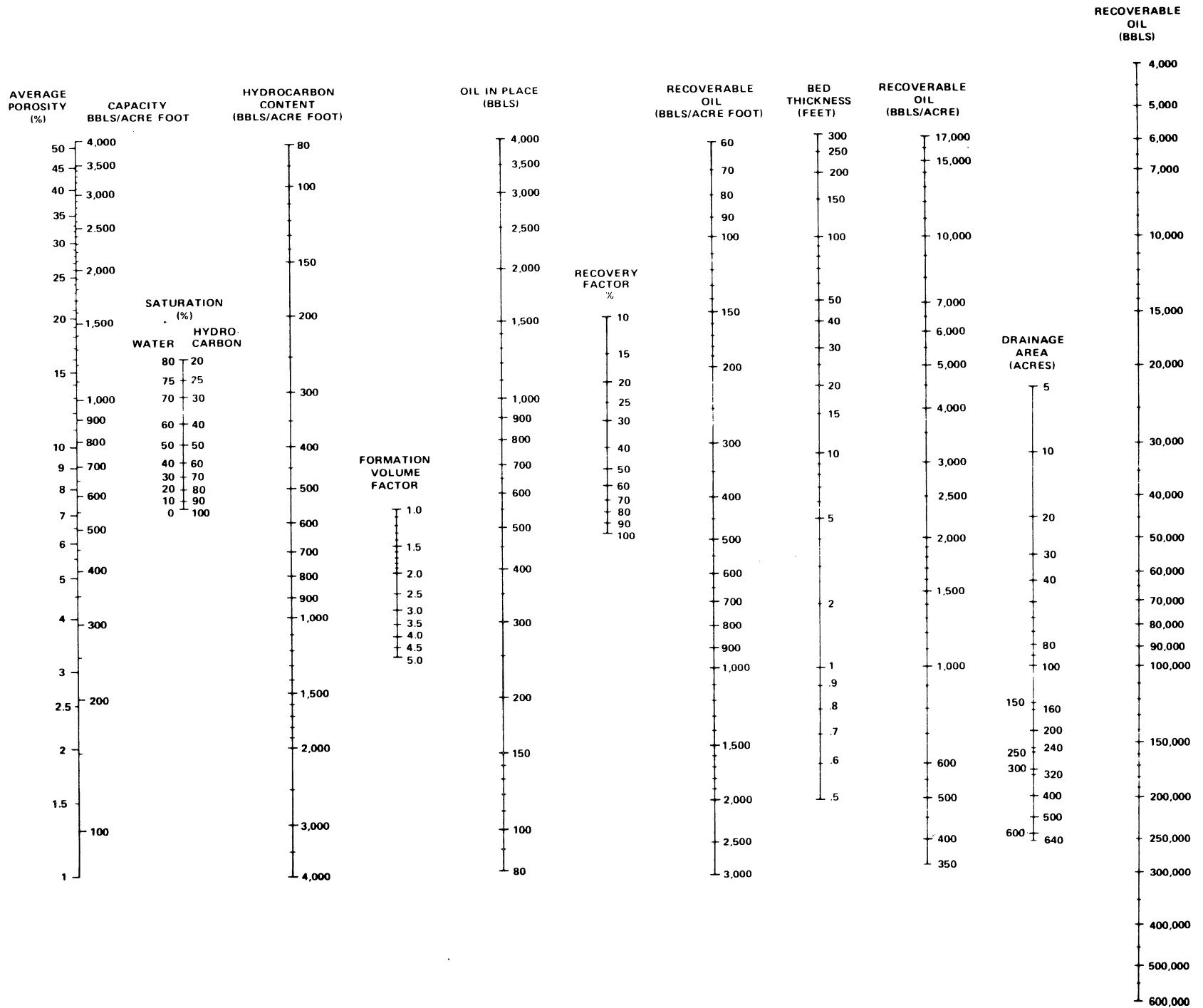


(CHART "a")

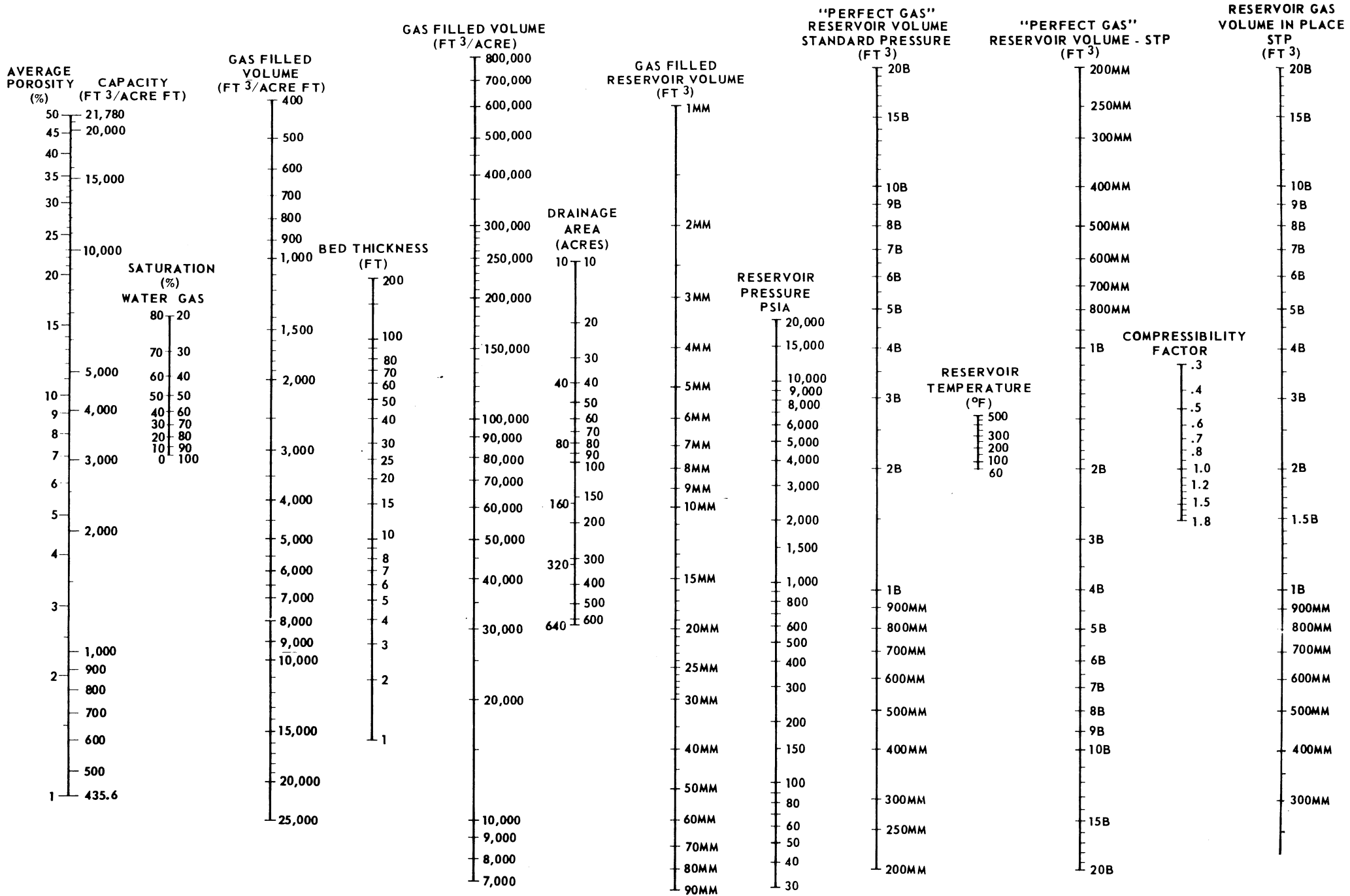
Z/A RATIO EFFECTS ON SAND POROSITY CALCULATION, WHERE $\rho_{ma} = 2.655$, $Z/A = 0.499$
 (FOR TOOLS CALIBRATED TO $Z/A = 0.5$)



OIL RESERVE NOMOGRAPH



GAS RESERVE NOMOGRAPH



COMMON DENSITY DERIVED POROSITY CORRECTION FOR CHANGE IN
MATRIX DENSITY*

$$\phi_D = \frac{\rho_{ma} - \rho_b}{\rho_{ma} - \rho_f}$$

($\rho_f = 1.0$)

ASSUMED MATRIX DENSITY (GM/CC)

ACTUAL MATRIX DENSITY - GM/CC	(Anhydrite)	(Dolomite)	(Calcite)	(Quartz)	(Gypsum)	(Halite)	(Sulfur)
	2.95	2.85	2.71	2.65	2.32	2.16	2.08
2.95	0	+ 5	+ 13	+ 16	+ 33	+ 42	+ 45
2.85	- 5	0	+ 7	+ 10	+ 29	+ 38	+ 42
2.71	-13	- 7	0	+ 3	+ 27	+ 32	+ 36
2.65	-16	-10	- 3	0	+ 20	+ 30	+ 34
2.32	-33	-29	-27	-20	0	+ 12	+ 18
2.16	-42	-38	-32	-30	-12	0	+ 13
2.08	-45	-42	-36	-34	-18	-13	0

*This tables gives the error values at the zero porosity level. For other porosities these values should be multiplied by $(100 - \phi\%)/100$.

GULF COAST SHALE DENSITIES

Depth	0 METERS	Bulk Densities
0		1.80
2000'	610	2.20
4000'	1220	2.34
6000'	1830	2.44
8000'	2440	2.52
10000'	3050	2.57
12000'	3660	2.60
16000'	4880	2.63

SONIC DENSITY CROSS PLOT FOR SHALE CONTENT

