R60FPD358-A

THERMODYNAMIC PROPERTIES OF ALKALI METAL VAPORS AND MERCURY

By

C. J. Meisl

Revised by

A. Shapiro

Second Revision

November 9, 1960

FLIGHT PROPULSION LABORATORY DEPARTMENT
GENERAL ELECTRIC COMPANY
CINCINNATI, OHIO

DISCLAIMER

TABLE OF CONTENTS

I. INTRODUCTION

The analysis of liquid metal vapor thermodynamic cycles for application to space power supply systems has been handicapped by a lack of information on the thermodynamic properties of the interesting metals. This was particularly true of those metals subject to dimerization, i.e., an equilibrium mixture of a monatomic and diatomic molecules in the vapor phase.

Consequently, a study was designed to calculate the equilibrium thermodynamic properties of the alkali metals - sodium, potassium, rubidium and cesium - and of mercury. This report contains the results of these calculations in the form of tables of thermodynamic properties and Mollier Diagrams suitable for use in thermodynamic design studies.

IA. INTRODUCTION TO FIRST REVISION

Revision of the first edition was necessary since the calculation procedure of the first edition did not account for the energy required to alter the equilibrium composition of the alkali metal vapors in the superheat region. In the first edition, the "frozen" vapor specific heat of the alkali metals was first determined by adding the contributions of the monatomic and diatomic gases. The superheat enthalpy and entropy were then calculated by integrating this frozen specific heat with temperature. Since the diatomic molecules of the alkali metal vapors dissociate in the superheat region, however, they absorb heat at constant temperature and alter the equilibrium composition of the vapor. This heat of dissociation is not included in the integration of the frozen specific heat with temperature, so that the properties calculated by integrating the frozen specific heat were in error.

In this edition, the absolute enthalpy and entropy of the vapor equilibrium composition were first calculated from standard perfect gas chemical thermodynamic equations. An "equilibrium" specific heat was then calculated by differentiating enthalpy as a function of tempera-

ture at constant pressure. The frozen specific heat was also calculated by adding the specific contributions of the diatomic and monatomic molecules.

In addition, the equilibrium constant in the first edition was determined by integrating the Van't Hoff equation, with the heat of dissociation being treated as a suitable chosen constant. In this edition, however, the free energies of the monatomic and diatomic forms of the vapor were used to calculate the equilibrium constant, so that no assumptions were required concerning the heat of dissociation.

Since mercury was assumed not to dissociate or dimerize, the mercury values given in the first edition did not require revision. These mercury data are repeated herein for the sake of completeness.

The liquid properties in this edition are the same as those of the first edition.

IB. INTRODUCTION TO SECOND REVISION

In the first revision, it was noted that there was a slight discrepancy between the heat of vaporization divided by T and the entropy of vaporization for the alkali metals. This discrepancy was attributed to known inaccuracies in vapor pressure. In this edition, iterations on the alkali metal vapor pressure were made until the discrepancy between the heat of vaporization divided by T and the entropy of vaporization was removed. The finalized vapor pressures resulting from this iteration were within the experimental accuracy of vapor pressure, where given. Thus, all data contained herein is now internally consistent.

This edition contains the thermodynamic properties of lithium between 1800 and 3600°R, in addition to those contained in the other editions.

II. SCOPE

The thermodynamic properties of sodium, potassium, rubidium, cesium, mercury and lithium are presented for the saturated liquid, saturated vapor, and superheated vapor phases as a function of temperature in °R. The following properties have been included:

Enthalpy - BTU/lb.
Entropy - BTU/lb. °R
Molecular Weight
Specific Volume - cu. ft/lb.
* Equilibrium Sonic Velocity (vapor only) - ft/sec.
* Frozen Sonic Velocity (vapor only) - ft/sec.
* Equilibrium Specific Heat (vapor only) - BTU/lb. °R
Frozen Specific Heat - BTU/lb. °R
Frozen Isentropic Exponent (vapor only) - C_p frozen/C_v frozen

Experimental reference values were derived from references 2 and 4.

* not given for mercury.

III. NOMENCLATURE

1, Symbols

	Description and Units
A	constant
a	sonic velocity - ft/sec
b_1	unit conversion factor = 1.9337×10^{-2} $\frac{\text{psi}}{\text{mm Hg}}$
b_2, b_3, b_4	constants for the vapor pressure equation
C_1, C_2, C_3	constants for the liquid specific heat equation
C_p	specific heat at constant pressure $\frac{\text{BTU}}{\text{lb } ^\circ\text{R}}$
Cp_i°	absolute specific heat of ith constituent at reference state pressure on a mole basis, $\frac{\text{BTU}}{\text{lb mole } ^\circ\text{R}}$
d_1, d_2	constants for the equation of the heat of vaporization of mercury
e_1, e_2	constants for the equation of the specific volume of liquid
f	number of degrees of freedom
F_i°	absolute free energy of ith constituent at reference state pressure on a mole basis $\frac{\text{BTU}}{\text{lb mole}}$
H	enthalpy $\frac{\text{BTU}}{\text{lb}}$
H_i°	absolute enthalpy of ith constituent at reference state pressure on a mole basis $\frac{\text{BTU}}{\text{lb mole}}$
ΔH_m	heat of fusion $\frac{\text{BTU}}{\text{lb.}}$
H_s	enthalpy of solid, $\frac{\text{BTU}}{\text{lb.}}$
ΔH_v	heat of vaporization, $\frac{\text{BTU}}{\text{lb.}}$
J	Joule's constant = 778.26 $\frac{\text{ft lb}}{\text{BTU}}$
K	equilibrium constant at constant pressure
M	molecular weight
P	pressure - psi or atmospheres where specified

Q	heat transferred, $\frac{BTU}{lb.}$
R	universal gas constant, 1.98588 $\frac{BTU}{lb\ mole\ ^\circ R}$
S	entropy $\frac{BTU}{lb\ ^\circ R}$
ΔSv	entropy change due to vaporization, $\frac{BTU}{lb\ ^\circ R}$
T	temperature - °R
Tm	temperature at the melting point - °R
Tg	temperature of superheated gas - °R
V	specific volume - ft^3/lb
X	mole fraction
γ	ratio of vapor specific heat at constant pressure to vapor specific heat at constant volume
ρ	vapor density, lbs/ft^3

2. Subscripts

e	equilibrium
f	frozen
g	superheated gas
i	ith pure constituent
L	saturated liquid
m	melting
o	0°R
p	constant pressure
rev	reversible
s	solid
v	saturated vapor
z_1	monatomic gas
z_2	diatomic gas

3. Superscript (°) identifies the standard state.

IV. EXPLANATION OF TABLES

The saturated liquid, saturated vapor, and superheat properties of each metal are presented in the following tables:

Table 1	Sodium
Table 2	Potassium
Table 3	Rubidium
Table 4	Cesium
Table 5	Mercury
Table 6	Lithium

Each table is preceded by a table of material constants which contain the physical properties from which the detailed thermodynamic data were generated. The source of all data has been referenced.

The tables are organized as follows: The first line gives saturated liquid properties; the second line gives saturated vapor properties and the remaining lines are superheat properties. The saturation temperatures and vapor pressure which apply to each set of numbers are given at the top of the set. The tables have been obtained directly from a digital computer printout and, consequently, have been printed in machine language. The individual columns have the following meaning:

Column	Symbol	Meaning and Unit
1	TEMP	Temperature - °R
2	H	Absolute enthalpy (referenced to 0°R) BTU/lb.
3	S	Absolute entropy (referenced to 0°R) $\frac{BTU}{lb\ °R}$
4	M	Molecular Weight
5	V	Specific Volume $\frac{cu\ ft}{lb}$
6	A(EQ)	Equilibrium sonic velocity - $\frac{ft}{sec}$
7	A(FR)	Frozen sonic velocity - $\frac{ft}{sec}$
8	CP(EQ)	Equilibrium specific heat at constant pressure $\frac{BTU}{lb\ °R}$
9	GAMF	Ratio of frozen specific heat at constant pressure to frozen specific heat at constant volume.
10	CP(FR)	Frozen specific heat at constant pressure - $\frac{BTU}{lb\ °R}$

The number following the numerical value of the specific volume and vapor pressure is the exponent of 10 by which the value must be multiplied. For example, the specific volume, 2.7508 3 should be read as 2.7508×10^{3} cu. ft. per lb.; the vapor pressure 1.7265 -2 should be read as 1.7265×10^{-2}.

Intermediate quality points of extensive properties (i.e., H, S and V) may be obtained by adding the quality times the difference between the saturated vapor and saturated liquid values of the property, to the liquid value. For example, to determine the value of enthalpy at quality x,

$$H(x) = H_L + x\,(Hv - H_L).$$

V. TABLES OF THERMODYNAMIC PROPERTIES

Table 1 - Sodium - Material Properties

Reference

starting vapor pressure:

$$P = .019337 \ln^{-1} \left[-\frac{23073}{T} - .5 \ln T + 21.558 \right] \quad \begin{matrix} P \text{ in psi} \\ T \text{ in } ^\circ R \end{matrix}$$

from:

$$P = \log^{-1} \left[-\frac{5567}{T} - .5 \log T + 9.235 \right] \quad \begin{matrix} P \text{ in mm Hg} \\ T \text{ in } ^\circ K \end{matrix}$$ 2

(accurate to 10% from 800 to 2250°R)

liquid molecular weight: $M_L = 22.991$ 4

specific heat of the liquid:

$$c_{pL} = .38964 - 1.1064 \times 10^{-4} T + 3.411 \times 10^{-8} T^2 \quad \left(\frac{BTU}{lb\ ^\circ R}\right)$$ 6

melting point: $T_m = 668^\circ R = 371^\circ K$ 4

specific heat of the solid: $c_{ps} = .307 \quad \left(\frac{BTU}{lb\ ^\circ R}\right)$ 6

enthalpy at 298°K: $(h_s)_{536^\circ R} = 119.94 \quad \left(\frac{BTU}{lb.}\right)$ 4

heat of melting: $\Delta h_m = 48.68 \quad \left(\frac{BTU}{lb.}\right)$ 4

absolute enthalpy of monatomic and diatomic vapor as a function of temperature, $H_i^\circ \quad \left(\frac{BTU}{lb\ mole}\right)$ 4

absolute free energy of monatomic and diatomic vapor as a function of temperature, $F_i^\circ \quad \left(\frac{BTU}{lb\ mole}\right)$ 4

entropy at the melting point: 4

$$(S_L)_{T_m} = .67 \quad \left(\frac{BTU}{lb\ ^\circ R}\right)$$

specific volume of the liquid: 2

$$V_L = .01502 + 3.16 \times 10^{-6} T \quad \left(\frac{ft^3}{lb.}\right)$$

specific heat of monatomic and diatomic vapor as a function of temperature $C_{p_i}^\circ \quad \left(\frac{BTU}{mole\ ^\circ R}\right)$ 4

Table 1 - Sodium - Material Properties (Continued)

Reference

The finalized vapor pressure is well represented by:

$$P = \log^{-1}\left[\frac{-10050}{T} - .698 \log T + 8.286\right] \qquad 700 \leq T \leq 1500$$

P in psia

T in °R

$$P = \log^{-1}\left[\frac{-10104}{T} - .723 \log T + 8.402\right] \qquad 1500 \leq T \leq 2700$$

P in psia

T in °R

These equations have a maximum deviation of .8% from the tabulated values, and a maximum percent error of 9.7% from the values given by the starting vapor pressure equation (see Figure 1, page 129).

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 700 DEG R VAPOR PRESSURE 8.7472067-9 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	700	219.7	0.6854	22.991	1.7232-2					0.32891
SAT VAP	700	2180.5	3.4866	23.007	0. *	1229.3	1587.1	0.24984	1.66556	0.21600
					SUPERHEAT					
	800	2203.1	3.5169	22.992	0.	1315.1	1697.6	0.21603	1.66618	0.21603
	900	2224.7	3.5424	22.991	0.	1394.9	1800.6	0.21603	1.66621	0.21603
	1000	2246.4	3.5652	22.991	0.	1470.4	1898.0	0.21603	1.66621	0.21603
	1100	2268.0	3.5857	22.991	0.	1542.1	1990.6	0.21603	1.66621	0.21603
	1200	2289.5	3.6043	22.991	0.	1610.7	2079.1	0.21603	1.66621	0.21603
	1300	2311.1	3.6216	22.991	0.	1676.5	2164.0	0.21603	1.66621	0.21603
	1400	2332.7	3.6381	22.991	0.	1739.8	2245.7	0.21603	1.66621	0.21603
	1500	2354.3	3.6529	22.991	0.	1800.8	2324.6	0.21603	1.66621	0.21603
	1600	2375.9	3.6665	22.991	0.	1859.9	2400.8	0.21603	1.66621	0.21603
	1700	2397.5	3.6797	22.991	0.	1917.1	2474.7	0.21603	1.66621	0.21603
	1800	2419.1	3.6924	22.991	0.	1972.7	2546.4	0.21603	1.66621	0.21603
	1900	2440.7	3.7039	22.991	0.	2026.8	2616.2	0.21603	1.66621	0.21603
	2000	2462.3	3.7148	22.991	0.	2079.4	2684.2	0.21603	1.66621	0.21603
	2100	2483.9	3.7253	22.991	0.	2130.8	2750.4	0.21603	1.66621	0.21603
	2200	2505.4	3.7354	22.991	0.	2180.9	2815.2	0.21603	1.66621	0.21603
	2300	2527.0	3.7453	22.991	0.	2229.9	2878.4	0.21603	1.66621	0.21603
	2400	2548.6	3.7545	22.991	0.	2277.9	2940.4	0.21603	1.66621	0.21603
	2500	2570.2	3.7631	22.991	0.	2324.9	3001.0	0.21603	1.66621	0.21603
	2600	2591.8	3.7713	22.991	0.	2370.9	3060.4	0.21603	1.66621	0.21603
	2700	2613.4	3.7796	22.991	0.	2416.1	3118.7	0.21603	1.66621	0.21603

* Specific Volumes in excess of 10^{10} ft^3/lb are not printed out.

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 800 DEG R VAPOR PRESSURE 5.0100119-7 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	800	252.3	0.7290	22.991	1.7548-2					0.32296
SAT VAP	800	2200.1	3.1637	23.041	7.4375 8	1312.3	1694.8	0.29443	1.66423	0.21595
					SUPERHEAT					
	900	2224.4	3.1925	22.996	8.3835 8	1394.6	1800.3	0.22184	1.66601	0.21602
	1000	2246.3	3.2155	22.992	9.3168 8	1470.3	1897.9	0.21603	1.66618	0.21603
	1100	2267.9	3.2360	22.991	1.0249 9	1542.1	1990.6	0.21603	1.66621	0.21603
	1200	2289.5	3.2546	22.991	1.1180 9	1610.7	2079.1	0.21603	1.66621	0.21603
	1300	2311.1	3.2720	22.991	1.2112 9	1676.5	2164.0	0.21603	1.66621	0.21603
	1400	2332.7	3.2884	22.991	1.3044 9	1739.8	2245.7	0.21603	1.66621	0.21603
	1500	2354.3	3.3033	22.991	1.3976 9	1800.8	2324.6	0.21603	1.66621	0.21603
	1600	2375.9	3.3169	22.991	1.4907 9	1859.9	2400.8	0.21603	1.66621	0.21603
	1700	2397.5	3.3301	22.991	1.5839 9	1917.1	2474.7	0.21603	1.66621	0.21603
	1800	2419.1	3.3428	22.991	1.6771 9	1972.7	2546.4	0.21603	1.66621	0.21603
	1900	2440.7	3.3543	22.991	1.7702 9	2026.8	2616.2	0.21603	1.66621	0.21603
	2000	2462.3	3.3652	22.991	1.8634 9	2079.4	2684.2	0.21603	1.66621	0.21603
	2100	2483.9	3.3756	22.991	1.9566 9	2130.8	2750.4	0.21603	1.66621	0.21603
	2200	2505.4	3.3858	22.991	2.0498 9	2180.9	2815.2	0.21603	1.66621	0.21603
	2300	2527.0	3.3956	22.991	2.1429 9	2229.9	2878.4	0.21603	1.66621	0.21603
	2400	2548.6	3.4048	22.991	2.2361 9	2277.9	2940.4	0.21603	1.66621	0.21603
	2500	2570.2	3.4134	22.991	2.3293 9	2324.9	3001.0	0.21603	1.66621	0.21603
	2600	2591.8	3.4217	22.991	2.4224 9	2370.9	3060.4	0.21603	1.66621	0.21603
	2700	2613.4	3.4299	22.991	2.5156 9	2416.1	3118.7	0.21603	1.66621	0.21603

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 900 DEG R VAPOR PRESSURE 1.1480254-5 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	900	284.3	0.7667	22.991	1.7864-2					0.31769
SAT VAP	900	2217.6	2.9148	23.107	3.6411 7	1388.0	1793.6	0.35857	1.66160	0.21585
					SUPERHEAT					
	1000	2245.2	2.9440	23.010	4.0627 7	1469.2	1896.8	0.23494	1.66546	0.21600
	1100	2267.7	2.9653	22.995	4.4718 7	1541.8	1990.3	0.22003	1.66604	0.21602
	1200	2289.4	2.9841	22.992	4.8789 7	1610.7	2079.1	0.21603	1.66617	0.21603
	1300	2311.0	3.0015	22.991	5.2857 7	1676.5	2164.0	0.21603	1.66620	0.21603
	1400	2332.7	3.0179	22.991	5.6924 7	1739.8	2245.7	0.21603	1.66621	0.21603
	1500	2354.3	3.0328	22.991	6.0990 7	1800.8	2324.5	0.21603	1.66621	0.21603
	1600	2375.9	3.0464	22.991	6.5056 7	1859.9	2400.8	0.21603	1.66621	0.21603
	1700	2397.5	3.0596	22.991	6.9122 7	1917.1	2474.7	0.21603	1.66621	0.21603
	1800	2419.1	3.0723	22.991	7.3188 7	1972.7	2546.4	0.21603	1.66621	0.21603
	1900	2440.7	3.0838	22.991	7.7254 7	2026.8	2616.2	0.21603	1.66621	0.21603
	2000	2462.3	3.0947	22.991	8.1320 7	2079.4	2684.2	0.21603	1.66621	0.21603
	2100	2483.9	3.1051	22.991	8.5386 7	2130.8	2750.4	0.21603	1.66621	0.21603
	2200	2505.4	3.1153	22.991	8.9452 7	2180.9	2815.2	0.21603	1.66621	0.21603
	2300	2527.0	3.1251	22.991	9.3518 7	2229.9	2878.4	0.21603	1.66621	0.21603
	2400	2548.6	3.1343	22.991	9.7584 7	2277.9	2940.4	0.21603	1.66621	0.21603
	2500	2570.2	3.1429	22.991	1.0165 8	2324.9	3001.0	0.21603	1.66621	0.21603
	2600	2591.8	3.1511	22.991	1.0572 8	2370.9	3060.4	0.21603	1.66621	0.21603
	2700	2613.4	3.1594	22.991	1.0978 8	2416.1	3118.7	0.21603	1.66621	0.21603

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 1000 DEG R VAPOR PRESSURE 1.3909467-4 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1000	315.9	0.7999	22.991	1.81[illegible]-2					0.31311
SAT VAP	1000	2232.7	2.7168	23.213	3.32[illegible] 6	1456.5	1883.8	0.43480	1.65735	0.21569
					SUPERHEAT					
	1100	2264.8	2.7474	23.041	3.6834 6	1538.8	1987.2	0.25843	1.66417	0.21595
	1200	2288.6	2.7680	23.005	4.0245 6	1609.7	2078.1	0.22634	1.66562	0.21601
	1300	2310.8	2.7858	22.996	4.3617 6	1676.1	2163.7	0.21893	1.66601	0.21602
	1400	2332.6	2.8024	22.993	4.6978 6	1739.6	2245.6	0.21708	1.66613	0.21603
	1500	2354.2	2.8173	22.992	5.0336 6	1800.8	2324.5	0.21603	1.66618	0.21603
	1600	2375.9	2.8309	22.991	5.3693 6	1859.9	2400.7	0.21603	1.66620	0.21603
	1700	2397.5	2.8441	22.991	5.7050 6	1917.1	2474.7	0.21603	1.66620	0.21603
	1800	2419.1	2.8568	22.991	6.0406 6	1972.7	2546.4	0.21603	1.66621	0.21603
	1900	2440.7	2.8683	22.991	6.3762 6	2026.8	2616.2	0.21603	1.66621	0.21603
	2000	2462.3	2.8792	22.991	6.7118 6	2079.4	2684.2	0.21603	1.66621	0.21603
	2100	2483.8	2.8897	22.991	7.0474 6	2130.8	2750.4	0.21603	1.66621	0.21603
	2200	2505.4	2.8998	22.991	7.3830 6	2180.9	2815.2	0.21603	1.66621	0.21603
	2300	2527.0	2.9097	22.991	7.7186 6	2229.9	2878.4	0.21603	1.66621	0.21603
	2400	2548.6	2.9188	22.991	8.0541 6	2277.9	2940.3	0.21603	1.66621	0.21603
	2500	2570.2	2.9274	22.991	8.3897 6	2324.9	3001.0	0.21603	1.66621	0.21603
	2600	2591.8	2.9357	22.991	8.7253 6	2370.9	3060.4	0.21603	1.66621	0.21603
	2700	2613.4	2.9439	22.991	9.0609 6	2416.1	3118.7	0.21603	1.66621	0.21603

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 1100 DEG R VAPOR PRESSURE 1.0616463-3 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1100	347.0	0.8296	22.991	1.8496-2					0.30921
SAT VAP	1100	2245.1	2.5551	23.365	4.7592 5	1518.1	1965.8	0.51330	1.65137	0.21548
					SUPERHEAT					
	1200	2282.7	2.5878	23.100	5.2512 5	1603.1	2071.4	0.29299	1.66177	0.21587
	1300	2308.7	2.6088	23.029	5.7064 5	1673.7	2161.2	0.23913	1.66466	0.21598
	1400	2331.7	2.6263	23.006	6.1515 5	1738.6	2244.6	0.22400	1.66559	0.21601
	1500	2353.9	2.6415	22.998	6.5933 5	1800.3	2324.0	0.21922	1.66593	0.21602
	1600	2375.7	2.6552	22.994	7.0339 5	1859.6	2400.5	0.21744	1.66607	0.21602
	1700	2397.4	2.6685	22.993	7.4740 5	1917.0	2474.5	0.21680	1.66614	0.21603
	1800	2419.0	2.6812	22.992	7.9139 5	1972.7	2546.3	0.21603	1.66617	0.21603
	1900	2440.7	2.6927	22.992	8.3537 5	2026.7	2616.1	0.21603	1.66619	0.21603
	2000	2462.3	2.7036	22.991	8.7935 5	2079.4	2684.1	0.21603	1.66620	0.21603
	2100	2483.8	2.7141	22.991	9.2332 5	2130.8	2750.4	0.21603	1.66620	0.21603
	2200	2505.4	2.7243	22.991	9.6729 5	2180.9	2815.2	0.21603	1.66621	0.21603
	2300	2527.0	2.7341	22.991	1.0113 6	2229.9	2878.4	0.21603	1.66621	0.21603
	2400	2548.6	2.7433	22.991	1.0552 6	2277.9	2940.3	0.21603	1.66621	0.21603
	2500	2570.2	2.7519	22.991	1.0992 6	2324.9	3001.0	0.21603	1.66621	0.21603
	2600	2591.8	2.7601	22.991	1.1432 6	2370.9	3060.4	0.21603	1.66621	0.21603
	2700	2613.4	2.7684	22.991	1.1871 6	2416.1	3118.7	0.21603	1.66621	0.21603

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 1200 DEG R VAPOR PRESSURE 5.7397985-3 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1200	377.7	0.8563	22.991	1.8812-2					0.30599
SAT VAP	1200	2254.9	2.4207	23.559	9.5235 4	1573.2	2040.0	0.58513	1.64377	0.21523
					SUPERHEAT					
	1300	2298.5	2.4558	23.193	1.0480 5	1662.0	2149.3	0.33584	1.65800	0.21575
	1400	2327.6	2.4778	23.073	1.1345 5	1733.7	2239.5	0.25868	1.66286	0.21592
	1500	2352.0	2.4946	23.028	1.2179 5	1797.9	2321.6	0.23311	1.66468	0.21598
	1600	2374.7	2.5089	23.010	1.3001 5	1858.4	2399.3	0.22356	1.66544	0.21601
	1700	2396.9	2.5225	23.001	1.3819 5	1916.3	2473.8	0.21960	1.66579	0.21602
	1800	2418.7	2.5353	22.997	1.4635 5	1972.2	2545.9	0.21781	1.66597	0.21602
	1900	2440.5	2.5469	22.995	1.5449 5	2026.5	2615.9	0.21701	1.66606	0.21603
	2000	2462.2	2.5578	22.993	1.6263 5	2079.2	2683.9	0.21649	1.66612	0.21603
	2100	2483.8	2.5683	22.993	1.7077 5	2130.6	2750.3	0.21665	1.66615	0.21603
	2200	2505.4	2.5785	22.992	1.7891 5	2180.9	2815.1	0.21603	1.66617	0.21603
	2300	2527.0	2.5883	22.992	1.8704 5	2229.9	2878.4	0.21603	1.66618	0.21603
	2400	2548.6	2.5975	22.992	1.9517 5	2277.9	2940.3	0.21603	1.66619	0.21603
	2500	2570.2	2.6061	22.991	2.0331 5	2324.8	3000.9	0.21603	1.66620	0.21603
	2600	2591.8	2.6143	22.991	2.1144 5	2370.9	3060.4	0.21603	1.66620	0.21603
	2700	2613.4	2.6226	22.991	2.1957 5	2416.1	3118.7	0.21603	1.66620	0.21603

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 1300 DEG R VAPOR PRESSURE 2.3916040-2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1300	408.2	0.8807	22.991	1.9128-2					0.30345
SAT VAP	1300	2262.8	2.3073	23.791	2.4520 4	1622.8	2107.2	0.64306	1.63488	0.21495
					SUPERHEAT					
	1400	2312.2	2.3445	23.323	2.6936 4	1715.5	2220.6	0.38243	1.65274	0.21559
	1500	2344.8	2.3670	23.144	2.9084 4	1789.1	2312.5	0.28499	1.65992	0.21583
	1600	2371.1	2.3836	23.068	3.1124 4	1853.7	2394.5	0.24715	1.66301	0.21593
	1700	2394.9	2.3981	23.033	3.3120 4	1913.7	2471.1	0.23107	1.66447	0.21598
	1800	2417.6	2.4115	23.015	3.5095 4	1970.7	2544.3	0.22381	1.66520	0.21600
	1900	2439.8	2.4233	23.006	3.7060 4	2025.5	2614.9	0.22034	1.66559	0.21601
	2000	2461.7	2.4343	23.000	3.9019 4	2078.6	2683.3	0.21845	1.66581	0.21602
	2100	2483.4	2.4449	22.997	4.0976 4	2130.2	2749.8	0.21753	1.66594	0.21602
	2200	2505.1	2.4551	22.995	4.2931 4	2180.5	2814.7	0.21702	1.66602	0.21602
	2300	2526.8	2.4650	22.994	4.4885 4	2229.6	2878.1	0.21679	1.66608	0.21603
	2400	2548.5	2.4742	22.993	4.6838 4	2277.7	2940.1	0.21635	1.66611	0.21603
	2500	2570.1	2.4828	22.993	4.8791 4	2324.8	3000.8	0.21603	1.66614	0.21603
	2600	2591.8	2.4911	22.992	5.0743 4	2370.7	3060.3	0.21650	1.66615	0.21603
	2700	2613.4	2.4993	22.992	5.2695 4	2416.0	3118.6	0.21603	1.66617	0.21603

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 1400 DEG R VAPOR PRESSURE 8.1347409-2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1400	438.4	0.9031	22.991	1.9444-2					0.30160
SAT VAP	1400	2269.3	2.2109	24.050	7.6798 3	1667.9	2168.5	0.68405	1.62510	0.21467
					SUPERHEAT					
	1500	2323.4	2.2483	23.494	8.4229 3	1763.5	2285.5	0.43008	1.64590	0.21539
	1600	2359.9	2.2715	23.249	9.0793 3	1839.6	2379.8	0.31700	1.65560	0.21571
	1700	2388.7	2.2891	23.131	9.6957 3	1905.6	2462.8	0.26594	1.66036	0.21586
	1800	2414.0	2.3040	23.072	1.0292 4	1965.8	2539.3	0.24211	1.66280	0.21593
	1900	2437.6	2.3165	23.041	1.0879 4	2022.4	2611.7	0.23058	1.66410	0.21597
	2000	2460.3	2.3280	23.023	1.1460 4	2076.5	2681.2	0.22453	1.66484	0.21599
	2100	2482.5	2.3388	23.013	1.2039 4	2128.8	2748.4	0.22122	1.66529	0.21601
	2200	2504.5	2.3491	23.006	1.2616 4	2179.5	2813.7	0.21934	1.66557	0.21601
	2300	2526.4	2.3591	23.002	1.3192 4	2228.9	2877.4	0.21820	1.66575	0.21602
	2400	2548.1	2.3683	22.999	1.3767 4	2277.1	2939.5	0.21752	1.66587	0.21602
	2500	2569.9	2.3770	22.997	1.4342 4	2324.3	3000.4	0.21706	1.66595	0.21602
	2600	2591.6	2.3853	22.996	1.4916 4	2370.5	3059.9	0.21671	1.66601	0.21603
	2700	2613.2	2.3935	22.995	1.5491 4	2415.7	3118.3	0.21668	1.66606	0.21603

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 1500 DEG R VAPOR PRESSURE 2.3351267-1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1500	468.5	0.9239	22.991	1.9760-2					0.30043
SAT VAP	1500	2274.9	2.1282	24.330	2.8334 3	1709.2	2224.5	0.70967	1.61477	0.21439
					SUPERHEAT					
	1600	2332.6	2.1651	23.702	3.1025 3	1806.5	2344.2	0.47348	1.63776	0.21516
	1700	2373.1	2.1898	23.385	3.3410 3	1885.6	2441.8	0.35010	1.65004	0.21556
	1800	2404.7	2.2083	23.221	3.5625 3	1953.5	2526.5	0.28800	1.65664	0.21576
	1900	2431.8	2.2227	23.133	3.7747 3	2014.4	2603.5	0.25676	1.66023	0.21587
	2000	2456.5	2.2352	23.083	3.9820 3	2071.2	2675.7	0.24009	1.66231	0.21593
	2100	2479.9	2.2466	23.053	4.1866 3	2125.1	2744.6	0.23079	1.66358	0.21596
	2200	2502.7	2.2573	23.034	4.3896 3	2176.9	2811.0	0.22542	1.66437	0.21599
	2300	2525.1	2.2675	23.022	4.5915 3	2227.0	2875.4	0.22221	1.66489	0.21600
	2400	2547.2	2.2769	23.014	4.7929 3	2275.7	2938.0	0.22022	1.66523	0.21601
	2500	2569.2	2.2857	23.008	4.9937 3	2323.2	2999.2	0.21893	1.66547	0.21601
	2600	2591.0	2.2940	23.004	5.1944 3	2369.6	3059.0	0.21813	1.66564	0.21602
	2700	2612.8	2.3023	23.001	5.3948 3	2415.0	3117.6	0.21756	1.66576	0.21602

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 1600 DEG R VAPOR PRESSURE 5.8424944-1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1600	498.5	0.9433	22.991	2.0076-2					0.29994
SAT VAP	1600	2280.0	2.0567	24.625	1.1935 3	1747.5	2276.2	0.72172	1.60423	0.21411
					SUPERHEAT					
	1700	2340.6	2.0936	23.930	1.3049 3	1846.0	2398.3	0.50689	1.62893	0.21493
	1800	2384.7	2.1192	23.550	1.4040 3	1927.5	2498.7	0.38126	1.64341	0.21539
	1900	2419.0	2.1375	23.340	1.4953 3	1997.1	2585.2	0.31256	1.65170	0.21564
	2000	2448.0	2.1523	23.218	1.5823 3	2059.4	2663.3	0.27414	1.65665	0.21578
	2100	2474.2	2.1650	23.144	1.6667 3	2116.8	2736.0	0.25207	1.65971	0.21587
	2200	2498.7	2.1765	23.097	1.7496 3	2170.9	2804.8	0.23911	1.66166	0.21592
	2300	2522.2	2.1872	23.067	1.8315 3	2222.6	2870.8	0.23128	1.66293	0.21596
	2400	2545.1	2.1969	23.047	1.9128 3	2272.4	2934.6	0.22642	1.66378	0.21598
	2500	2567.5	2.2059	23.034	1.9937 3	2320.6	2996.5	0.22332	1.66436	0.21599
	2600	2589.7	2.2144	23.024	2.0743 3	2367.5	3056.9	0.22127	1.66477	0.21600
	2700	2611.8	2.2228	23.017	2.1548 3	2413.4	3115.9	0.21986	1.66508	0.21601

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 1700 DEG R VAPOR PRESSURE 1.3169859 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1700	528.5	0.9615	22.991	2.0392-2					0.30013
SAT VAP	1700	2285.3	1.9948	24.922	5.5585 2	1783.9	2324.7	0.72134	1.59384	0.21386
					SUPERHEAT					
	1800	2347.7	2.0309	24.181	6.0659 2	1882.3	2447.9	0.53176	1.61946	0.21470
	1900	2394.2	2.0559	23.750	6.5190 2	1964.9	2550.2	0.41150	1.63545	0.21520
	2000	2431.3	2.0747	23.491	6.9378 2	2036.5	2638.9	0.33799	1.64552	0.21550
	2100	2462.6	2.0900	23.330	7.3349 2	2100.4	2718.7	0.29340	1.65196	0.21568
	2200	2490.5	2.1031	23.228	7.7180 2	2159.0	2792.3	0.26631	1.65614	0.21579
	2300	2516.3	2.1148	23.161	8.0921 2	2213.7	2861.5	0.24956	1.65891	0.21587
	2400	2540.7	2.1252	23.117	8.4601 2	2265.6	2927.5	0.23904	1.66078	0.21591
	2500	2564.2	2.1345	23.087	8.8242 2	2315.3	2991.0	0.23225	1.66207	0.21594
	2600	2587.1	2.1433	23.065	9.1858 2	2363.4	3052.5	0.22770	1.66299	0.21597
	2700	2609.8	2.1519	23.049	9.5458 2	2410.0	3112.4	0.22454	1.66367	0.21598

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 1800 DEG R VAPOR PRESSURE 2.7164443 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1800	558.6	0.9786	22.991	2.0708-2					0.30100
SAT VAP	1800	2291.1	1.9411	25.217	2.8200 2	1818.7	2370.5	0.71186	1.58378	0.21365
					SUPERHEAT					
	1900	2353.5	1.9747	24.459	3.0690 2	1915.1	2492.7	0.55085	1.60920	0.21447
	2000	2402.3	1.9996	23.979	3.2952 2	1998.7	2596.8	0.43745	1.62656	0.21500
	2100	2442.0	2.0190	23.670	3.5050 2	2072.1	2687.9	0.36204	1.63829	0.21534
	2200	2475.6	2.0347	23.470	3.7033 2	2137.7	2769.5	0.31338	1.64618	0.21556
	2300	2505.3	2.0482	23.337	3.8937 2	2197.6	2844.4	0.28208	1.65155	0.21570
	2400	2532.5	2.0597	23.248	4.0785 2	2253.1	2914.4	0.26190	1.65522	0.21579
	2500	2557.9	2.0699	23.186	4.2598 2	2305.5	2980.8	0.24862	1.65779	0.21586
	2600	2582.2	2.0792	23.142	4.4385 2	2355.5	3044.4	0.23962	1.65964	0.21590
	2700	2605.9	2.0882	23.110	4.6158 2	2403.8	3105.8	0.23331	1.66102	0.21593

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 1900 DEG R VAPOR PRESSURE 5.1528903 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1900	588.8	0.9949	22.991	2.1024-2					0.30256
SAT VAP	1900	2297.2	1.8941	25.510	1.5512 2	1852.1	2414.0	0.69741	1.57401	0.21346
					SUPERHEAT					
	2000	2359.5	1.9259	24.738	1.6838 2	1946.5	2535.1	0.56018	1.59916	0.21426
	2100	2410.0	1.9506	24.217	1.8060 2	2030.4	2640.4	0.45602	1.61746	0.21481
	2200	2451.8	1.9701	23.868	1.9197 2	2105.0	2733.2	0.38244	1.63044	0.21518
	2300	2487.5	1.9862	23.630	2.0271 2	2172.0	2816.5	0.33206	1.63961	0.21543
	2400	2518.8	1.9996	23.469	2.1298 2	2232.9	2892.6	0.29816	1.64605	0.21560
	2500	2547.3	2.0110	23.356	2.2293 2	2289.4	2963.5	0.27516	1.65064	0.21571
	2600	2573.9	2.0212	23.275	2.3265 2	2342.5	3030.5	0.25925	1.65399	0.21579
	2700	2599.3	2.0309	23.214	2.4224 2	2393.2	3094.7	0.24793	1.65652	0.21585

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 2000 DEG R VAPOR PRESSURE 9.1533274 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2000	619.1	1.0105	22.991	2.1340-2					0.30480
SAT VAP	2000	2304.1	1.8530	25.793	9.0914 1	1884.7	2455.9	0.67856	1.56481	0.21331
					SUPERHEAT					
	2100	2366.0	1.8832	25.013	9.8436 1	1977.0	2575.5	0.56185	1.58946	0.21408
	2200	2417.4	1.9072	24.465	1.0543 2	2060.3	2681.1	0.46874	1.60818	0.21464
	2300	2460.8	1.9268	24.081	1.1198 2	2135.4	2775.0	0.39918	1.62209	0.21503
	2400	2498.0	1.9426	23.814	1.1816 2	2203.1	2859.5	0.34931	1.63223	0.21529
	2500	2530.9	1.9558	23.624	1.2407 2	2265.0	2936.8	0.31394	1.63966	0.21548
	2600	2560.9	1.9673	23.486	1.2980 2	2322.5	3008.8	0.28868	1.64520	0.21561
	2700	2588.9	1.9780	23.381	1.3539 2	2376.7	3077.0	0.27027	1.64943	0.21572

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 2100 DEG R VAPOR PRESSURE 1.5392310 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2100	649.7	1.0255	22.991	2.1656-2					0.30772
SAT VAP	2100	2312.1	1.8171	26.060	5.6185 1	1917.0	2496.7	0.65665	1.55627	0.21320
					SUPERHEAT					
	2200	2372.9	1.8455	25.285	6.0665 1	2006.5	2614.2	0.55845	1.58009	0.21394
	2300	2424.8	1.8687	24.719	6.4874 1	2088.7	2719.3	0.47650	1.59888	0.21449
	2400	2469.0	1.8876	24.313	6.8825 1	2163.3	2813.5	0.41265	1.61325	0.21487
	2500	2507.5	1.9031	24.018	7.2572 1	2231.4	2898.8	0.36452	1.62417	0.21515
	2600	2541.9	1.9164	23.800	7.6167 1	2294.2	2977.4	0.32855	1.63253	0.21536
	2700	2573.5	1.9284	23.633	7.9656 1	2353.0	3050.9	0.30143	1.63906	0.21552

SATURATION TEMPERATURE 2200 DEG R VAPOR PRESSURE 2.4692122 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2200	680.7	1.0399	22.991	2.1972-2					0.31132
SAT VAP	2200	2321.0	1.7855	26.314	3.6338 1	1948.7	2536.6	0.63389	1.54829	0.21312
					SUPERHEAT					
	2300	2380.5	1.8121	25.551	3.9124 1	2035.3	2651.4	0.55149	1.57110	0.21382
	2400	2431.8	1.8340	24.983	4.1754 1	2115.5	2755.0	0.48049	1.58951	0.21433
	2500	2476.6	1.8520	24.559	4.4243 1	2189.3	2849.0	0.42271	1.60410	0.21472
	2600	2516.2	1.8674	24.238	4.6622 1	2257.6	2935.1	0.37694	1.61567	0.21501
	2700	2552.3	1.8811	23.988	4.8920 1	2321.5	3015.2	0.34084	1.62496	0.21525

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 2300 DEG R VAPOR PRESSURE 3.8013167 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2300	712.0	1.0538	22.991	2.2288-2					0.31561
SAT VAP	2300	2330.7	1.7576	26.554	2.4454 1	1980.0	2575.6	0.61125	1.54084	0.21307
					SUPERHEAT					
	2400	2388.2	1.7820	25.818	2.6244 1	2063.2	2686.8	0.54239	1.56235	0.21370
	2500	2438.9	1.8026	25.251	2.7951 1	2141.1	2788.6	0.48112	1.58022	0.21419
	2600	2484.0	1.8201	24.811	2.9585 1	2214.0	2882.3	0.42909	1.59493	0.21458
	2700	2525.0	1.8356	24.461	3.1163 1	2282.8	2969.5	0.38575	1.60714	0.21491

SATURATION TEMPERATURE 2400 DEG R VAPOR PRESSURE 5.6212160 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2400	743.8	1.0673	22.991	2.2604-2					0.32058
SAT VAP	2400	2341.2	1.7329	26.781	1.7109 1	2011.0	2614.0	0.58899	1.53397	0.21302
					SUPERHEAT					
	2500	2396.7	1.7554	26.074	1.8306 1	2090.8	2721.6	0.53115	1.55419	0.21360
	2600	2446.8	1.7748	25.508	1.9460 1	2166.7	2821.7	0.47809	1.57151	0.21407
	2700	2492.6	1.7922	25.048	2.0580 1	2239.2	2915.5	0.43106	1.58638	0.21449

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 2500 DEG R VAPOR PRESSURE 8.0235619 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2500	776.2	1.0805	22.991	2.2920-2					0.32623
SAT VAP	2500	2352.6	1.7111	26.994	1.2388 1	2041.7	2652.0	0.56740	1.52771	0.21298
					SUPERHEAT					
	2600	2406.5	1.7321	26.309	1.3219 1	2118.7	2756.5	0.51829	1.54680	0.21353
	2700	2456.5	1.7510	25.737	1.4032 1	2193.4	2855.6	0.47178	1.56375	0.21404

SATURATION TEMPERATURE 2600 DEG R VAPOR PRESSURE 1.1116396 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2600	809.1	1.0934	22.991	2.3236-2					0.33256
SAT VAP	2600	2365.1	1.6919	27.186	9.2328 0	2072.5	2689.9	0.54665	1.52204	0.21297
					SUPERHEAT					
	2700	2418.1	1.7120	26.510	9.8326 0	2147.7	2792.5	0.50427	1.54034	0.21355

TABLE 1
THERMODYNAMIC PROPERTIES - SODIUM

SATURATION TEMPERATURE 2700 DEG R VAPOR PRESSURE 1.5052067 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2700	842.7	1.1061	22.991	2.3552-2					0.33957
SAT VAP	2700	2378.8	1.6751	27.352	7.0380 0	2103.8	2728.2	0.52690	1.51696	0.21305

Table 2 - Potassium - Material Properties

Reference

starting vapor pressure:

$$P = .019337\ \ln^{-1}\left[-\frac{18867}{T} - .5 \ln T + 20.54\right]$$ P in psi, T in °R

from:

$$P = \log^{-1}\left[-\frac{4552}{T} - .5 \log T + 8.793\right]$$ P in mm Hg, T in °K — 2

(accurate to 20% from 630 to 2160°R)

liquid molecular weight: $M_L = 39.1$ — 4

specific heat of the liquid:

$c_{pL} = .2271 - 6.44 \times 10^{-5} T + 2.3 \times 10^{-8} T^2 \quad (\frac{BTU}{lb\ °R})$ — 2

melting point: $T_m = 606°R = 336.4°K$ — 4

specific heat of the solid: $c_{ps} = .1836 \quad (\frac{BTU}{lb\ °R})$ — 4

enthalpy at 278°K: $(h_s)_{536°R} = 78.03 \quad (\frac{BTU}{lb.})$ — 4

heat of melting: $\Delta h_m = 25.50 \quad (\frac{BTU}{lb.})$ — 4

absolute enthalpy of monatomic and diatomic vapor as a function of temperature, $H_i° \quad (\frac{BTU}{lb\ mole})$ — 4

absolute free energy of monatomic and diatomic vapor as a function of temperature, $F_i° \quad (\frac{BTU}{lb\ mole})$ — 4

entropy at the melting point: — 4

$(S_L)_{T_m} = .455 \quad (\frac{BTU}{lb\ °R})$

specific volume of the liquid: — 2

$V_L = .01669 + 4 \times 10^{-6} T \quad (\frac{ft^3}{lb.})$

specific heat of monatomic and diatomic vapor as a function of temperature, $C_{p_i}° \quad (\frac{BTU}{mole\ °R})$ — 4

Table 2 - Potassium - Material Properties (Continued)

Reference

The finalized vapor pressure is will represented by:

$$P = \log^{-1}\left[\frac{-8363}{T} - .888 \log T + 8.571\right] \qquad \begin{array}{l} 700 \leq T \leq 1500 \\ P \text{ in psia} \\ T \text{ in } ^\circ R \end{array}$$

$$P = \log^{-1}\left[\frac{-8391}{T} - .896 \log T + 8.615\right] \qquad \begin{array}{l} 700 \leq T \leq 1500 \\ P \text{ in psia} \\ T \text{ in } ^\circ R \end{array}$$

These equations have a maximum deviation of .95% from the tabulated values, and a maximum percent error of 8.4% from the values given by the starting vapor pressure equation (see Figure 2, page 130).

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 700 DEG R VAPOR PRESSURE 1.2525066-6 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	700	134.7	0.4831	39.100	1.9490-2					0.19329
SAT VAP	700	1084.1	1.8394	39.105	1.5338 8	943.2	1217.6	0.12914	1.66609	0.12702
					SUPERHEAT					
	800	1096.8	1.8565	39.101	1.7531 8	1008.5	1301.7	0.12703	1.66620	0.12703
	900	1109.6	1.8715	39.100	1.9722 8	1069.6	1380.7	0.12703	1.66621	0.12703
	1000	1122.3	1.8847	39.100	2.1914 8	1127.5	1455.4	0.12703	1.66621	0.12703
	1100	1135.0	1.8967	39.100	2.4105 8	1182.5	1526.4	0.12703	1.66621	0.12703
	1200	1147.6	1.9078	39.100	2.6297 8	1235.1	1594.3	0.12703	1.66621	0.12703
	1300	1160.3	1.9180	39.100	2.8488 8	1285.6	1659.4	0.12703	1.66621	0.12703
	1400	1173.0	1.9275	39.100	3.0679 8	1334.1	1722.1	0.12703	1.66621	0.12703
	1500	1185.7	1.9362	39.100	3.2871 8	1380.9	1782.5	0.12703	1.66621	0.12703
	1600	1198.4	1.9444	39.100	3.5062 8	1426.2	1841.0	0.12703	1.66621	0.12703
	1700	1211.1	1.9522	39.100	3.7254 8	1470.1	1897.6	0.12703	1.66621	0.12703
	1800	1223.8	1.9594	39.100	3.9445 8	1512.7	1952.6	0.12703	1.66621	0.12703
	1900	1236.5	1.9662	39.100	4.1636 8	1554.2	2006.1	0.12703	1.66621	0.12703
	2000	1249.2	1.9726	39.100	4.3828 8	1594.5	2058.3	0.12703	1.66621	0.12703
	2100	1261.9	1.9787	39.100	4.6019 8	1633.9	2109.1	0.12703	1.66621	0.12703
	2200	1274.6	1.9847	39.100	4.8211 8	1672.4	2158.7	0.12703	1.66621	0.12703
	2300	1287.3	1.9905	39.100	5.0402 8	1709.9	2207.2	0.12703	1.66621	0.12703
	2400	1300.0	1.9959	39.100	5.2593 8	1746.7	2254.7	0.12703	1.66621	0.12703
	2500	1312.7	2.0010	39.100	5.4785 8	1782.7	2301.2	0.12703	1.66621	0.12703
	2600	1325.4	2.0058	39.100	5.6976 8	1818.0	2346.8	0.12703	1.66621	0.12703
	2700	1338.1	2.0107	39.100	5.9168 8	1852.7	2391.5	0.12703	1.66621	0.12703

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 800 DEG R VAPOR PRESSURE 3.4994852-5 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	800	153.9	0.5087	39.100	1.9890-2					0.19030
SAT VAP	800	1096.6	1.6872	39.116	6.2721 6	1008.1	1301.3	0.13093	1.66584	0.12702
					SUPERHEAT					
	900	1109.5	1.7023	39.103	7.0584 6	1069.6	1380.6	0.12702	1.66614	0.12702
	1000	1122.3	1.7155	39.101	7.8430 6	1127.5	1455.4	0.12703	1.66619	0.12703
	1100	1135.0	1.7275	39.100	8.6275 6	1182.5	1526.4	0.12703	1.66620	0.12703
	1200	1147.6	1.7387	39.100	9.4119 6	1235.1	1594.3	0.12703	1.66621	0.12703
	1300	1160.3	1.7489	39.100	1.0196 7	1285.6	1659.4	0.12703	1.66621	0.12703
	1400	1173.0	1.7583	39.100	1.0981 7	1334.1	1722.1	0.12703	1.66621	0.12703
	1500	1185.7	1.7671	39.100	1.1765 7	1380.9	1782.5	0.12703	1.66621	0.12703
	1600	1198.4	1.7753	39.100	1.2549 7	1426.2	1841.0	0.12703	1.66621	0.12703
	1700	1211.1	1.7830	39.100	1.3334 7	1470.1	1897.6	0.12703	1.66621	0.12703
	1800	1223.8	1.7903	39.100	1.4118 7	1512.7	1952.6	0.12703	1.66621	0.12703
	1900	1236.5	1.7970	39.100	1.4902 7	1554.2	2006.1	0.12703	1.66621	0.12703
	2000	1249.2	1.8034	39.100	1.5686 7	1594.5	2058.3	0.12703	1.66621	0.12703
	2100	1261.9	1.8096	39.100	1.6471 7	1633.9	2109.1	0.12703	1.66621	0.12703
	2200	1274.6	1.8156	39.100	1.7255 7	1672.4	2158.7	0.12703	1.66621	0.12703
	2300	1287.3	1.8214	39.100	1.8039 7	1709.9	2207.2	0.12703	1.66621	0.12703
	2400	1300.0	1.8268	39.100	1.8824 7	1746.7	2254.7	0.12703	1.66621	0.12703
	2500	1312.7	1.8318	39.100	1.9608 7	1782.7	2301.2	0.12703	1.66621	0.12703
	2600	1325.4	1.8367	39.100	2.0392 7	1818.0	2346.8	0.12703	1.66621	0.12703
	2700	1338.1	1.8415	39.100	2.1177 7	1852.7	2391.5	0.12703	1.66621	0.12703

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 900 DEG R VAPOR PRESSURE 4.5742935-4 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	900	172.8	0.5310	39.100	2.0290-2					0.18777
SAT VAP	900	1109.0	1.5712	39.138	5.3950 5	1068.6	1379.7	0.13474	1.66530	0.12701
					SUPERHEAT					
	1000	1122.1	1.5848	39.113	5.9983 5	1127.1	1455.0	0.12915	1.66589	0.12702
	1100	1134.9	1.5969	39.106	6.5994 5	1182.4	1526.3	0.12759	1.66608	0.12702
	1200	1147.6	1.6081	39.102	7.2000 5	1235.1	1594.2	0.12703	1.66616	0.12703
	1300	1160.3	1.6183	39.101	7.8002 5	1285.5	1659.4	0.12703	1.66619	0.12703
	1400	1173.0	1.6278	39.101	8.4004 5	1334.1	1722.0	0.12703	1.66620	0.12703
	1500	1185.7	1.6365	39.100	9.0004 5	1380.9	1782.5	0.12703	1.66621	0.12703
	1600	1198.4	1.6447	39.100	9.6005 5	1426.2	1841.0	0.12703	1.66621	0.12703
	1700	1211.1	1.6525	39.100	1.0201 6	1470.1	1897.6	0.12703	1.66621	0.12703
	1800	1223.8	1.6597	39.100	1.0801 6	1512.7	1952.6	0.12703	1.66621	0.12703
	1900	1236.5	1.6665	39.100	1.1401 6	1554.2	2006.1	0.12703	1.66621	0.12703
	2000	1249.2	1.6729	39.100	1.2001 6	1594.5	2058.3	0.12703	1.66621	0.12703
	2100	1261.9	1.6791	39.100	1.2601 6	1633.9	2109.1	0.12703	1.66621	0.12703
	2200	1274.6	1.6850	39.100	1.3201 6	1672.4	2158.7	0.12703	1.66621	0.12703
	2300	1287.3	1.6908	39.100	1.3801 6	1709.9	2207.2	0.12703	1.66621	0.12703
	2400	1300.0	1.6962	39.100	1.4401 6	1746.7	2254.7	0.12703	1.66621	0.12703
	2500	1312.7	1.7013	39.100	1.5001 6	1782.7	2301.2	0.12703	1.66621	0.12703
	2600	1325.4	1.7061	39.100	1.5601 6	1818.0	2346.8	0.12703	1.66621	0.12703
	2700	1338.1	1.7110	39.100	1.6201 6	1852.7	2391.5	0.12703	1.66621	0.12703

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 1000 DEG R VAPOR PRESSURE 3.5203232-3 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1000	191.4	0.5507	39.100	2.0690-2					0.18570
SAT VAP	1000	1120.8	1.4800	39.202	7.7766 4	1124.6	1452.4	0.14366	1.66376	0.12698
					SUPERHEAT					
	1100	1134.3	1.4928	39.143	8.5672 4	1181.3	1525.1	0.13283	1.66518	0.12701
	1200	1147.4	1.5043	39.118	9.3519 4	1234.6	1593.7	0.12910	1.66578	0.12702
	1300	1160.2	1.5146	39.108	1.0134 5	1285.3	1659.1	0.12797	1.66601	0.12702
	1400	1173.0	1.5241	39.105	1.0914 5	1334.0	1721.9	0.12724	1.66610	0.12702
	1500	1185.7	1.5329	39.103	1.1694 5	1380.9	1782.4	0.12703	1.66615	0.12703
	1600	1198.4	1.5411	39.102	1.2474 5	1426.2	1840.9	0.12703	1.66617	0.12703
	1700	1211.1	1.5488	39.101	1.3254 5	1470.1	1897.6	0.12703	1.66619	0.12703
	1800	1223.8	1.5561	39.101	1.4034 5	1512.7	1952.6	0.12703	1.66620	0.12703
	1900	1236.5	1.5628	39.101	1.4814 5	1554.1	2006.1	0.12703	1.66620	0.12703
	2000	1249.2	1.5693	39.100	1.5593 5	1594.5	2058.2	0.12703	1.66620	0.12703
	2100	1261.9	1.5754	39.100	1.6373 5	1633.9	2109.1	0.12703	1.66621	0.12703
	2200	1274.6	1.5814	39.100	1.7153 5	1672.4	2158.7	0.12703	1.66621	0.12703
	2300	1287.3	1.5872	39.100	1.7933 5	1709.9	2207.2	0.12703	1.66621	0.12703
	2400	1300.0	1.5926	39.100	1.8712 5	1746.7	2254.7	0.12703	1.66621	0.12703
	2500	1312.7	1.5976	39.100	1.9492 5	1782.7	2301.2	0.12703	1.66621	0.12703
	2600	1325.4	1.6025	39.100	2.0272 5	1818.0	2346.8	0.12703	1.66621	0.12703
	2700	1338.1	1.6073	39.100	2.1051 5	1852.7	2391.5	0.12703	1.66621	0.12703

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 1100 DEG R VAPOR PRESSURE 1.8551990-2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1100	209.9	0.5683	39.100	2.1090-2					0.18409
SAT VAP	1100	1131.7	1.4062	39.323	1.6182 4	1175.9	1519.7	0.15691	1.66083	0.12692
					SUPERHEAT					
	1200	1146.3	1.4190	39.193	1.7711 4	1232.2	1591.3	0.13776	1.66393	0.12698
	1300	1159.7	1.4298	39.144	1.9211 4	1284.1	1657.9	0.13140	1.66512	0.12701
	1400	1172.7	1.4395	39.124	2.0700 4	1333.3	1721.2	0.12905	1.66563	0.12702
	1500	1185.5	1.4484	39.114	2.2184 4	1380.4	1782.0	0.12808	1.66587	0.12702
	1600	1198.3	1.4566	39.109	2.3666 4	1425.9	1840.6	0.12755	1.66600	0.12702
	1700	1211.1	1.4644	39.106	2.5148 4	1469.9	1897.4	0.12739	1.66607	0.12702
	1800	1223.8	1.4717	39.104	2.6628 4	1512.6	1952.5	0.12718	1.66612	0.12702
	1900	1236.5	1.4784	39.103	2.8108 4	1554.1	2006.0	0.12703	1.66614	0.12703
	2000	1249.2	1.4848	39.102	2.9588 4	1594.5	2058.2	0.12703	1.66616	0.12703
	2100	1261.9	1.4910	39.102	3.1068 4	1633.9	2109.0	0.12703	1.66617	0.12703
	2200	1274.6	1.4970	39.101	3.2548 4	1672.3	2158.7	0.12703	1.66618	0.12703
	2300	1287.3	1.5027	39.101	3.4027 4	1709.9	2207.2	0.12703	1.66619	0.12703
	2400	1300.0	1.5081	39.101	3.5507 4	1746.7	2254.7	0.12703	1.66619	0.12703
	2500	1312.7	1.5132	39.101	3.6986 4	1782.7	2301.2	0.12703	1.66620	0.12703
	2600	1325.4	1.5181	39.101	3.8466 4	1818.0	2346.7	0.12703	1.66620	0.12703
	2700	1338.1	1.5229	39.100	3.9946 4	1852.7	2391.5	0.12703	1.66620	0.12703

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 1200 DEG R VAPOR PRESSURE 7.3859801-2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1200	228.3	0.5842	39.100	2.1490-2					0.18294
SAT VAP	1200	1142.3	1.3459	39.467	4.4179 3	1223.8	1582.7	0.16800	1.65734	0.12687
					SUPERHEAT					
	1300	1157.7	1.3584	39.275	4.8094 3	1279.9	1653.6	0.14413	1.66192	0.12695
	1400	1171.6	1.3687	39.194	5.1901 3	1330.9	1718.8	0.13506	1.66389	0.12699
	1500	1184.9	1.3779	39.155	5.5664 3	1379.0	1780.5	0.13113	1.66485	0.12700
	1600	1197.9	1.3862	39.134	5.9406 3	1424.9	1839.7	0.12930	1.66535	0.12701
	1700	1210.8	1.3941	39.122	6.3138 3	1469.2	1896.8	0.12835	1.66565	0.12702
	1800	1223.6	1.4014	39.115	6.6864 3	1512.1	1952.0	0.12785	1.66582	0.12702
	1900	1236.4	1.4082	39.111	7.0587 3	1553.7	2005.7	0.12757	1.66593	0.12702
	2000	1249.1	1.4146	39.108	7.4307 3	1594.2	2057.9	0.12739	1.66600	0.12702
	2100	1261.8	1.4208	39.106	7.8027 3	1633.6	2108.8	0.12732	1.66605	0.12702
	2200	1274.5	1.4268	39.105	8.1745 3	1672.2	2158.5	0.12720	1.66609	0.12702
	2300	1287.2	1.4326	39.104	8.5463 3	1709.8	2207.1	0.12713	1.66611	0.12703
	2400	1300.0	1.4380	39.103	8.9180 3	1746.6	2254.6	0.12714	1.66613	0.12703
	2500	1312.7	1.4430	39.103	9.2897 3	1782.6	2301.1	0.12715	1.66615	0.12703
	2600	1325.4	1.4479	39.102	9.6614 3	1817.9	2346.7	0.12717	1.66616	0.12703
	2700	1338.1	1.4527	39.102	1.0033 4	1852.5	2391.4	0.12718	1.66617	0.12703

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 1300 DEG R VAPOR PRESSURE 2.3636710-1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1300	246.5	0.5988	39.100	2.1890-2					0.18225
SAT VAP	1300	1152.3	1.2956	39.650	1.4887 3	1268.1	1641.3	0.17868	1.65292	0.12680
					SUPERHEAT					
	1400	1168.6	1.3077	39.398	1.6134 3	1324.1	1711.8	0.15190	1.65890	0.12691
	1500	1183.2	1.3177	39.274	1.7341 3	1374.8	1776.2	0.13992	1.66189	0.12696
	1600	1196.8	1.3266	39.209	1.8528 3	1422.2	1836.9	0.13421	1.66348	0.12699
	1700	1210.1	1.3346	39.172	1.9705 3	1467.4	1894.9	0.13124	1.66441	0.12700
	1800	1223.1	1.3421	39.149	2.0876 3	1510.8	1950.7	0.12961	1.66497	0.12701
	1900	1236.0	1.3489	39.135	2.2043 3	1552.8	2004.7	0.12870	1.66532	0.12702
	2000	1248.8	1.3554	39.126	2.3209 3	1593.5	2057.2	0.12814	1.66554	0.12702
	2100	1261.6	1.3616	39.120	2.4373 3	1633.1	2108.2	0.12780	1.66570	0.12702
	2200	1274.4	1.3676	39.115	2.5537 3	1671.7	2158.0	0.12759	1.66581	0.12702
	2300	1287.1	1.3734	39.112	2.6700 3	1709.4	2206.7	0.12743	1.66590	0.12702
	2400	1299.9	1.3789	39.110	2.7862 3	1746.3	2254.2	0.12731	1.66595	0.12702
	2500	1312.6	1.3839	39.108	2.9024 3	1782.4	2300.8	0.12726	1.66600	0.12702
	2600	1325.3	1.3888	39.107	3.0186 3	1817.7	2346.4	0.12720	1.66603	0.12702
	2700	1338.0	1.3936	39.106	3.1348 3	1852.4	2391.2	0.12717	1.66606	0.12703

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 1400 DEG R VAPOR PRESSURE 6.3740022-1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1400	264.7	0.6123	39.100	2.2290-2					0.18202
SAT VAP	1400	1161.6	1.2530	39.883	5.9102 2	1308.6	1695.4	0.18927	1.64731	0.12671
					SUPERHEAT					
	1500	1178.9	1.2649	39.563	6.3837 2	1365.0	1766.0	0.16028	1.65485	0.12685
	1600	1194.1	1.2747	39.391	6.8389 2	1415.8	1830.1	0.14585	1.65897	0.12692
	1700	1208.3	1.2833	39.292	7.2847 2	1463.0	1890.2	0.13816	1.66140	0.12696
	1800	1221.9	1.2911	39.231	7.7251 2	1507.7	1947.4	0.13390	1.66288	0.12698
	1900	1235.1	1.2982	39.194	8.1620 2	1550.4	2002.3	0.13149	1.66381	0.12700
	2000	1248.2	1.3048	39.170	8.5969 2	1591.7	2055.3	0.13003	1.66442	0.12701
	2100	1261.1	1.3111	39.153	9.0306 2	1631.7	2106.8	0.12911	1.66484	0.12701
	2200	1274.0	1.3171	39.141	9.4635 2	1670.6	2156.9	0.12850	1.66514	0.12702
	2300	1286.8	1.3229	39.133	9.8959 2	1708.5	2205.7	0.12811	1.66536	0.12702
	2400	1299.6	1.3284	39.126	1.0328 3	1745.5	2253.5	0.12782	1.66552	0.12702
	2500	1312.4	1.3335	39.122	1.0759 3	1781.7	2300.2	0.12764	1.66563	0.12702
	2600	1325.1	1.3383	39.118	1.1191 3	1817.2	2345.9	0.12749	1.66572	0.12702
	2700	1337.9	1.3432	39.116	1.1622 3	1851.9	2390.7	0.12740	1.66580	0.12702

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 1500 DEG R VAPOR PRESSURE 1.5006184 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1500	283.0	0.6249	39.100	2.2690-2					0.18225
SAT VAP	1500	1170.4	1.2166	40.156	2.6715 2	1346.0	1745.5	0.19849	1.64082	0.12663
					SUPERHEAT					
	1600	1188.6	1.2283	39.772	2.8770 2	1402.7	1816.3	0.16881	1.64972	0.12678
	1700	1204.5	1.2380	39.545	3.0744 2	1453.8	1880.6	0.15224	1.65512	0.12687
	1800	1219.3	1.2464	39.406	3.2667 2	1501.1	1940.5	0.14278	1.65850	0.12692
	1900	1233.3	1.2539	39.321	3.4557 2	1545.5	1997.1	0.13733	1.66061	0.12696
	2000	1246.8	1.2607	39.264	3.6429 2	1587.9	2051.4	0.13399	1.66202	0.12698
	2100	1260.0	1.2671	39.225	3.8288 2	1628.7	2103.7	0.13187	1.66299	0.12699
	2200	1273.1	1.2733	39.197	4.0140 2	1668.2	2154.4	0.13048	1.66369	0.12700
	2300	1286.1	1.2792	39.177	4.1986 2	1706.6	2203.7	0.12954	1.66421	0.12701
	2400	1299.1	1.2847	39.162	4.3828 2	1744.0	2251.8	0.12891	1.66458	0.12701
	2500	1311.9	1.2898	39.151	4.5667 2	1780.4	2298.7	0.12847	1.66485	0.12702
	2600	1324.8	1.2947	39.143	4.7503 2	1816.0	2344.7	0.12815	1.66506	0.12702
	2700	1337.6	1.2996	39.136	4.9339 2	1851.0	2389.7	0.12791	1.66523	0.12702

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 1600 DEG R VAPOR PRESSURE 3.1657459 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1600	301.2	0.6367	39.100	2.3090-2					0.18294
SAT VAP	1600	1178.7	1.1851	40.467	1.3403 2	1380.3	1791.7	0.20623	1.63350	0.12654
					SUPERHEAT					
	1700	1197.7	1.1967	40.017	1.4401 2	1437.5	1863.1	0.17649	1.64378	0.12671
	1800	1214.5	1.2063	39.736	1.5357 2	1489.1	1927.7	0.15862	1.65040	0.12682
	1900	1229.7	1.2144	39.560	1.6282 2	1536.4	1987.5	0.14797	1.65464	0.12688
	2000	1244.1	1.2217	39.442	1.7190 2	1580.9	2043.9	0.14133	1.65750	0.12693
	2100	1258.0	1.2284	39.361	1.8086 2	1623.2	2097.8	0.13704	1.65951	0.12695
	2200	1271.5	1.2348	39.303	1.8976 2	1663.8	2149.7	0.13420	1.66095	0.12697
	2300	1284.9	1.2409	39.261	1.9859 2	1703.0	2199.9	0.13227	1.66201	0.12699
	2400	1298.0	1.2465	39.231	2.0739 2	1740.9	2248.6	0.13096	1.66278	0.12700
	2500	1311.1	1.2517	39.208	2.1615 2	1777.8	2296.0	0.13004	1.66335	0.12700
	2600	1324.0	1.2566	39.191	2.2490 2	1813.8	2342.3	0.12938	1.66379	0.12701
	2700	1336.9	1.2615	39.177	2.3363 2	1849.1	2387.7	0.12887	1.66415	0.12701

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 1700 DEG R VAPOR PRESSURE 6.1049537 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1700	319.6	0.6478	39.100	2.3490-2					0.18409
SAT VAP	1700	1186.8	1.1580	40.797	7.3252 1	1412.5	1835.1	0.21161	1.62586	0.12645
					SUPERHEAT					
	1800	1206.5	1.1692	40.291	7.8535 1	1469.9	1906.7	0.18297	1.63720	0.12664
	1900	1223.8	1.1785	39.967	8.3568 1	1521.5	1971.4	0.16496	1.64469	0.12676
	2000	1239.6	1.1865	39.750	8.8449 1	1569.1	2031.3	0.15333	1.64987	0.12684
	2100	1254.5	1.1937	39.597	9.3228 1	1613.8	2087.8	0.14565	1.65355	0.12689
	2200	1268.8	1.2004	39.488	9.7938 1	1656.2	2141.6	0.14047	1.65623	0.12693
	2300	1282.7	1.2068	39.408	1.0260 2	1696.7	2193.3	0.13691	1.65822	0.12695
	2400	1296.2	1.2125	39.350	1.0722 2	1735.7	2243.1	0.13447	1.65966	0.12697
	2500	1309.6	1.2178	39.308	1.1180 2	1773.4	2291.3	0.13276	1.66074	0.12698
	2600	1322.8	1.2229	39.275	1.1637 2	1810.0	2338.3	0.13151	1.66157	0.12699
	2700	1335.9	1.2279	39.248	1.2093 2	1845.8	2384.1	0.13055	1.66227	0.12700

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 1800 DEG R VAPOR PRESSURE 1.0918242 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1800	338.0	0.6584	39.100	2.3890-2					0.18570
SAT VAP	1800	1194.8	1.1344	41.135	4.3011 1	1443.0	1876.0	0.21485	1.61810	0.12638
					SUPERHEAT					
	1900	1214.8	1.1451	40.600	4.5999 1	1499.7	1947.1	0.18856	1.62985	0.12657
	2000	1232.7	1.1541	40.233	4.8863 1	1551.5	2012.0	0.17069	1.63823	0.12670
	2100	1249.0	1.1621	39.972	5.1640 1	1599.4	2072.2	0.15847	1.64432	0.12679
	2200	1264.4	1.1693	39.784	5.4355 1	1644.3	2128.9	0.15000	1.64883	0.12685
	2300	1279.2	1.1760	39.645	5.7025 1	1686.9	2182.8	0.14407	1.65221	0.12690
	2400	1293.4	1.1820	39.544	5.9657 1	1727.5	2234.3	0.13995	1.65469	0.12693
	2500	1307.2	1.1876	39.468	6.2261 1	1766.3	2283.8	0.13703	1.65656	0.12695
	2600	1320.7	1.1927	39.410	6.4847 1	1803.9	2331.8	0.13488	1.65802	0.12697
	2700	1334.2	1.1979	39.362	6.7423 1	1840.5	2378.5	0.13322	1.65923	0.12698

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 1900 DEG R VAPOR PRESSURE 1.8281404 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1900	356.7	0.6685	39.100	2.4290-2					0.18777
SAT VAP	1900	1202.7	1.1137	41.494	2.6880 1	1471.6	1914.3	0.21678	1.61001	0.12631
					SUPERHEAT					
	2000	1223.0	1.1240	40.928	2.8687 1	1527.8	1985.0	0.19271	1.62219	0.12651
	2100	1241.3	1.1329	40.519	3.0425 1	1579.5	2050.0	0.17542	1.63131	0.12664
	2200	1258.2	1.1409	40.219	3.2111 1	1627.7	2110.5	0.16300	1.63822	0.12674
	2300	1274.1	1.1481	39.995	3.3759 1	1672.9	2167.5	0.15406	1.64350	0.12681
	2400	1289.1	1.1545	39.832	3.5371 1	1715.5	2221.3	0.14773	1.64742	0.12686
	2500	1303.6	1.1603	39.709	3.6959 1	1756.0	2272.6	0.14316	1.65040	0.12690
	2600	1317.7	1.1657	39.614	3.8529 1	1794.9	2322.0	0.13977	1.65274	0.12693
	2700	1331.6	1.1710	39.535	4.0091 1	1832.6	2370.0	0.13712	1.65471	0.12695

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 2000 DEG R VAPOR PRESSURE 2.9024223 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2000	375.6	0.6782	39.100	2.4690-2					0.19030
SAT VAP	2000	1210.5	1.0956	41.858	1.7667 1	1498.8	1950.5	0.21733	1.60193	0.12626
					SUPERHEAT					
	2100	1231.0	1.1056	41.265	1.8817 1	1554.4	2020.8	0.19550	1.61440	0.12645
	2200	1249.7	1.1144	40.821	1.9928 1	1606.0	2085.9	0.17908	1.62412	0.12660
	2300	1267.1	1.1222	40.485	2.1006 1	1654.3	2146.6	0.16682	1.63171	0.12670
	2400	1283.3	1.1291	40.237	2.2055 1	1699.4	2203.4	0.15790	1.63746	0.12678
	2500	1298.6	1.1353	40.050	2.3081 1	1741.9	2257.1	0.15133	1.64187	0.12683
	2600	1313.4	1.1409	39.904	2.4092 1	1782.5	2308.4	0.14637	1.64538	0.12688
	2700	1327.9	1.1465	39.782	2.5095 1	1821.7	2358.1	0.14245	1.64835	0.12691

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 2100 DEG R VAPOR PRESSURE 4.4067186 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2100	394.8	0.6875	39.100	2.5090-2					0.19329
SAT VAP	2100	1218.4	1.0797	42.219	1.2113 1	1525.1	1985.2	0.21671	1.59403	0.12622
					SUPERHEAT					
	2200	1239.0	1.0894	41.604	1.2878 1	1580.0	2055.0	0.19704	1.60667	0.12641
	2300	1258.1	1.0980	41.131	1.3618 1	1631.3	2119.9	0.18170	1.61681	0.12656
	2400	1275.6	1.1054	40.778	1.4333 1	1679.0	2180.1	0.17015	1.62464	0.12667
	2500	1292.1	1.1120	40.508	1.5030 1	1723.8	2236.7	0.16141	1.63077	0.12675
	2600	1307.8	1.1181	40.296	1.5714 1	1766.4	2290.4	0.15467	1.63570	0.12681
	2700	1323.0	1.1239	40.118	1.6390 1	1807.4	2342.2	0.14926	1.63991	0.12686

SATURATION TEMPERATURE 2200 DEG R VAPOR PRESSURE 6.4388805 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2200	414.3	0.6966	39.100	2.5490-2					0.19674
SAT VAP	2200	1226.5	1.0658	42.569	8.6138 0	1550.8	2018.8	0.21512	1.58648	0.12620
					SUPERHEAT					
	2300	1247.2	1.0751	41.940	9.1404 0	1604.7	2087.8	0.19752	1.59912	0.12638
	2400	1266.2	1.0832	41.462	9.6477 0	1655.0	2151.7	0.18371	1.60913	0.12653
	2500	1283.9	1.0903	41.094	1.0140 1	1702.1	2211.3	0.17293	1.61710	0.12663
	2600	1300.6	1.0967	40.801	1.0621 1	1746.7	2267.8	0.16439	1.62363	0.12672
	2700	1316.8	1.1029	40.553	1.1097 1	1789.7	2322.1	0.15741	1.62928	0.12679

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 2300 DEG R VAPOR PRESSURE 9.0965371 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2300	434.2	0.7054	39.100	2.5890-2					0.20065
SAT VAP	2300	1234.9	1.0536	42.902	6.3248 0	1576.0	2051.5	0.21280	1.57935	0.12619
					SUPERHEAT					
	2400	1255.3	1.0623	42.289	6.6955 0	1628.3	2118.8	0.19748	1.59140	0.12636
	2500	1274.2	1.0699	41.810	7.0545 0	1677.3	2181.5	0.18508	1.60120	0.12650
	2600	1292.1	1.0767	41.424	7.4050 0	1723.9	2240.8	0.17498	1.60937	0.12661
	2700	1309.3	1.0833	41.095	7.7514 0	1768.8	2297.7	0.16651	1.61655	0.12670

SATURATION TEMPERATURE 2400 DEG R VAPOR PRESSURE 1.2429350 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2400	454.4	0.7141	39.100	2.6290-2					0.20502
SAT VAP	2400	1243.4	1.0428	43.231	4.7934 0	1600.5	2083.0	0.21016	1.57240	0.12619
					SUPERHEAT					
	2500	1263.5	1.0509	42.636	5.0628 0	1651.1	2148.5	0.19680	1.58382	0.12636
	2600	1282.4	1.0582	42.151	5.3260 0	1699.2	2210.4	0.18557	1.59352	0.12649
	2700	1300.6	1.0651	41.732	5.5862 0	1745.8	2269.9	0.17591	1.60219	0.12661

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 2500 DEG R VAPOR PRESSURE 1.6493732 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2500	475.2	0.7225	39.100	2.6690-2					0.20985
SAT VAP	2500	1252.0	1.0333	43.553	3.7349 0	1624.4	2113.6	0.20728	1.56568	0.12620
					SUPERHEAT					
	2600	1271.9	1.0410	42.967	3.9373 0	1673.7	2177.7	0.19546	1.57669	0.12636
	2700	1291.1	1.0482	42.456	4.1379 0	1721.6	2239.6	0.18501	1.58670	0.12650

SATURATION TEMPERATURE 2600 DEG R VAPOR PRESSURE 2.1359809 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2600	496.4	0.7308	39.100	2.7090-2					0.21514
SAT VAP	2600	1260.9	1.0249	43.858	2.9786 0	1648.0	2143.6	0.20414	1.55937	0.12623
					SUPERHEAT					
	2700	1281.0	1.0325	43.254	3.1363 0	1696.9	2207.5	0.19335	1.57050	0.12639

TABLE 2
THERMODYNAMIC PROPERTIES - POTASSIUM

SATURATION TEMPERATURE 2700 DEG R VAPOR PRESSURE 2.7159143 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2700	518.2	0.7391	39.100	2.7490-2					0.22089
SAT VAP	2700	1270.4	1.0177	44.123	2.4180 0	1672.1	2174.0	0.20065	1.55387	0.12627

Table 3 - Rubidium - Material Properties

Reference

starting vapor pressure:

$$P = .019337 \ln^{-1} \left[-\frac{16496}{T} + 16.16 \right]$$ P in psi, T in °R — 2

This curve fits the measured vapor pressure points given in (2). The accuracy of the above equation at high temperatures is questionable.

liquid molecular weight: $M_L = 85.48$ — 4

specific heat of the liquid:

$c_{pL} = .0877 \left(\frac{BTU}{lb\ °R}\right)$; apparently no measurements of the specific heat at a wide temperature range have been performed. — 4

melting point: $T_m = 562°R = 312°K$ — 4

specific heat of the solid: $c_{ps} = .0883 \left(\frac{BTU}{lb\ °R}\right)$ — 4

enthalpy at 298°K: $(h_s)_{536°R} = 37.69 \left(\frac{BTU}{lb.}\right)$ — 4

heat of melting: $\Delta h_m = 11.79 \left(\frac{BTU}{lb.}\right)$ — 4

absolute enthalpy of monatomic and diatomic vapor as a function of temperature, $H_i° \left(\frac{BTU}{lb\ mole}\right)$ — 4

absolute free energy of monatomic and diatomic vapor as a function of temperature, $F_i° \left(\frac{BTU}{lb\ mole}\right)$ — 4

entropy at the melting point: — 4

$$(S_L)_{T_m} = .238 \left(\frac{BTU}{lb\ °R}\right)$$

Table 3 - Rubidium - Material Properties (Continued)

Reference

specific volume of the liquid: 2

$$V_L = .0101 + 1.2 \times 10^{-6} T \quad (\frac{ft^3}{lb.})$$

The density is given in reference (2) only at one point.

It was assumed that the density change with temperature is the same for Rb as it is for Na and K.

Specific heat of monatomic and diatomic vapor as a function of temperature, $C_{p_i}^{\circ}$ $(\frac{BTU}{mole\ ^{\circ}R})$ 4

The finalized vapor pressure is well represented by:

$$P = \log^{-1}\left[\frac{-7661}{T} - .930 \log T + 8.547\right] \qquad 700 \leq T \leq 1500$$

P in psia

T in °R

$$P = \log^{-1}\left[\frac{-7684}{T} - .968 \log T + 8.685\right] \qquad 1500 \leq T \leq 2700$$

P in psia

T in °R

These equations have a maximum deviation of .87% from the tabulated values, and a maximum percent error of 26.5% from the values given by the starting vapor pressure equation (see Figure 3, page 131).

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 700 DEG R VAPOR PRESSURE 9.0971513-6 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	700	63.9	0.2573	85.480	1.0940-2					0.08770
SAT VAP	700	459.5	0.8224	85.524	9.6557 6	637.7	823.2	0.06081	1.66574	0.05810
					SUPERHEAT					
	800	465.4	0.8304	85.487	1.1040 7	682.0	880.4	0.05810	1.66614	0.05810
	900	471.2	0.8372	85.481	1.2421 7	723.4	933.8	0.05810	1.66620	0.05810
	1000	477.0	0.8433	85.480	1.3801 7	762.6	984.3	0.05810	1.66621	0.05810
	1100	482.8	0.8487	85.480	1.5181 7	799.8	1032.4	0.05810	1.66621	0.05810
	1200	488.6	0.8538	85.480	1.6561 7	835.3	1078.3	0.05810	1.66621	0.05810
	1300	494.4	0.8585	85.480	1.7941 7	869.5	1122.3	0.05810	1.66621	0.05810
	1400	500.3	0.8628	85.480	1.9321 7	902.3	1164.7	0.05810	1.66621	0.05810
	1500	506.1	0.8668	85.480	2.0701 7	933.9	1205.6	0.05810	1.66621	0.05810
	1600	511.9	0.8706	85.480	2.2081 7	964.6	1245.1	0.05810	1.66621	0.05810
	1700	517.7	0.8741	85.480	2.3461 7	994.3	1283.4	0.05810	1.66621	0.05810
	1800	523.5	0.8775	85.480	2.4842 7	1023.1	1320.6	0.05810	1.66621	0.05810
	1900	529.3	0.8805	85.480	2.6222 7	1051.1	1356.8	0.05810	1.66621	0.05810
	2000	535.1	0.8835	85.480	2.7602 7	1078.4	1392.1	0.05810	1.66621	0.05810
	2100	540.9	0.8864	85.480	2.8982 7	1105.1	1426.4	0.05810	1.66621	0.05810
	2200	546.7	0.8891	85.480	3.0362 7	1131.1	1460.0	0.05810	1.66621	0.05810
	2300	552.5	0.8917	85.480	3.1742 7	1156.5	1492.8	0.05810	1.66621	0.05810
	2400	558.3	0.8941	85.480	3.3122 7	1181.4	1524.9	0.05810	1.66621	0.05810
	2500	564.2	0.8964	85.480	3.4502 7	1205.7	1556.4	0.05810	1.66621	0.05810
	2600	570.0	0.8987	85.480	3.5882 7	1229.6	1587.2	0.05810	1.66621	0.05810
	2700	575.8	0.9010	85.480	3.7262 7	1253.0	1617.4	0.05810	1.66621	0.05810

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 800 DEG R VAPOR PRESSURE 1.8914169-4 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	800	72.6	0.2690	85.480	1.1060-2					0.08770
SAT VAP	800	465.0	0.7594	85.616	5.3018 5	681.0	879.3	0.06461	1.66474	0.05809
					SUPERHEAT					
	900	471.1	0.7666	85.511	5.9719 5	723.2	933.6	0.05925	1.66588	0.05810
	1000	477.0	0.7727	85.489	6.6371 5	762.5	984.2	0.05828	1.66611	0.05810
	1100	482.8	0.7782	85.484	7.3013 5	799.8	1032.3	0.05810	1.66617	0.05810
	1200	488.6	0.7833	85.482	7.9652 5	835.3	1078.3	0.05810	1.66620	0.05810
	1300	494.4	0.7880	85.481	8.6291 5	869.4	1122.3	0.05810	1.66621	0.05810
	1400	500.3	0.7923	85.480	9.2929 5	902.3	1164.7	0.05810	1.66621	0.05810
	1500	506.1	0.7963	85.480	9.9567 5	933.9	1205.5	0.05810	1.66621	0.05810
	1600	511.9	0.8001	85.480	1.0620 6	964.6	1245.1	0.05810	1.66621	0.05810
	1700	517.7	0.8036	85.480	1.1284 6	994.3	1283.4	0.05810	1.66621	0.05810
	1800	523.5	0.8070	85.480	1.1948 6	1023.1	1320.6	0.05810	1.66621	0.05810
	1900	529.3	0.8100	85.480	1.2612 6	1051.1	1356.8	0.05810	1.66621	0.05810
	2000	535.1	0.8130	85.480	1.3276 6	1078.4	1392.1	0.05810	1.66621	0.05810
	2100	540.9	0.8159	85.480	1.3939 6	1105.1	1426.4	0.05810	1.66621	0.05810
	2200	546.7	0.8186	85.480	1.4603 6	1131.1	1460.0	0.05810	1.66621	0.05810
	2300	552.5	0.8212	85.480	1.5267 6	1156.5	1492.8	0.05810	1.66621	0.05810
	2400	558.3	0.8236	85.480	1.5931 6	1181.4	1524.9	0.05810	1.66621	0.05810
	2500	564.2	0.8259	85.480	1.6595 6	1205.7	1556.4	0.05810	1.66621	0.05810
	2600	570.0	0.8282	85.480	1.7258 6	1229.6	1587.2	0.05810	1.66621	0.05810
	2700	575.8	0.8305	85.480	1.7922 6	1253.0	1617.4	0.05810	1.66621	0.05810

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 900 DEG R VAPOR PRESSURE 1.9657840-3 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	900	81.4	0.2793	85.480	1.1160-2					0.08770
SAT VAP	900	470.3	0.7114	85.799	5.7267 4	720.8	931.1	0.07015	1.66274	0.05807
					SUPERHEAT					
	1000	476.8	0.7181	85.578	6.3794 4	761.7	983.4	0.06115	1.66514	0.05809
	1100	482.7	0.7238	85.517	7.0223 4	799.4	1032.0	0.05906	1.66580	0.05810
	1200	488.6	0.7289	85.496	7.6626 4	835.2	1078.1	0.05840	1.66603	0.05810
	1300	494.4	0.7336	85.488	8.3019 4	869.4	1122.2	0.05823	1.66612	0.05810
	1400	500.2	0.7379	85.484	8.9409 4	902.3	1164.6	0.05810	1.66616	0.05810
	1500	506.1	0.7419	85.483	9.5797 4	933.9	1205.5	0.05810	1.66618	0.05810
	1600	511.9	0.7457	85.482	1.0219 5	964.6	1245.1	0.05810	1.66619	0.05810
	1700	517.7	0.7492	85.481	1.0857 5	994.3	1283.4	0.05810	1.66620	0.05810
	1800	523.5	0.7526	85.481	1.1496 5	1023.1	1320.6	0.05810	1.66621	0.05810
	1900	529.3	0.7556	85.481	1.2135 5	1051.1	1356.8	0.05810	1.66621	0.05810
	2000	535.1	0.7586	85.480	1.2773 5	1078.4	1392.0	0.05810	1.66621	0.05810
	2100	540.9	0.7615	85.480	1.3412 5	1105.1	1426.4	0.05810	1.66621	0.05810
	2200	546.7	0.7642	85.480	1.4051 5	1131.1	1460.0	0.05810	1.66621	0.05810
	2300	552.5	0.7668	85.480	1.4689 5	1156.5	1492.8	0.05810	1.66621	0.05810
	2400	558.3	0.7692	85.480	1.5328 5	1181.4	1524.9	0.05810	1.66621	0.05810
	2500	564.2	0.7715	85.480	1.5967 5	1205.7	1556.4	0.05810	1.66621	0.05810
	2600	570.0	0.7738	85.480	1.6605 5	1229.6	1587.2	0.05810	1.66621	0.05810
	2700	575.8	0.7761	85.480	1.7244 5	1253.0	1617.4	0.05810	1.66621	0.05810

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 1000 DEG R VAPOR PRESSURE 1.2590716-2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1000	90.2	0.2885	85.480	1.1300-2					0.08770
SAT VAP	1000	475.2	0.6736	86.100	9.8997 3	757.1	978.8	0.07694	1.65946	0.05804
					SUPERHEAT					
	1100	482.2	0.6801	85.716	1.0938 4	797.6	1030.1	0.06417	1.66361	0.05808
	1200	488.3	0.6856	85.584	1.1951 4	834.3	1077.2	0.06037	1.66506	0.05809
	1300	494.3	0.6904	85.532	1.2955 4	868.9	1121.8	0.05907	1.66563	0.05810
	1400	500.2	0.6947	85.508	1.3955 4	902.0	1164.4	0.05857	1.66589	0.05810
	1500	506.0	0.6988	85.497	1.4954 4	933.8	1205.4	0.05833	1.66602	0.05810
	1600	511.9	0.7025	85.491	1.5952 4	964.5	1245.0	0.05823	1.66609	0.05810
	1700	517.7	0.7061	85.487	1.6950 4	994.2	1283.3	0.05810	1.66613	0.05810
	1800	523.5	0.7094	85.485	1.7948 4	1023.1	1320.6	0.05810	1.66616	0.05810
	1900	529.3	0.7125	85.484	1.8945 4	1051.1	1356.8	0.05810	1.66617	0.05810
	2000	535.1	0.7154	85.483	1.9942 4	1078.4	1392.0	0.05810	1.66618	0.05810
	2100	540.9	0.7184	85.482	2.0940 4	1105.0	1426.4	0.05810	1.66619	0.05810
	2200	546.7	0.7211	85.482	2.1937 4	1131.1	1460.0	0.05810	1.66619	0.05810
	2300	552.5	0.7237	85.481	2.2934 4	1156.5	1492.8	0.05810	1.66620	0.05810
	2400	558.3	0.7261	85.481	2.3931 4	1181.3	1524.9	0.05810	1.66620	0.05810
	2500	564.2	0.7284	85.481	2.4929 4	1205.7	1556.3	0.05810	1.66620	0.05810
	2600	570.0	0.7307	85.481	2.5926 4	1229.6	1587.2	0.05810	1.66620	0.05810
	2700	575.8	0.7330	85.481	2.6923 4	1253.0	1617.4	0.05810	1.66621	0.05810

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 1100 DEG R VAPOR PRESSURE 5.7058679-2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1100	99.0	0.2969	85.480	1.1420-2					0.08770
SAT VAP	1100	479.8	0.6431	86.529	2.3910 3	790.3	1022.6	0.08407	1.65481	0.05800
					SUPERHEAT					
	1200	487.3	0.6497	85.947	2.6261 3	830.8	1073.7	0.06816	1.66105	0.05806
	1300	493.8	0.6549	85.714	2.8526 3	867.1	1119.9	0.06246	1.66361	0.05808
	1400	499.9	0.6595	85.609	3.0759 3	900.9	1163.3	0.06019	1.66477	0.05809
	1500	505.8	0.6636	85.557	3.2976 3	933.1	1204.7	0.05920	1.66535	0.05810
	1600	511.7	0.6674	85.529	3.5185 3	964.0	1244.5	0.05871	1.66566	0.05810
	1700	517.6	0.6709	85.513	3.7392 3	993.9	1283.0	0.05846	1.66584	0.05810
	1800	523.4	0.6743	85.503	3.9596 3	1022.8	1320.3	0.05832	1.66595	0.05810
	1900	529.3	0.6774	85.497	4.1798 3	1050.9	1356.6	0.05822	1.66602	0.05810
	2000	535.1	0.6803	85.492	4.4000 3	1078.3	1391.9	0.05821	1.66607	0.05810
	2100	540.9	0.6832	85.489	4.6202 3	1105.0	1426.3	0.05815	1.66610	0.05810
	2200	546.7	0.6860	85.487	4.8403 3	1131.0	1459.9	0.05810	1.66613	0.05810
	2300	552.5	0.6885	85.486	5.0604 3	1156.4	1492.7	0.05810	1.66614	0.05810
	2400	558.3	0.6910	85.485	5.2805 3	1181.3	1524.8	0.05810	1.66616	0.05810
	2500	564.1	0.6933	85.484	5.5006 3	1205.7	1556.3	0.05810	1.66616	0.05810
	2600	570.0	0.6956	85.483	5.7207 3	1229.5	1587.1	0.05818	1.66617	0.05810
	2700	575.8	0.6979	85.483	5.9407 3	1253.0	1617.4	0.05810	1.66618	0.05810

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 1200 DEG R VAPOR PRESSURE 2.0033027-1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1200	107.7	0.3045	85.480	1.1540-2					0.08770
SAT VAP	1200	484.0	0.6181	87.077	7.3825 2	820.4	1062.8	0.09070	1.64888	0.05795
					SUPERHEAT					
	1300	492.1	0.6246	86.289	8.0708 2	861.4	1114.0	0.07279	1.65726	0.05803
	1400	498.9	0.6297	85.928	8.7282 2	897.6	1159.9	0.06527	1.66121	0.05806
	1500	505.3	0.6341	85.748	9.3713 2	931.0	1202.6	0.06189	1.66319	0.05808
	1600	511.4	0.6380	85.651	1.0007 3	962.7	1243.1	0.06025	1.66427	0.05809
	1700	517.4	0.6416	85.594	1.0640 3	992.9	1282.0	0.05938	1.66491	0.05809
	1800	523.3	0.6450	85.560	1.1270 3	1022.1	1319.6	0.05890	1.66530	0.05810
	1900	529.1	0.6481	85.538	1.1899 3	1050.4	1356.1	0.05863	1.66554	0.05810
	2000	535.0	0.6511	85.524	1.2528 3	1077.9	1391.5	0.05846	1.66570	0.05810
	2100	540.8	0.6540	85.513	1.3156 3	1104.6	1426.0	0.05836	1.66582	0.05810
	2200	546.6	0.6568	85.506	1.3783 3	1130.7	1459.6	0.05828	1.66591	0.05810
	2300	552.5	0.6593	85.501	1.4411 3	1156.2	1492.5	0.05823	1.66597	0.05810
	2400	558.3	0.6618	85.497	1.5038 3	1181.1	1524.7	0.05820	1.66601	0.05810
	2500	564.1	0.6641	85.494	1.5665 3	1205.5	1556.1	0.05816	1.66604	0.05810
	2600	569.9	0.6664	85.492	1.6292 3	1229.4	1587.0	0.05815	1.66607	0.05810
	2700	575.7	0.6687	85.490	1.6919 3	1252.9	1617.3	0.05815	1.66609	0.05810

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 1300 DEG R VAPOR PRESSURE 5.7616777-1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1300	116.5	0.3115	85.480	1.1660-2					0.08770
SAT VAP	1300	488.0	0.5973	87.730	2.7601 2	848.0	1099.7	0.09626	1.64192	0.05790
					SUPERHEAT					
	1400	496.6	0.6037	86.744	3.0062 2	889.4	1151.3	0.07756	1.65228	0.05799
	1500	503.8	0.6087	86.242	3.2397 2	925.8	1197.1	0.06862	1.65770	0.05804
	1600	510.4	0.6130	85.968	3.4667 2	959.1	1239.5	0.06413	1.66070	0.05806
	1700	516.7	0.6168	85.807	3.6902 2	990.5	1279.5	0.06172	1.66249	0.05808
	1800	522.8	0.6203	85.708	3.9118 2	1020.4	1317.8	0.06038	1.66360	0.05809
	1900	528.8	0.6234	85.647	4.1321 2	1049.1	1354.7	0.05961	1.66428	0.05809
	2000	534.7	0.6265	85.606	4.3517 2	1076.8	1390.4	0.05913	1.66475	0.05810
	2100	540.6	0.6294	85.576	4.5709 2	1103.8	1425.2	0.05881	1.66510	0.05810
	2200	546.5	0.6322	85.555	4.7897 2	1130.1	1459.0	0.05862	1.66533	0.05810
	2300	552.4	0.6348	85.540	5.0082 2	1155.7	1492.0	0.05848	1.66550	0.05810
	2400	558.2	0.6372	85.530	5.2266 2	1180.7	1524.2	0.05839	1.66562	0.05810
	2500	564.0	0.6395	85.521	5.4449 2	1205.1	1555.8	0.05832	1.66572	0.05810
	2600	569.9	0.6418	85.515	5.6632 2	1229.1	1586.7	0.05828	1.66579	0.05810
	2700	575.7	0.6441	85.509	5.8814 2	1252.6	1617.0	0.05823	1.66586	0.05810

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 1400 DEG R VAPOR PRESSURE 1.4165903 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1400	125.3	0.3180	85.480	1.1780-2					0.08770
SAT VAP	1400	491.7	0.5798	88.462	1.1990 2	873.3	1133.8	0.10049	1.63424	0.05784
					SUPERHEAT					
	1500	500.8	0.5860	87.306	1.3016 2	915.0	1185.7	0.08208	1.64615	0.05795
	1600	508.4	0.5910	86.660	1.3987 2	951.7	1231.7	0.07222	1.65302	0.05801
	1700	515.3	0.5952	86.275	1.4928 2	985.2	1274.0	0.06672	1.65722	0.05804
	1800	521.8	0.5989	86.036	1.5850 2	1016.5	1313.8	0.06357	1.65986	0.05806
	1900	528.1	0.6022	85.889	1.6759 2	1046.2	1351.7	0.06175	1.66151	0.05807
	2000	534.2	0.6053	85.787	1.7662 2	1074.6	1388.1	0.06060	1.66265	0.05808
	2100	540.2	0.6084	85.714	1.8561 2	1102.0	1423.3	0.05984	1.66348	0.05809
	2200	546.2	0.6112	85.664	1.9456 2	1128.6	1457.5	0.05935	1.66406	0.05809
	2300	552.1	0.6138	85.628	2.0349 2	1154.5	1490.7	0.05903	1.66446	0.05810
	2400	558.0	0.6162	85.602	2.1240 2	1179.7	1523.2	0.05881	1.66477	0.05810
	2500	563.8	0.6186	85.582	2.2131 2	1204.3	1554.9	0.05865	1.66500	0.05810
	2600	569.7	0.6209	85.566	2.3020 2	1228.4	1585.9	0.05853	1.66518	0.05810
	2700	575.6	0.6232	85.552	2.3909 2	1252.0	1616.3	0.05844	1.66534	0.05810

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 1500 DEG R VAPOR PRESSURE 3.0761695 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1500	134.0	0.3241	85.480	1.1900-2					0.08770
SAT VAP	1500	495.3	0.5650	89.262	5.8626 1	896.7	1165.4	0.10347	1.62596	0.05779
					SUPERHEAT					
	1600	504.7	0.5710	87.964	6.3458 1	938.4	1217.3	0.08606	1.63904	0.05790
	1700	512.8	0.5759	87.169	6.8038 1	975.5	1263.7	0.07567	1.64739	0.05797
	1800	520.0	0.5801	86.670	7.2455 1	1009.3	1306.2	0.06946	1.65278	0.05801
	1900	526.7	0.5836	86.358	7.6757 1	1040.6	1345.8	0.06576	1.65619	0.05804
	2000	533.1	0.5869	86.142	8.1000 1	1070.2	1383.5	0.06339	1.65858	0.05806
	2100	539.4	0.5900	85.986	8.5204 1	1098.6	1419.7	0.06181	1.66034	0.05807
	2200	545.5	0.5929	85.877	8.9374 1	1125.9	1454.6	0.06078	1.66157	0.05808
	2300	551.6	0.5956	85.800	9.3520 1	1152.2	1488.3	0.06009	1.66244	0.05808
	2400	557.5	0.5981	85.744	9.7651 1	1177.7	1521.1	0.05962	1.66309	0.05809
	2500	563.5	0.6005	85.700	1.0177 2	1202.6	1553.1	0.05928	1.66359	0.05809
	2600	569.4	0.6028	85.665	1.0589 2	1226.9	1584.4	0.05902	1.66399	0.05809
	2700	575.3	0.6051	85.636	1.0999 2	1250.7	1615.0	0.05882	1.66433	0.05810

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 1600 DEG R VAPOR PRESSURE 6.0414352 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1600	142.8	0.3298	85.480	1.2020-2					0.08770
SAT VAP	1600	498.8	0.5523	90.109	3.1542 1	918.5	1194.8	0.10529	1.61730	0.05774
					SUPERHEAT					
	1700	508.5	0.5581	88.679	3.4054 1	960.2	1246.8	0.08912	1.63144	0.05786
	1800	516.9	0.5629	87.758	3.6435 1	997.5	1293.5	0.07876	1.64096	0.05793
	1900	524.3	0.5669	87.171	3.8719 1	1031.3	1335.9	0.07231	1.64716	0.05798
	2000	531.3	0.5705	86.761	4.0949 1	1062.8	1375.7	0.06805	1.65160	0.05802
	2100	538.0	0.5738	86.462	4.3145 1	1092.7	1413.5	0.06514	1.65490	0.05804
	2200	544.4	0.5768	86.253	4.5309 1	1121.1	1449.5	0.06322	1.65723	0.05806
	2300	550.7	0.5796	86.105	4.7450 1	1148.2	1484.1	0.06192	1.65890	0.05807
	2400	556.8	0.5822	85.995	4.9576 1	1174.3	1517.6	0.06102	1.66014	0.05807
	2500	562.9	0.5846	85.910	5.1693 1	1199.7	1550.1	0.06037	1.66110	0.05808
	2600	568.9	0.5869	85.843	5.3803 1	1224.4	1581.8	0.05988	1.66187	0.05809
	2700	574.8	0.5893	85.786	5.5910 1	1248.6	1612.8	0.05950	1.66254	0.05809

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 1700 DEG R VAPOR PRESSURE 1.0928434 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1700	151.6	0.3351	85.480	1.2140-2					0.08770
SAT VAP	1700	502.3	0.5414	90.952	1.8355 1	939.4	1222.6	0.10589	1.60887	0.05770
					SUPERHEAT					
	1800	512.2	0.5470	89.436	1.9764 1	980.6	1274.4	0.09129	1.62355	0.05781
	1900	520.7	0.5516	88.446	2.1096 1	1017.5	1320.7	0.08159	1.63350	0.05790
	2000	528.5	0.5556	87.743	2.2384 1	1051.6	1363.5	0.07488	1.64082	0.05795
	2100	535.8	0.5592	87.224	2.3643 1	1083.6	1403.7	0.07017	1.64637	0.05799
	2200	542.6	0.5624	86.858	2.4873 1	1113.5	1441.5	0.06697	1.65037	0.05802
	2300	549.2	0.5653	86.597	2.6082 1	1141.8	1477.4	0.06478	1.65325	0.05804
	2400	555.6	0.5680	86.402	2.7277 1	1168.9	1511.8	0.06323	1.65541	0.05805
	2500	561.8	0.5705	86.252	2.8464 1	1195.1	1545.1	0.06211	1.65709	0.05806
	2600	568.0	0.5729	86.131	2.9644 1	1220.4	1577.5	0.06126	1.65846	0.05807
	2700	574.1	0.5753	86.030	3.0820 1	1245.1	1609.1	0.06059	1.65963	0.05808

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 1800 DEG R VAPOR PRESSURE 1.8450898 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1800	160.3	0.3401	85.480	1.2260-2					0.08770
SAT VAP	1800	506.0	0.5321	91.780	1.1407 1	959.3	1249.2	0.10557	1.60075	0.05765
					SUPERHEAT					
	1900	515.7	0.5373	90.269	1.2243 1	999.4	1299.8	0.09297	1.61495	0.05777
	2000	524.5	0.5418	89.171	1.3046 1	1036.4	1346.3	0.08372	1.62577	0.05786
	2100	532.6	0.5458	88.346	1.3826 1	1070.9	1389.6	0.07692	1.63422	0.05792
	2200	540.0	0.5493	87.757	1.4581 1	1102.8	1429.7	0.07215	1.64043	0.05796
	2300	547.0	0.5524	87.333	1.5318 1	1132.7	1467.4	0.06880	1.64497	0.05799
	2400	553.8	0.5552	87.015	1.6043 1	1161.1	1503.3	0.06640	1.64843	0.05802
	2500	560.3	0.5579	86.768	1.6759 1	1188.2	1537.8	0.06462	1.65114	0.05804
	2600	566.7	0.5604	86.568	1.7469 1	1214.4	1571.1	0.06326	1.65335	0.05805
	2700	573.0	0.5628	86.400	1.8176 1	1239.9	1603.5	0.06219	1.65527	0.05806

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 1900 DEG R VAPOR PRESSURE 2.9312454 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1900	169.1	0.3448	85.480	1.2380-2					0.08770
SAT VAP	1900	509.5	0.5240	92.647	7.5084 0	978.2	1274.0	0.10490	1.59232	0.05762
					SUPERHEAT					
	2000	519.3	0.5290	91.074	8.0401 0	1017.7	1324.3	0.09367	1.60677	0.05774
	2100	528.3	0.5335	89.868	8.5554 0	1054.8	1371.1	0.08494	1.61846	0.05783
	2200	536.5	0.5373	88.991	9.0511 0	1088.9	1414.1	0.07855	1.62727	0.05789
	2300	544.1	0.5407	88.353	9.5308 0	1120.6	1454.0	0.07392	1.63386	0.05794
	2400	551.3	0.5437	87.869	1.0000 1	1150.5	1491.7	0.07051	1.63894	0.05797
	2500	558.2	0.5465	87.491	1.0462 1	1178.9	1527.6	0.06794	1.64297	0.05800
	2600	564.9	0.5491	87.184	1.0918 1	1206.2	1562.2	0.06595	1.64630	0.05802
	2700	571.5	0.5516	86.924	1.1372 1	1232.7	1595.7	0.06436	1.64920	0.05804

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 2000 DEG R VAPOR PRESSURE 4.4433727 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2000	177.9	0.3493	85.480	1.2500-2					0.08770
SAT VAP	2000	513.2	0.5170	93.461	5.1685 0	996.7	1298.2	0.10361	1.58452	0.05760
					SUPERHEAT					
	2100	523.2	0.5219	91.815	5.5242 0	1035.9	1348.5	0.09355	1.59939	0.05771
	2200	532.2	0.5261	90.596	5.8651 0	1072.1	1394.5	0.08577	1.61094	0.05780
	2300	540.4	0.5298	89.695	6.1933 0	1105.7	1436.9	0.07991	1.61980	0.05786
	2400	548.1	0.5330	89.003	6.5128 0	1137.2	1476.6	0.07546	1.62676	0.05791
	2500	555.4	0.5360	88.458	6.8260 0	1167.1	1514.3	0.07203	1.63236	0.05795
	2600	562.5	0.5387	88.012	7.1350 0	1195.7	1550.4	0.06933	1.63704	0.05798
	2700	569.4	0.5414	87.632	7.4416 0	1223.3	1585.4	0.06712	1.64116	0.05801

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 2100 DEG R VAPOR PRESSURE 6.4804321 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2100	186.7	0.3536	85.480	1.2620-2					0.08770
SAT VAP	2100	517.1	0.5110	94.177	3.6927 0	1015.3	1322.4	0.10180	1.57779	0.05758
					SUPERHEAT					
	2200	526.9	0.5156	92.578	3.9354 0	1053.2	1371.3	0.09317	1.59192	0.05769
	2300	535.9	0.5195	91.376	4.1684 0	1088.4	1416.2	0.08634	1.60305	0.05777
	2400	544.1	0.5230	90.440	4.3947 0	1121.5	1458.2	0.08097	1.61198	0.05784
	2500	552.0	0.5262	89.694	4.6158 0	1152.8	1497.8	0.07672	1.61929	0.05789
	2600	559.5	0.5291	89.079	4.8336 0	1182.7	1535.7	0.07328	1.62550	0.05793
	2700	566.8	0.5319	88.549	5.0495 0	1211.7	1572.3	0.07043	1.63104	0.05797

SATURATION TEMPERATURE 2200 DEG R VAPOR PRESSURE 9.1003010 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2200	195.4	0.3577	85.480	1.2740-2					0.08770
SAT VAP	2200	521.2	0.5058	94.873	2.7347 0	1033.4	1345.8	0.09991	1.57132	0.05757
					SUPERHEAT					
	2300	530.7	0.5100	93.353	2.9055 0	1069.8	1393.0	0.09256	1.58446	0.05767
	2400	539.6	0.5137	92.152	3.0713 0	1104.1	1437.1	0.08654	1.59525	0.05775
	2500	547.9	0.5171	91.183	3.2333 0	1136.7	1478.6	0.08162	1.60426	0.05782
	2600	555.9	0.5202	90.375	3.3927 0	1168.0	1518.3	0.07755	1.61203	0.05788
	2700	563.6	0.5232	89.673	3.5508 0	1198.2	1556.6	0.07408	1.61907	0.05792

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 2300 DEG R VAPOR PRESSURE 1.2355142 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2300	204.2	0.3616	85.480	1.2860-2					0.08770
SAT VAP	2300	525.3	0.5012	95.567	2.0905 0	1050.9	1368.3	0.09804	1.56496	0.05756
					SUPERHEAT					
	2400	534.6	0.5051	94.096	2.2155 0	1086.1	1414.1	0.09172	1.57733	0.05766
	2500	543.4	0.5087	92.894	2.3377 0	1119.7	1457.4	0.08638	1.58785	0.05774
	2600	551.9	0.5120	91.880	2.4580 0	1152.0	1498.8	0.08183	1.59710	0.05781
	2700	560.0	0.5151	90.990	2.5775 0	1183.4	1538.9	0.07787	1.60562	0.05786

SATURATION TEMPERATURE 2400 DEG R VAPOR PRESSURE 1.6302461 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2400	213.0	0.3653	85.480	1.2980-2					0.08770
SAT VAP	2400	529.4	0.4972	96.228	1.6419 0	1068.1	1390.2	0.09618	1.55888	0.05756
					SUPERHEAT					
	2500	538.7	0.5009	94.793	1.7362 0	1102.3	1434.9	0.09069	1.57066	0.05766
	2600	547.5	0.5044	93.568	1.8292 0	1135.4	1477.8	0.08587	1.58120	0.05774
	2700	556.1	0.5077	92.482	1.9219 0	1167.7	1519.5	0.08156	1.59106	0.05780

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 2500 DEG R VAPOR PRESSURE 2.0993274 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2500	221.7	0.3689	85.480	1.3100-2					0.08770
SAT VAP	2500	533.7	0.4937	96.837	1.3198 0	1085.1	1411.8	0.09434	1.55324	0.05758
					SUPERHEAT					
	2600	542.9	0.4973	95.406	1.3931 0	1118.7	1455.9	0.08946	1.56482	0.05767
	2700	551.9	0.5007	94.123	1.4664 0	1151.7	1499.0	0.08498	1.57583	0.05774

SATURATION TEMPERATURE 2600 DEG R VAPOR PRESSURE 2.6495160 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2600	230.5	0.3723	85.480	1.3220-2					0.08770
SAT VAP	2600	538.2	0.4907	97.366	1.0816 0	1102.4	1433.6	0.09248	1.54834	0.05759
					SUPERHEAT					
	2700	547.5	0.4943	95.892	1.1405 0	1135.7	1477.7	0.08799	1.56028	0.05767

TABLE 3
THERMODYNAMIC PROPERTIES - RUBIDIUM

SATURATION TEMPERATURE 2700 DEG R VAPOR PRESSURE 3.2911672 2 PSIA

	TEMP	H	S	M	v	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2700	239.3	0.3756	85.480	1.3340-2					0.08770
SAT VAP	2700	543.0	0.4882	97.774	9.0047-1	1120.1	1456.1	0.09053	1.54463	0.05760

Table 4 - Cesium - Material Properties

Reference

starting vapor pressure:

$$P = .019337 \ln^{-1}\left[-\frac{15289}{T} + 15.503\right] \qquad \begin{matrix} P \text{ in psia} \\ T \text{ in } ^\circ R \end{matrix}$$

This vapor pressure equation was taken from a COX - curve

$$P = \log^{-1}\left[-\frac{6640}{T} + 5.022\right] \qquad \begin{matrix} P \text{ in psi} \\ T \text{ in } ^\circ R \end{matrix}$$ 7

measured values exist only at low temperatures, up to about 1000°R.

liquid molecular weight: $M_L = 132.91$ 4

specific heat of the liquid:

$c_{pL} = .0572 \left(\frac{BTU}{lb\ ^\circ R}\right)$; apparently no measurements of the specific heat at a wide temperature range have been performed. 4

melting point: $T_m = 543^\circ R = 301.8^\circ K$ 4

specific heat of the solid: $c_{ps} = .0567 \left(\frac{BTU}{lb\ ^\circ R}\right)$ 4

enthalpy at 298°K: $(h_s)_{536^\circ R} = 25.18 \left(\frac{BTU}{lb.}\right)$ 4

heat of melting: $\Delta h_m = 6.907 \left(\frac{BTU}{lb.}\right)$ 4

absolute enthalpy of monatomic and diatomic vapor as a function of temperature, $H_i^\circ \left(\frac{BTU}{lb\ mole}\right)$ 4

absolute free energy of monatomic and diatomic vapor as a function of temperature, $F_i^\circ \left(\frac{BTU}{lb\ mole}\right)$ 4

entropy at the melting point: 4

$$(S_L)_{T_m} = .1651 \left(\frac{BTU}{lb\ ^\circ R}\right)$$

specific volume of the liquid: 2

$$V_L = .00823 + .764 \times 10^{-6}\ T \left(\frac{ft^3}{lb.}\right)$$

Table 4 - Cesium - Material Properties (Continued)

Reference

The density is given in reference (2) only at one point.

It was assumed, that the density change with temperature is the same for Cs as for Na and K.

specific heat of monatomic and diatomic vapor as a function of temperature, $C_{p_i}^{\circ}$ $\left(\frac{BTU}{mole\ ^{\circ}R}\right)$ 4

The finalized vapor pressure is well represented by:

$$P = \log^{-1}\left[\frac{-7329}{T} - .969 \log T + 8.561\right] \qquad 700 \leq T \leq 1500$$

P in psia

T in °R

$$P = \log^{-1}\left[\frac{-7442}{T} - 1.124 \log T + 9.126\right] \qquad 700 \leq T \leq 1500$$

P in psia

T in °R

These equations have a maximum deviation of .48% from the values given in the tables. The maximum percent error from those values given by the starting vapor equation is 36.7% at 700°R, and 9.8% between 1000 and 2700°R (see Figure 4, page 132).

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 700 DEG R VAPOR PRESSURE 2.1536358-5 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	700	41.5	0.1796	132.910	8.7648-3					0.05720
SAT VAP	700	283.8	0.5258	133.021	2.6223 6	511.2	660.0	0.03977	1.66543	0.03736
					SUPERHEAT					
	800	287.7	0.5310	132.928	2.9990 6	546.9	706.0	0.03761	1.66609	0.03737
	900	291.4	0.5354	132.914	3.3742 6	580.1	748.9	0.03777	1.66618	0.03737
	1000	295.2	0.5394	132.911	3.7492 6	611.5	789.4	0.03737	1.66620	0.03737
	1100	298.9	0.5429	132.911	4.1242 6	641.4	827.9	0.03737	1.66621	0.03737
	1200	302.6	0.5461	132.910	4.4991 6	669.9	864.7	0.03737	1.66621	0.03737
	1300	306.3	0.5491	132.910	4.8740 6	697.3	900.0	0.03737	1.66621	0.03737
	1400	310.1	0.5520	132.910	5.2490 6	723.6	934.0	0.03737	1.66621	0.03737
	1500	313.8	0.5545	132.910	5.6239 6	749.0	966.8	0.03737	1.66621	0.03737
	1600	317.6	0.5569	132.910	5.9988 6	773.5	998.5	0.03737	1.66621	0.03737
	1700	321.3	0.5592	132.910	6.3738 6	797.4	1029.2	0.03737	1.66621	0.03737
	1800	325.0	0.5614	132.910	6.7487 6	820.5	1059.1	0.03737	1.66621	0.03737
	1900	328.8	0.5634	132.910	7.1236 6	843.0	1088.1	0.03737	1.66621	0.03737
	2000	332.5	0.5652	132.910	7.4985 6	864.9	1116.4	0.03737	1.66621	0.03737
	2100	336.2	0.5671	132.910	7.8735 6	886.2	1143.9	0.03737	1.66621	0.03737
	2200	340.0	0.5688	132.910	8.2484 6	907.1	1170.9	0.03737	1.66621	0.03737
	2300	343.7	0.5705	132.910	8.6233 6	927.5	1197.2	0.03737	1.66621	0.03737
	2400	347.4	0.5721	132.910	8.9982 6	947.4	1222.9	0.03737	1.66621	0.03737
	2500	351.2	0.5736	132.910	9.3732 6	966.9	1248.1	0.03737	1.66621	0.03737
	2600	354.9	0.5750	132.910	9.7481 6	986.1	1272.9	0.03737	1.66621	0.03737
	2700	358.7	0.5764	132.910	1.0123 7	1004.9	1297.1	0.03737	1.66621	0.03737

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 800 DEG R VAPOR PRESSURE 3.8740464-4 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	800	47.2	0.1873	132.910	8.8412-3					0.05720
SAT VAP	800	287.3	0.4874	133.233	1.6634 5	545.7	704.7	0.04276	1.66392	0.03736
					SUPERHEAT					
	900	291.3	0.4922	132.989	1.8747 5	579.8	748.5	0.03842	1.66565	0.03737
	1000	295.1	0.4962	132.935	2.0839 5	611.4	789.3	0.03766	1.66603	0.03737
	1100	298.9	0.4997	132.920	2.2925 5	641.3	827.9	0.03749	1.66614	0.03737
	1200	302.6	0.5029	132.915	2.5010 5	669.9	864.7	0.03737	1.66618	0.03737
	1300	306.3	0.5059	132.912	2.7095 5	697.3	900.0	0.03737	1.66620	0.03737
	1400	310.1	0.5088	132.911	2.9180 5	723.6	934.0	0.03737	1.66620	0.03737
	1500	313.8	0.5114	132.911	3.1264 5	749.0	966.8	0.03737	1.66621	0.03737
	1600	317.6	0.5137	132.911	3.3348 5	773.5	998.5	0.03737	1.66621	0.03737
	1700	321.3	0.5160	132.910	3.5433 5	797.4	1029.2	0.03737	1.66621	0.03737
	1800	325.0	0.5182	132.910	3.7517 5	820.5	1059.1	0.03737	1.66621	0.03737
	1900	328.8	0.5202	132.910	3.9601 5	843.0	1088.1	0.03737	1.66621	0.03737
	2000	332.5	0.5221	132.910	4.1685 5	864.9	1116.4	0.03737	1.66621	0.03737
	2100	336.2	0.5239	132.910	4.3770 5	886.2	1143.9	0.03737	1.66621	0.03737
	2200	340.0	0.5256	132.910	4.5854 5	907.1	1170.9	0.03737	1.66621	0.03737
	2300	343.7	0.5273	132.910	4.7938 5	927.5	1197.2	0.03737	1.66621	0.03737
	2400	347.4	0.5289	132.910	5.0022 5	947.4	1222.9	0.03737	1.66621	0.03737
	2500	351.2	0.5304	132.910	5.2107 5	966.9	1248.1	0.03737	1.66621	0.03737
	2600	354.9	0.5318	132.910	5.4191 5	986.1	1272.9	0.03737	1.66621	0.03737
	2700	358.7	0.5333	132.910	5.6275 5	1004.9	1297.1	0.03737	1.66621	0.03737

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 900 DEG R VAPOR PRESSURE 3.6021651-3 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	900	52.9	0.1940	132.910	8.9176-3					0.05720
SAT VAP	900	290.6	0.4581	133.633	2.0065 4	577.0	745.7	0.04685	1.66107	0.03734
					SUPERHEAT					
	1000	294.9	0.4626	133.142	2.2377 4	610.5	788.3	0.03989	1.66454	0.03736
	1100	298.8	0.4663	133.001	2.4641 4	641.0	827.5	0.03819	1.66555	0.03737
	1200	302.6	0.4696	132.952	2.6890 4	669.7	864.5	0.03770	1.66590	0.03737
	1300	306.3	0.4726	132.932	2.9136 4	697.1	899.9	0.03753	1.66605	0.03737
	1400	310.1	0.4755	132.922	3.1379 4	723.5	934.0	0.03743	1.66612	0.03737
	1500	313.8	0.4780	132.917	3.3622 4	749.0	966.8	0.03737	1.66616	0.03737
	1600	317.6	0.4804	132.915	3.5864 4	773.5	998.5	0.03737	1.66618	0.03737
	1700	321.3	0.4827	132.913	3.8106 4	797.3	1029.2	0.03737	1.66619	0.03737
	1800	325.0	0.4849	132.912	4.0348 4	820.5	1059.1	0.03737	1.66620	0.03737
	1900	328.8	0.4869	132.912	4.2590 4	843.0	1088.1	0.03737	1.66620	0.03737
	2000	332.5	0.4887	132.911	4.4831 4	864.9	1116.4	0.03737	1.66620	0.03737
	2100	336.2	0.4906	132.911	4.7073 4	886.2	1143.9	0.03737	1.66621	0.03737
	2200	340.0	0.4923	132.911	4.9315 4	907.1	1170.9	0.03737	1.66621	0.03737
	2300	343.7	0.4940	132.911	5.1556 4	927.5	1197.2	0.03737	1.66621	0.03737
	2400	347.4	0.4956	132.911	5.3798 4	947.4	1222.9	0.03737	1.66621	0.03737
	2500	351.2	0.4971	132.910	5.6039 4	966.9	1248.1	0.03737	1.66621	0.03737
	2600	354.9	0.4985	132.910	5.8281 4	986.1	1272.9	0.03737	1.66621	0.03737
	2700	358.7	0.4999	132.910	6.0523 4	1004.9	1297.1	0.03737	1.66621	0.03737

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 1000 DEG R VAPOR PRESSURE 2.1173333-2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1000	58.6	0.2000	132.910	8.9940-3					0.05720
SAT VAP	1000	293.7	0.4351	134.251	3.7755 3	605.5	783.2	0.05144	1.65665	0.03732
					SUPERHEAT					
	1100	298.3	0.4395	133.443	4.1781 3	638.8	825.3	0.04213	1.66235	0.03735
	1200	302.3	0.4430	133.157	4.5678 3	668.7	863.5	0.03925	1.66440	0.03736
	1300	306.2	0.4461	133.038	4.9529 3	696.6	899.4	0.03820	1.66527	0.03736
	1400	310.0	0.4490	132.981	5.3361 3	723.2	933.6	0.03777	1.66568	0.03737
	1500	313.8	0.4516	132.953	5.7185 3	748.7	966.6	0.03758	1.66589	0.03737
	1600	317.5	0.4539	132.938	6.1004 3	773.4	998.3	0.03749	1.66600	0.03737
	1700	321.3	0.4562	132.929	6.4821 3	797.3	1029.1	0.03742	1.66607	0.03737
	1800	325.0	0.4584	132.924	6.8637 3	820.4	1059.0	0.03740	1.66611	0.03737
	1900	328.8	0.4604	132.920	7.2452 3	842.9	1088.0	0.03737	1.66614	0.03737
	2000	332.5	0.4623	132.918	7.6267 3	864.8	1116.3	0.03737	1.66615	0.03737
	2100	336.2	0.4641	132.916	8.0081 3	886.2	1143.9	0.03737	1.66617	0.03737
	2200	340.0	0.4659	132.915	8.3895 3	907.1	1170.8	0.03737	1.66618	0.03737
	2300	343.7	0.4676	132.914	8.7709 3	927.4	1197.1	0.03737	1.66618	0.03737
	2400	347.4	0.4691	132.913	9.1523 3	947.4	1222.9	0.03737	1.66619	0.03737
	2500	351.2	0.4706	132.913	9.5337 3	966.9	1248.1	0.03737	1.66619	0.03737
	2600	354.9	0.4721	132.912	9.9151 3	986.1	1272.8	0.03737	1.66620	0.03737
	2700	358.7	0.4735	132.912	1.0296 4	1004.9	1297.1	0.03737	1.66620	0.03737

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 1100 DEG R VAPOR PRESSURE 8.9239770-2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1100	64.3	0.2055	132.910	9.0704-3					0.05720
SAT VAP	1100	296.5	0.4165	135.101	9.7916 2	631.2	817.3	0.05601	1.65062	0.03729
					SUPERHEAT					
	1200	301.5	0.4208	133.940	1.0774 3	664.8	859.5	0.04503	1.65874	0.03733
	1300	305.8	0.4243	133.444	1.1716 3	694.5	897.2	0.04083	1.66229	0.03735
	1400	309.8	0.4273	133.210	1.2639 3	722.0	932.3	0.03906	1.66399	0.03736
	1500	313.6	0.4300	133.093	1.3554 3	748.0	965.7	0.03828	1.66484	0.03736
	1600	317.4	0.4324	133.030	1.4464 3	772.9	997.8	0.03790	1.66531	0.03737
	1700	321.2	0.4347	132.991	1.5372 3	796.9	1028.7	0.03769	1.66560	0.03737
	1800	325.0	0.4369	132.967	1.6280 3	820.1	1058.7	0.03757	1.66578	0.03737
	1900	328.7	0.4389	132.952	1.7186 3	842.7	1087.8	0.03751	1.66589	0.03737
	2000	332.5	0.4408	132.942	1.8092 3	864.6	1116.2	0.03746	1.66596	0.03737
	2100	336.2	0.4426	132.935	1.8998 3	886.1	1143.8	0.03742	1.66602	0.03737
	2200	339.9	0.4444	132.930	1.9903 3	906.9	1170.7	0.03742	1.66606	0.03737
	2300	343.7	0.4461	132.926	2.0808 3	927.3	1197.1	0.03740	1.66609	0.03737
	2400	347.4	0.4476	132.923	2.1713 3	947.3	1222.8	0.03739	1.66611	0.03737
	2500	351.2	0.4491	132.921	2.2619 3	966.9	1248.1	0.03737	1.66612	0.03737
	2600	354.9	0.4506	132.920	2.3524 3	986.1	1272.8	0.03737	1.66614	0.03737
	2700	358.6	0.4520	132.918	2.4429 3	1004.8	1297.0	0.03737	1.66615	0.03737

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 1200 DEG R VAPOR PRESSURE 2.9353358-1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1200	70.1	0.2105	132.910	9.1468-3					0.05720
SAT VAP	1200	299.0	0.4013	136.182	3.2217 2	654.4	848.3	0.06015	1.64302	0.03726
					SUPERHEAT					
	1300	304.4	0.4056	134.635	3.5302 2	688.5	890.9	0.04815	1.65369	0.03731
	1400	309.0	0.4091	133.886	3.8231 2	718.4	928.6	0.04277	1.65902	0.03734
	1500	313.2	0.4119	133.508	4.1077 2	745.7	963.3	0.04030	1.66175	0.03735
	1600	317.1	0.4144	133.302	4.3884 2	771.3	996.2	0.03908	1.66326	0.03736
	1700	321.0	0.4168	133.177	4.6670 2	795.8	1027.6	0.03840	1.66419	0.03736
	1800	324.8	0.4190	133.098	4.9445 2	819.3	1057.9	0.03802	1.66478	0.03736
	1900	328.6	0.4211	133.049	5.2211 2	842.1	1087.2	0.03781	1.66514	0.03737
	2000	332.4	0.4230	133.016	5.4972 2	864.2	1115.7	0.03767	1.66539	0.03737
	2100	336.1	0.4248	132.992	5.7731 2	885.7	1143.4	0.03758	1.66557	0.03737
	2200	339.9	0.4265	132.975	6.0488 2	906.6	1170.4	0.03753	1.66570	0.03737
	2300	343.6	0.4283	132.963	6.3244 2	927.1	1196.8	0.03748	1.66580	0.03737
	2400	347.4	0.4298	132.954	6.5998 2	947.1	1222.6	0.03745	1.66587	0.03737
	2500	351.1	0.4313	132.947	6.8751 2	966.7	1247.9	0.03744	1.66592	0.03737
	2600	354.9	0.4328	132.941	7.1504 2	985.8	1272.6	0.03743	1.66596	0.03737
	2700	358.6	0.4342	132.937	7.4257 2	1004.7	1296.9	0.03742	1.66599	0.03737

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 1300 DEG R VAPOR PRESSURE 8.0137313-1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1300	75.8	0.2150	132.910	9.2232-3					0.05720
SAT VAP	1300	301.5	0.3886	137.422	1.2669 2	675.4	876.7	0.06331	1.63442	0.03723
					SUPERHEAT					
	1400	307.2	0.3930	135.508	1.3836 2	710.1	919.8	0.05108	1.64739	0.03729
	1500	312.0	0.3963	134.518	1.4933 2	740.2	957.6	0.04502	1.65435	0.03732
	1600	316.4	0.3990	133.969	1.5994 2	767.5	992.2	0.04189	1.65829	0.03734
	1700	320.5	0.4015	133.633	1.7036 2	793.1	1024.8	0.04014	1.66075	0.03735
	1800	324.5	0.4039	133.420	1.8067 2	817.4	1055.8	0.03913	1.66233	0.03736
	1900	328.3	0.4059	133.288	1.9090 2	840.6	1085.6	0.03855	1.66331	0.03736
	2000	332.2	0.4079	133.198	2.0108 2	863.0	1114.4	0.03819	1.66398	0.03736
	2100	336.0	0.4097	133.135	2.1124 2	884.7	1142.4	0.03795	1.66446	0.03737
	2200	339.8	0.4115	133.088	2.2137 2	905.9	1169.6	0.03779	1.66481	0.03737
	2300	343.5	0.4132	133.054	2.3150 2	926.5	1196.1	0.03768	1.66507	0.03737
	2400	347.3	0.4148	133.029	2.4161 2	946.6	1222.0	0.03761	1.66526	0.03737
	2500	351.1	0.4163	133.010	2.5171 2	966.2	1247.4	0.03756	1.66541	0.03737
	2600	354.8	0.4177	132.996	2.6180 2	985.5	1272.2	0.03752	1.66552	0.03737
	2700	358.6	0.4192	132.983	2.7190 2	1004.3	1296.5	0.03749	1.66562	0.03737

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 1400 DEG R VAPOR PRESSURE 1.8925242 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1400	81.5	0.2193	132.910	9.2996-3					0.05720
SAT VAP	1400	303.8	0.3781	138.745	5.7220 1	695.0	902.9	0.06532	1.62538	0.03720
					SUPERHEAT					
	1500	309.8	0.3822	136.587	6.2275 1	729.6	946.1	0.05381	1.63969	0.03727
	1600	314.8	0.3854	135.360	6.7030 1	759.9	984.1	0.04740	1.64818	0.03731
	1700	319.4	0.3882	134.592	7.1625 1	787.6	1018.9	0.04364	1.65364	0.03733
	1800	323.7	0.3907	134.102	7.6115 1	813.3	1051.5	0.04140	1.65720	0.03734
	1900	327.8	0.3928	133.796	8.0528 1	837.4	1082.3	0.04010	1.65945	0.03735
	2000	331.7	0.3948	133.587	8.4899 1	860.5	1111.8	0.03927	1.66099	0.03736
	2100	335.6	0.3967	133.438	8.9243 1	882.7	1140.3	0.03872	1.66210	0.03736
	2200	339.5	0.3986	133.329	9.3569 1	904.2	1167.9	0.03835	1.66292	0.03736
	2300	343.3	0.4003	133.248	9.7882 1	925.1	1194.7	0.03810	1.66354	0.03736
	2400	347.1	0.4019	133.190	1.0218 2	945.4	1220.8	0.03793	1.66398	0.03737
	2500	350.9	0.4034	133.147	1.0647 2	965.2	1246.3	0.03780	1.66431	0.03737
	2600	354.7	0.4049	133.112	1.1076 2	984.6	1271.3	0.03771	1.66458	0.03737
	2700	358.5	0.4063	133.083	1.1505 2	1003.6	1295.7	0.03764	1.66481	0.03737

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 1500 DEG R VAPOR PRESSURE 3.9520092 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1500	87.2	0.2232	132.910	9.3760-3					0.05720
SAT VAP	1500	306.1	0.3691	140.169	2.9060 1	713.0	927.1	0.06656	1.61581	0.03717
					SUPERHEAT					
	1600	312.2	0.3730	137.833	3.1523 1	747.3	970.1	0.05609	1.63093	0.03724
	1700	317.5	0.3763	136.330	3.3862 1	778.1	1008.6	0.04946	1.64114	0.03729
	1800	322.3	0.3790	135.352	3.6113 1	806.1	1043.7	0.04533	1.64801	0.03731
	1900	326.7	0.3814	134.734	3.8294 1	831.8	1076.2	0.04283	1.65243	0.03733
	2000	330.9	0.3835	134.309	4.0438 1	856.0	1107.0	0.04121	1.65551	0.03734
	2100	335.0	0.3855	134.003	4.2556 1	879.1	1136.4	0.04013	1.65776	0.03735
	2200	339.0	0.3874	133.780	4.4657 1	901.2	1164.7	0.03938	1.65942	0.03736
	2300	342.9	0.3892	133.613	4.6745 1	922.6	1192.0	0.03887	1.66068	0.03736
	2400	346.8	0.3908	133.492	4.8822 1	943.3	1218.6	0.03852	1.66159	0.03736
	2500	350.6	0.3923	133.402	5.0890 1	963.4	1244.4	0.03827	1.66227	0.03736
	2600	354.4	0.3938	133.331	5.2954 1	983.0	1269.6	0.03808	1.66282	0.03737
	2700	358.2	0.3952	133.270	5.5016 1	1002.2	1294.2	0.03794	1.66329	0.03737

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 1600 DEG R VAPOR PRESSURE 7.4718379 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1600	92.9	0.2269	132.910	9.4524-3					0.05720
SAT VAP	1600	308.3	0.3615	141.668	1.6222 1	729.7	949.5	0.06711	1.60592	0.03715
					SUPERHEAT					
	1700	314.6	0.3653	139.102	1.7554 1	764.1	992.7	0.05753	1.62216	0.03722
	1800	320.1	0.3686	137.384	1.8819 1	795.0	1031.5	0.05109	1.63361	0.03727
	1900	325.0	0.3712	136.277	2.0025 1	822.9	1066.5	0.04699	1.64120	0.03730
	2000	329.6	0.3735	135.506	2.1199 1	848.7	1099.1	0.04425	1.64662	0.03732
	2100	333.9	0.3756	134.948	2.2351 1	873.1	1129.9	0.04236	1.65063	0.03733
	2200	338.1	0.3776	134.536	2.3487 1	896.3	1159.4	0.04105	1.65363	0.03734
	2300	342.2	0.3794	134.227	2.4611 1	918.5	1187.6	0.04013	1.65592	0.03735
	2400	346.2	0.3811	134.002	2.5725 1	939.8	1214.8	0.03949	1.65759	0.03736
	2500	350.1	0.3827	133.834	2.6830 1	960.3	1241.1	0.03904	1.65885	0.03736
	2600	354.0	0.3841	133.702	2.7931 1	980.3	1266.7	0.03870	1.65985	0.03736
	2700	357.9	0.3856	133.587	2.9030 1	999.8	1291.7	0.03843	1.66073	0.03736

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 1700 DEG R VAPOR PRESSURE 1.3125327 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1700	98.7	0.2304	132.910	9.5288-3					0.05720
SAT VAP	1700	310.6	0.3550	143.110	9.7128 0	746.0	971.0	0.06689	1.59663	0.03713
					SUPERHEAT					
	1800	317.0	0.3587	140.404	1.0482 1	779.9	1014.0	0.05839	1.61334	0.03720
	1900	322.6	0.3617	138.614	1.1208 1	810.3	1052.2	0.05258	1.62492	0.03725
	2000	327.6	0.3643	137.343	1.1907 1	838.2	1087.4	0.04849	1.63344	0.03729
	2100	332.3	0.3666	136.410	1.2587 1	864.3	1120.2	0.04558	1.63989	0.03731
	2200	336.8	0.3687	135.715	1.3254 1	888.9	1151.2	0.04350	1.64480	0.03733
	2300	341.1	0.3706	135.189	1.3911 1	912.2	1180.7	0.04201	1.64859	0.03734
	2400	345.3	0.3724	134.805	1.4557 1	934.4	1208.9	0.04096	1.65139	0.03735
	2500	349.4	0.3740	134.517	1.5196 1	955.6	1235.9	0.04021	1.65351	0.03735
	2600	353.4	0.3755	134.289	1.5831 1	976.1	1262.1	0.03964	1.65522	0.03736
	2700	357.3	0.3771	134.090	1.6464 1	996.1	1287.7	0.03919	1.65671	0.03736

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 1800 DEG R VAPOR PRESSURE 2.1648123 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1800	104.4	0.2337	132.910	9.6052-3					0.05720
SAT VAP	1800	313.0	0.3495	144.480	6.1762 0	761.7	991.7	0.06616	1.58797	0.03712
					SUPERHEAT					
	1900	319.3	0.3529	141.846	6.6404 0	794.4	1033.3	0.05902	1.60372	0.03719
	2000	324.9	0.3558	139.930	7.0856 0	824.5	1071.4	0.05368	1.61577	0.03724
	2100	330.1	0.3583	138.498	7.5168 0	852.5	1106.7	0.04968	1.62515	0.03728
	2200	335.0	0.3606	137.416	7.9367 0	878.7	1139.8	0.04673	1.63248	0.03730
	2300	339.6	0.3627	136.589	8.3477 0	903.4	1171.0	0.04455	1.63822	0.03732
	2400	344.0	0.3645	135.980	8.7497 0	926.7	1200.4	0.04299	1.64253	0.03733
	2500	348.2	0.3662	135.520	9.1452 0	948.8	1228.5	0.04185	1.64583	0.03734
	2600	352.4	0.3678	135.154	9.5368 0	970.1	1255.5	0.04098	1.64850	0.03735
	2700	356.5	0.3694	134.835	9.9270 0	990.8	1281.9	0.04027	1.65085	0.03736

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 1900 DEG R VAPOR PRESSURE 3.3584919 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1900	110.1	0.2367	132.910	9.6816-3					0.05720
SAT VAP	1900	315.3	0.3448	145.884	4.1618 0	776.7	1011.1	0.06531	1.57916	0.03712
					SUPERHEAT					
	2000	321.6	0.3479	143.236	4.4618 0	808.5	1052.0	0.05913	1.59456	0.03718
	2100	327.3	0.3507	141.214	4.7520 0	838.3	1089.9	0.05425	1.60697	0.03723
	2200	332.6	0.3532	139.659	5.0337 0	866.2	1125.2	0.05049	1.61693	0.03727
	2300	337.6	0.3554	138.454	5.3083 0	892.4	1158.3	0.04761	1.62491	0.03730
	2400	342.3	0.3574	137.558	5.5752 0	916.9	1189.3	0.04548	1.63100	0.03732
	2500	346.8	0.3592	136.876	5.8364 0	940.1	1218.6	0.04390	1.63573	0.03733
	2600	351.1	0.3609	136.329	6.0942 0	962.2	1246.7	0.04268	1.63959	0.03734
	2700	355.4	0.3625	135.850	6.3509 0	983.8	1274.0	0.04167	1.64304	0.03735

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 2000 DEG R VAPOR PRESSURE 4.9721918 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2000	115.8	0.2397	132.910	9.7580-3					0.05720
SAT VAP	2000	317.8	0.3407	147.220	2.9322 0	791.3	1029.9	0.06422	1.57087	0.03712
					SUPERHEAT					
	2100	324.0	0.3437	144.553	3.1356 0	822.4	1070.2	0.05884	1.58601	0.03718
	2200	329.8	0.3464	142.462	3.3331 0	851.8	1107.7	0.05446	1.59853	0.03723
	2300	335.2	0.3488	140.817	3.5254 0	879.4	1142.9	0.05098	1.60882	0.03727
	2400	340.2	0.3509	139.577	3.7113 0	905.2	1175.5	0.04833	1.61684	0.03729
	2500	344.9	0.3528	138.623	3.8925 0	929.4	1206.3	0.04630	1.62317	0.03731
	2600	349.5	0.3546	137.853	4.0709 0	952.5	1235.6	0.04470	1.62840	0.03733
	2700	353.9	0.3562	137.175	4.2483 0	975.0	1264.0	0.04337	1.63311	0.03734

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 2100 DEG R VAPOR PRESSURE 7.0820722 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2100	121.5	0.2425	132.910	9.8344-3					0.05720
SAT VAP	2100	320.4	0.3371	148.446	2.1437 0	805.9	1048.5	0.06295	1.56334	0.03713
					SUPERHEAT					
	2200	326.6	0.3400	145.791	2.2867 0	836.2	1088.0	0.05828	1.57806	0.03719
	2300	332.3	0.3426	143.664	2.4260 0	865.0	1125.0	0.05440	1.59050	0.03723
	2400	337.7	0.3449	142.039	2.5605 0	891.8	1159.4	0.05133	1.60041	0.03727
	2500	342.7	0.3469	140.775	2.6911 0	917.1	1191.5	0.04891	1.60836	0.03729
	2600	347.5	0.3487	139.744	2.8194 0	941.1	1222.1	0.04696	1.61504	0.03732
	2700	352.2	0.3505	138.829	2.9471 0	964.6	1251.9	0.04530	1.62114	0.03733

SATURATION TEMPERATURE 2200 DEG R VAPOR PRESSURE 9.7574319 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2200	127.3	0.2451	132.910	9.9108-3					0.05720
SAT VAP	2200	323.1	0.3341	149.560	1.6179 0	820.3	1066.8	0.06161	1.55652	0.03714
					SUPERHEAT					
	2300	329.2	0.3369	146.942	1.7216 0	849.8	1105.5	0.05757	1.57073	0.03719
	2400	334.9	0.3393	144.911	1.8216 0	877.5	1141.3	0.05424	1.58231	0.03724
	2500	340.1	0.3414	143.311	1.9187 0	903.6	1174.8	0.05153	1.59179	0.03727
	2600	345.2	0.3433	141.993	2.0139 0	928.5	1206.7	0.04929	1.59988	0.03730
	2700	350.1	0.3452	140.813	2.1089 0	952.8	1237.7	0.04735	1.60737	0.03732

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 2300 DEG R VAPOR PRESSURE 1.3059212 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2300	133.0	0.2477	132.910	9.9872-3					0.05720
SAT VAP	2300	325.9	0.3315	150.564	1.2554 0	834.7	1085.0	0.06026	1.55037	0.03715
					SUPERHEAT					
	2400	331.8	0.3341	148.128	1.3315 0	862.9	1122.1	0.05686	1.56329	0.03721
	2500	337.4	0.3363	146.185	1.4054 0	889.5	1156.7	0.05400	1.57407	0.03725
	2600	342.6	0.3383	144.566	1.4780 0	915.1	1189.8	0.05156	1.58342	0.03728
	2700	347.8	0.3403	143.103	1.5505 0	940.1	1222.0	0.04941	1.59221	0.03731

SATURATION TEMPERATURE 2400 DEG R VAPOR PRESSURE 1.6984804 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2400	138.7	0.2501	132.910	1.0064-2					0.05720
SAT VAP	2400	328.7	0.3293	151.564	1.0005 0	848.7	1102.5	0.05901	1.54431	0.03717
					SUPERHEAT					
	2500	334.5	0.3316	149.290	1.0581 0	875.6	1138.1	0.05612	1.55608	0.03722
	2600	340.0	0.3337	147.376	1.1147 0	901.6	1172.0	0.05360	1.56645	0.03726
	2700	345.3	0.3357	145.627	1.1715 0	927.2	1205.3	0.05132	1.57636	0.03730

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 2500 DEG R VAPOR PRESSURE 2.1545446 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2500	144.4	0.2524	132.910	1.0140-2					0.05720
SAT VAP	2500	331.6	0.3273	152.544	8.1633-1	862.3	1119.5	0.05784	1.53840	0.03720
					SUPERHEAT					
	2600	337.2	0.3295	150.350	8.6137-1	888.4	1154.1	0.05533	1.54953	0.03724
	2700	342.8	0.3316	148.326	9.0671-1	914.3	1188.2	0.05301	1.56032	0.03728

SATURATION TEMPERATURE 2600 DEG R VAPOR PRESSURE 2.6768321 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2600	150.1	0.2547	132.910	1.0216-2					0.05720
SAT VAP	2600	334.5	0.3256	153.435	6.7936-1	875.9	1136.3	0.05672	1.53302	0.03722
					SUPERHEAT					
	2700	340.3	0.3278	151.152	7.1615-1	901.9	1171.0	0.05444	1.54446	0.03727

TABLE 4
THERMODYNAMIC PROPERTIES - CESIUM

SATURATION TEMPERATURE 2700 DEG R VAPOR PRESSURE 3.2738741 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2700	155.9	0.2568	132.910	1.0293-2					0.05720
SAT VAP	2700	337.7	0.3242	154.092	5.7438-1	890.0	1153.9	0.05559	1.52888	0.03726

Table 5 - Mercury - Material Properties

Reference

The constants necessary to calculate the effect of dimerization were not found in the literature. Yet it is known that dimerization takes place. Reference (9) states that at 1135°R, 7% of the mercury vapor is present in the form of diatomic molecules.

vapor pressure:

$$P = .019337 \ln^{-1}\left[-\frac{13711}{T} - .8 \ln T + 24.356\right] \quad \begin{matrix} P \text{ in psi} \\ T \text{ in } °R \end{matrix}$$

from:

$$P = \log^{-1}\left[-\frac{3308}{T} - .8 \log T + 10.3735\right] \quad \begin{matrix} P \text{ in mm Hg} \\ T \text{ in } °R \end{matrix} \qquad 2$$

(accurate to 5% from 420 to 1530°R)

liquid molecular weight: $M_L = 200.61$ 4

specific heat of the liquid:

$$c_{pL} = .03631 - 7.943 \times 10^{-6} T + 3.913 \times 10^{-9} T^2 \quad \left(\frac{BTU}{lb\ °R}\right) \qquad 2$$

melting point: $T_m = 422°R = 234.3°K$ 4

specific heat of the solid c_{ps} and the heat of melting Δh_m are not required for the calculation of the enthalpy of the liquid, since they are included in $(h_s)_{536}$.

enthalpy at 298°K: $(h_s)_{536°R} = 20.054 \quad \left(\frac{BTU}{lb.}\right)$ 4

measured heat of vaporization of equilibrium gas:

$$\Delta\bar{h}_v = 26\,246 - .90174\,T \quad \left(\frac{BTU}{lb\ mole}\right) \qquad 8$$

entropy at the melting point:

$$(S_L)_{T_m} = .0832 \quad \left(\frac{BTU}{lb\ °R}\right)$$

Table 5 - Mercury - Material Properties (Continued)

Reference

specific volume of the liquid:

$$V_L = .001109 + 1.32 \times 10^{-7} T \quad (\frac{ft^3}{lb.}) \qquad 2$$

Neglect of the dimerization effect leads to incorrect results in the superheated region only. Because the heat of vaporization was measured for an equilibrium mixture of monatomic and diatomic gas the entropies and enthalpies in the wet region are correct. Only the specific heat of the vapor c_{pv} would change if dimerization is considered.

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 700 DEG R VAPOR PRESSURE 1.2061 -2 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	700	29.259	.09998	200.610	.00120		.03270
SAT VAP	700	156.943	.28240	200.610	3.10700 3	1.6667	.02476
	800	159.212	.28540	200.610	3.55100 3	1.6667	.02476
	900	161.488	.28820	200.610	3.99500 3	1.6667	.02476
	1000	163.772	.29060	200.610	4.43900 3	1.6667	.02476
	1100	166.060	.29280	200.610	4.88300 3	1.6667	.02476
	1200	168.356	.29480	200.610	5.32700 3	1.6667	.02476
	1300	170.659	.29660	200.610	5.77000 3	1.6667	.02476
	1400	172.969	.29840	200.610	6.21400 3	1.6667	.02476
	1500	175.285	.30000	200.610	6.65800 3	1.6667	.02476
	1600	177.608	.30150	200.610	7.10200 3	1.6667	.02476
	1700	179.938	.30290	200.610	7.54600 3	1.6667	.02476
	1800	182.274	.30420	200.610	7.99000 3	1.6667	.02476
	1900	184.618	.30550	200.610	8.43400 3	1.6667	.02476
	2000	186.968	.30670	200.610	8.87800 3	1.6667	.02476
	2100	189.324	.30790	200.610	9.32100 3	1.6667	.02476
	2200	191.688	.30900	200.610	9.76500 3	1.6667	.02476
	2300	194.058	.31000	200.610	1.02100 4	1.6667	.02476
	2400	196.435	.31110	200.610	1.06500 4	1.6667	.02476
	2500	198.818	.31200	200.610	1.11000 4	1.6667	.02476
	2600	201.209	.31300	200.610	1.15400 4	1.6667	.02476
	2700	203.606	.31390	200.610	1.19800 4	1.6667	.02476

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 800 DEG R VAPOR PRESSURE 1.2541 -1 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	800	32.514	.10430	200.610	.00122		.03250
SAT VAP	800	159.749	.26340	200.610	3.41500 2	1.6667	.02476
	900	162.025	.26610	200.610	3.84200 2	1.6667	.02476
	1000	164.308	.26850	200.610	4.26900 2	1.6667	.02476
	1100	166.597	.27070	200.610	4.69600 2	1.6667	.02476
	1200	168.894	.27270	200.610	5.12300 2	1.6667	.02476
	1300	171.196	.27460	200.610	5.55000 2	1.6667	.02476
	1400	173.506	.27630	200.610	5.97700 2	1.6667	.02476
	1500	175.822	.27790	200.610	6.40400 2	1.6667	.02476
	1600	178.145	.27940	200.610	6.83100 2	1.6667	.02476
	1700	180.475	.28080	200.610	7.25700 2	1.6667	.02476
	1800	182.811	.28220	200.610	7.68400 2	1.6667	.02476
	1900	185.155	.28340	200.610	8.11100 2	1.6667	.02476
	2000	187.505	.28470	200.610	8.53800 2	1.6667	.02476
	2100	189.861	.28580	200.610	8.96500 2	1.6667	.02476
	2200	192.225	.28690	200.610	9.39200 2	1.6667	.02476
	2300	194.595	.28800	200.610	9.81900 2	1.6667	.02476
	2400	196.972	.28900	200.610	1.02500 3	1.6667	.02476
	2500	199.355	.29000	200.610	1.06700 3	1.6667	.02476
	2600	201.746	.29090	200.610	1.11000 3	1.6667	.02476
	2700	204.143	.29180	200.610	1.15300 3	1.6667	.02476

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 900 DEG R VAPOR PRESSURE 7.6637 -1 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	900	35.753	.10810	200.610	.00123		.03230
SAT VAP	900	162.539	.24900	200.610	6.28700 1	1.6667	.02476
	1000	164.821	.25140	200.610	6.98600 1	1.6667	.02476
	1100	167.111	.25360	200.610	7.68500 1	1.6667	.02476
	1200	169.407	.25570	200.610	8.38300 1	1.6667	.02476
	1300	171.710	.25750	200.610	9.08200 1	1.6667	.02476
	1400	174.019	.25920	200.610	9.78000 1	1.6667	.02476
	1500	176.336	.26080	200.610	1.04800 2	1.6667	.02476
	1600	178.659	.26230	200.610	1.11800 2	1.6667	.02476
	1700	180.988	.26380	200.610	1.18800 2	1.6667	.02476
	1800	183.325	.26510	200.610	1.25700 2	1.6667	.02476
	1900	185.668	.26640	200.610	1.32700 2	1.6667	.02476
	2000	188.018	.26760	200.610	1.39700 2	1.6667	.02476
	2100	190.375	.26870	200.610	1.46700 2	1.6667	.02476
	2200	192.738	.26980	200.610	1.53700 2	1.6667	.02476
	2300	195.108	.27090	200.610	1.60700 2	1.6667	.02476
	2400	197.485	.27190	200.610	1.67700 2	1.6667	.02476
	2500	199.869	.27290	200.610	1.74600 2	1.6667	.02476
	2600	202.259	.27380	200.610	1.81600 2	1.6667	.02476
	2700	204.656	.27470	200.610	1.88600 2	1.6667	.02476

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 1000 DEG R VAPOR PRESSURE 3.2319 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	1000	38.983	.11150	200.610	.00124		.03230
SAT VAP	1000	165.319	.23790	200.610	16.57000	1.6667	.02476
	1100	167.609	.20410	200.610	18.22000	1.6667	.02476
	1200	169.905	.24210	200.610	19.88000	1.6667	.02476
	1300	172.208	.24390	200.610	21.54000	1.6667	.02476
	1400	174.517	.24570	200.610	23.19000	1.6667	.02476
	1500	176.833	.24730	200.610	24.85000	1.6667	.02476
	1600	179.156	.24880	200.610	26.51000	1.6667	.02476
	1700	181.486	.25020	200.610	28.16000	1.6667	.02476
	1800	183.823	.25150	200.610	29.82000	1.6667	.02476
	1900	186.166	.25280	200.610	31.47000	1.6667	.02476
	2000	188.516	.25400	200.610	33.13000	1.6667	.02476
	2100	190.873	.25520	200.610	34.79000	1.6667	.02476
	2200	193.236	.25630	200.610	36.44000	1.6667	.02476
	2300	195.606	.25730	200.610	38.10000	1.6667	.02476
	2400	197.983	.25840	200.610	39.76000	1.6667	.02476
	2500	200.367	.25930	200.610	41.41000	1.6667	.02476
	2600	202.757	.26030	200.610	43.07000	1.6667	.02476
	2700	205.154	.26120	200.610	44.73000	1.6667	.02476

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 1100 DEG R VAPOR PRESSURE 10.415 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	1100	42.212	.11460	200.610	.00125		.03230
SAT VAP	1100	168.098	.22910	200.610	5.65400	1.6667	.02476
	1200	170.395	.23110	200.610	6.16800	1.6667	.02476
	1300	172.697	.23290	200.610	6.68300	1.6667	.02476
	1400	175.007	.23470	200.610	7.19700	1.6667	.02476
	1500	177.323	.23630	200.610	7.71100	1.6667	.02476
	1600	179.646	.23780	200.610	8.22500	1.6667	.02476
	1700	181.976	.23920	200.610	8.73900	1.6667	.02476
	1800	184.313	.24050	200.610	9.25300	1.6667	.02476
	1900	186.656	.24180	200.610	9.76700	1.6667	.02476
	2000	189.006	.24300	200.610	10.28000	1.6667	.02476
	2100	191.362	.24420	200.610	10.79000	1.6667	.02476
	2200	193.726	.24530	200.610	11.31000	1.6667	.02476
	2300	196.096	.24630	200.610	11.82000	1.6667	.02476
	2400	198.473	.24730	200.610	12.34000	1.6667	.02476
	2500	200.856	.24830	200.610	12.85000	1.6667	.02476
	2600	203.247	.24930	200.610	13.37000	1.6667	.02476
	2700	205.644	.25020	200.610	13.88000	1.6667	.02476

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 1200 DEG R VAPOR PRESSURE 27.450 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	1200	45.447	.11740	200.610	.00127		.03240
SAT VAP	1200	170.884	.22200	200.610	2.34000	1.6667	.02476
	1300	173.187	.22380	200.610	2.53500	1.6667	.02476
	1400	175.497	.22550	200.610	2.73100	1.6667	.02476
	1500	177.813	.22720	200.610	2.92600	1.6667	.02476
	1600	180.136	.22870	200.610	3.12100	1.6667	.02476
	1700	182.466	.23010	200.610	3.31600	1.6667	.02476
	1800	184.802	.23140	200.610	3.51100	1.6667	.02476
	1900	187.146	.23270	200.610	3.70600	1.6667	.02476
	2000	189.495	.23390	200.610	3.90100	1.6667	.02476
	2100	191.852	.23510	200.610	4.09600	1.6667	.02476
	2200	194.216	.23620	200.610	4.29100	1.6667	.02476
	2300	196.586	.23720	200.610	4.48600	1.6667	.02476
	2400	198.963	.23820	200.610	4.68100	1.6667	.02476
	2500	201.346	.23920	200.610	4.87600	1.6667	.02476
	2600	203.736	.24020	200.610	5.07100	1.6667	.02476
	2700	206.133	.24110	200.610	5.26600	1.6667	.02476

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 1300 DEG R VAPOR PRESSURE 62.007 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	1300	48.697	.12000	200.610	.00128		.03260
SAT VAP	1300	173.685	.21620	200.610	1.12200	1.6667	.02476
	1400	175.994	.21790	200.610	1.20900	1.6667	.02476
	1500	178.311	.21950	200.610	1.29500	1.6667	.02476
	1600	180.634	.22100	200.610	1.38100	1.6667	.02476
	1700	182.963	.22400	200.610	1.46800	1.6667	.02476
	1800	185.300	.22380	200.610	1.55400	1.6667	.02476
	1900	187.643	.22510	200.610	1.64100	1.6667	.02476
	2000	189.993	.22630	200.610	1.72700	1.6667	.02476
	2100	192.350	.22740	200.610	1.81300	1.6667	.02476
	2200	194.713	.22850	200.610	1.90000	1.6667	.02476
	2300	197.083	.22960	200.610	1.98600	1.6667	.02476
	2400	199.460	.23060	200.610	2.07200	1.6667	.02476
	2500	201.844	.23160	200.610	2.15900	1.6667	.02476
	2600	204.234	.23250	200.610	2.24500	1.6667	.02476
	2700	206.631	.23340	200.610	2.33100	1.6667	.02476

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 1400 DEG R VAPOR PRESSURE 124.13 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	1400	51.969	.12250	200.610	.00129		.03290
SAT VAP	1400	176.507	.21140	200.610	.60380	1.6667	.02476
	1500	178.824	.21300	200.610	.64700	1.6667	.02476
	1600	181.147	.21450	200.610	.69010	1.6667	.02476
	1700	183.476	.21600	200.610	.73320	1.6667	.02476
	1800	185.813	.21730	200.610	.77640	1.6667	.02476
	1900	188.156	.21860	200.610	.81950	1.6667	.02476
	2000	190.506	.21980	200.610	.86260	1.6667	.02476
	2100	192.863	.22090	200.610	.90580	1.6667	.02476
	2200	195.226	.22200	200.610	.94890	1.6667	.02476
	2300	197.596	.22310	200.610	.99200	1.6667	.02476
	2400	199.973	.22410	200.610	1.03500	1.6667	.02476
	2500	202.357	.22510	200.610	1.07800	1.6667	.02476
	2600	204.747	.22600	200.610	1.12100	1.6667	.02476
	2700	207.144	.22690	200.610	1.16500	1.6667	.02476

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 1500 DEG R VAPOR PRESSURE 225.66 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	1500	55.272	.12470	200.610	.00131		.03320
SAT VAP	1500	179.360	.20750	200.610	.35590	1.6667	.02476
	1600	181.683	.20900	200.610	.37960	1.6667	.02476
	1700	184.013	.21040	200.610	.40330	1.6667	.02476
	1800	186.349	.21170	200.610	.42710	1.6667	.02476
	1900	188.693	.21300	200.610	.45080	1.6667	.02476
	2000	191.043	.21420	200.610	.47450	1.6667	.02476
	2100	193.399	.21540	200.610	.49820	1.6667	.02476
	2200	195.763	.21650	200.610	.52200	1.6667	.02476
	2300	198.133	.21750	200.610	.54570	1.6667	.02476
	2400	200.510	.21850	200.610	.56940	1.6667	.02476
	2500	202.893	.21950	200.610	.59310	1.6667	.02476
	2600	205.284	.22050	200.610	.61690	1.6667	.02476
	2700	207.681	.22140	200.610	.64060	1.6667	.02476

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 1600 DEG R VAPOR PRESSURE 379.43 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	1600	58.612	.12690	200.610	.00132		.03360
SAT VAP	1600	182.251	.20420	200.610	.22580	1.6667	.02476
	1700	184.581	.20560	200.610	.23990	1.6667	.02476
	1800	186.917	.20690	200.610	.25400	1.6667	.02476
	1900	189.260	.20820	200.610	.26810	1.6667	.02476
	2000	191.610	.20940	200.610	.28220	1.6667	.02476
	2100	193.967	.21060	200.610	.29630	1.6667	.02476
	2200	196.330	.21170	200.610	.31040	1.6667	.02476
	2300	198.701	.21270	200.610	.32450	1.6667	.02476
	2400	201.077	.21370	200.610	.33860	1.6667	.02476
	2500	203.461	.21470	200.610	.35280	1.6667	.02476
	2600	205.851	.21570	200.610	.36690	1.6667	.02476
	2700	208.248	.21660	200.610	.38100	1.6667	.02476

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 1700 DEG R VAPOR PRESSURE 598.40 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	1700	61.998	.12890	200.610	.00133		.03410
SAT VAP	1700	185.187	.20140	200.610	.15210	1.6667	.02476
	1800	187.524	.20280	200.610	.16100	1.6667	.02476
	1900	189.867	.20400	200.610	.17000	1.6667	.02476
	2000	192.217	.20520	200.610	.17890	1.6667	.02476
	2100	194.574	.20640	200.610	.18790	1.6667	.02476
	2200	196.937	.20750	200.610	.19680	1.6667	.02476
	2300	199.307	.20860	200.610	.20580	1.6667	.02476
	2400	201.684	.20960	200.610	.21470	1.6667	.02476
	2500	204.068	.21050	200.610	.22370	1.6667	.02476
	2600	206.458	.21150	200.610	.23260	1.6667	.02476
	2700	208.855	.21240	200.610	.24160	1.6667	.02476

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 1800 DEG R VAPOR PRESSURE 894.81 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	1800	65.438	.13090	200.610	.00135		.03470
SAT VAP	1800	188.178	.19910	200.610	.10770	1.6667	.02476
	1900	190.521	.20040	200.610	.11370	1.6667	.02476
	2000	192.871	.20160	200.610	.11970	1.6667	.02476
	2100	195.227	.20270	200.610	.12560	1.6667	.02476
	2200	197.591	.20380	200.610	.13160	1.6667	.02476
	2300	199.961	.20490	200.610	.13760	1.6667	.02476
	2400	202.338	.20590	200.610	.14360	1.6667	.02476
	2500	204.721	.20690	200.610	.14960	1.6667	.02476
	2600	207.112	.20780	200.610	.15560	1.6667	.02476
	2700	209.509	.20870	200.610	.16150	1.6667	.02476

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 1900 DEG R VAPOR PRESSURE 1279.5 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	1900	68.939	.13280	200.610	.00136		.03530
SAT VAP	1900	191.229	.19720	200.610	.07950	1.6667	.02476
	2000	193.579	.19840	200.610	.08368	1.6667	.02476
	2100	195.936	.19950	200.610	.08787	1.6667	.02476
	2200	198.299	.20060	200.610	.09205	1.6667	.02476
	2300	200.669	.20170	200.610	.09624	1.6667	.02476
	2400	203.046	.20270	200.610	.10040	1.6667	.02476
	2500	205.430	.20370	200.610	.10460	1.6667	.02476
	2600	207.820	.20460	200.610	.10880	1.6667	.02476
	2700	210.217	.20550	200.610	.11300	1.6667	.02476

SATURATION TEMP 2000 DEG R VAPOR PRESSURE 1761.7 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	2000	72.509	.13460	200.610	.00137		.03610
SAT VAP	2000	194.350	.19560	200.610	.06078	1.6667	.02476
	2100	196.707	.19670	200.610	.06382	1.6667	.02476
	2200	199.070	.19780	200.610	.06686	1.6667	.02476
	2300	201.440	.19890	200.610	.06990	1.6667	.02476
	2400	203.817	.19990	200.610	.07294	1.6667	.02476
	2500	206.201	.20090	200.610	.07597	1.6667	.02476
	2600	208.591	.20180	200.610	.07901	1.6667	.02476
	2700	210.988	.20270	200.610	.08205	1.6667	.02476

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 2100 DEG R VAPOR PRESSURE 2348.3 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	2100	76.157	.13640	200.610	.00139		.03690
SAT VAP	2100	197.548	.19420	200.610	.04788	1.6667	.02476
	2200	199.911	.19530	200.610	.05016	1.6667	.02476
	2300	202.282	.19640	200.610	.05244	1.6667	.02476
	2400	204.658	.19740	200.610	.05472	1.6667	.02476
	2500	207.042	.19840	200.610	.05700	1.6667	.02476
	2600	209.432	.19930	200.610	.05928	1.6667	.02476
	2700	211.829	.20020	200.610	.06156	1.6667	.02476

SATURATION TEMP 2200 DEG R VAPOR PRESSURE 3044.3 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	2200	79.889	.13820	200.610	.00140		.03780
SAT VAP	2200	200.831	.19310	200.610	.03869	1.6667	.02476
	2300	203.201	.19420	200.610	.04045	1.6667	.02476
	2400	205.578	.19520	200.610	.04221	1.6667	.02476
	2500	207.961	.19620	200.610	.04397	1.6667	.02476
	2600	210.352	.19710	200.610	.04572	1.6667	.02476
	2700	212.749	.19800	200.610	.04748	1.6667	.02476

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 2300 DEG R VAPOR PRESSURE 3852.3 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	2300	83.714	.13990	200.610	.00141		.03870
SAT VAP	2300	204.206	.19220	200.610	.03196	1.6667	.02476
	2400	206.583	.19330	200.610	.03335	1.6667	.02476
	2500	208.967	.19420	200.610	.03474	1.6667	.02476
	2600	211.357	.19520	200.610	.03613	1.6667	.02476
	2700	213.754	.19610	200.610	.03752	1.6667	.02476

SATURATION TEMP 2400 DEG R VAPOR PRESSURE 4773.2 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	2400	87.640	.14150	200.610	.00143		.03980
SAT VAP	2400	207.683	.19150	200.610	.02692	1.6667	.02476
	2500	210.066	.19250	200.610	.02804	1.6667	.02476
	2600	212.457	.19350	200.610	.02916	1.6667	.02476
	2700	214.854	.19440	200.610	.03028	1.6667	.02476

TABLE 5
THERMODYNAMIC PROPERTIES-MERCURY

SATURATION TEMP 2500 DEG R VAPOR PRESSURE 5805.9 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	2500	91.674	.14320	200.610	.00144		.04090
SAT VAP	2500	211.267	.19100	200.610	.02305	1.6667	.02476
	2600	213.658	.19190	200.610	.02398	1.6667	.02476
	2700	216.055	.19290	200.610	.02490	1.6667	.02476

SATURATION TEMP 2600 DEG R VAPOR PRESSURE 6947.9 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	2600	95.824	.14480	200.610	.00145		.04210
SAT VAP	2600	214.968	.19060	200.610	.02003	1.6667	.02476
	2700	217.365	.19150	200.610	.02081	1.6667	.02476

SATURATION TEMP 2700 DEG R VAPOR PRESSURE 8195.3 PSIA

	TEMP	H	S	M	V	GAMF	CP(FR)
SAT LIQ	2700	100.100	.14640	200.610	.00147		.04340
SAT VAP	2700	218.793	.19040	200.610	.01764	1.6667	.02476

Table 6 - Lithium - Material Properties

Reference

starting vapor pressure:

$$P = .019337 \ln^{-1}\left[\frac{-33749.8}{T} + 18.421\right] \quad \begin{matrix} P \text{ in psia} \\ T \text{ in } ^\circ R \end{matrix}$$

from:

$$P = \log^{-1}\left[\frac{-8143}{T} + 8.00\right] \quad \begin{matrix} P \text{ in mm Hg} \\ T \text{ in } ^\circ K \end{matrix}$$ 2

(accurate to 10% from 1980° to 2520°R and 30% from 1260 to 1980°R)

liquid molecular weight: $M_L = 6.94$ 4

absolute enthalpy of liquid as a function of temperature, 4

$H_L^\circ \quad (\frac{BTU}{lb\ mole})$

absolute free energy of liquid as a function of temperature, 4

$F_L^\circ \quad (\frac{BTU}{lb\ mole})$

specific heat of liquid as a function of temperature, 4

$C_{p_L}^\circ \quad (\frac{BTU}{mole\ ^\circ R})$

absolute enthalpy of monatomic and diatomic vapor as a function 4

of temperature, $H_i^\circ \quad (\frac{BTU}{lb\ mole})$

absolute free energy of monatomic and diatomic vapor as a func- 4

tion of temperature, $F_i^\circ \quad (\frac{BTU}{lb\ mole})$

specific volume of the liquid:

$V_L = .02885 + 3.2222 \times 10^{-6} T$ 2

specific heat of monatomic and diatomic vapor as a function 4

of temperature $C_{p_i}^\circ \quad (\frac{BTU}{mole\ ^\circ R})$

Table 6 - Lithium - Material Properties (Continued)

Reference

The finalized pressure is well represented by:

$$P = \log^{-1}\left[\frac{-14649}{T} - .325 \log T + 7.362\right] \qquad 1800 \leq T \leq 2800$$

P in psia

T in °R

$$P = \log^{-1}\left[\frac{-14662}{T} - .315 \log T + 7.332\right] \qquad 2800 \leq T \leq 3600$$

P in psia

T in °R

These equations have a maximum deviation of 1.2% from the values given in the tables, and a maximum percent error of 15.6% from the values given by the starting vapor pressure equation (see Figure 5, page 133).

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 1800 DEG R VAPOR PRESSURE 1.4712830-2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1800	1717.9	2.3840	6.940	3.4650-2					0.99214
SAT VAP	1800	10966.1	7.5219	7.127	1.8423 5	3499.9	4539.7	1.99682	1.64159	0.71295
					SUPERHEAT					
	1900	11127.8	7.6088	7.034	1.9703 5	3640.6	4711.8	1.32748	1.65353	0.71432
	2000	11242.8	7.6672	6.990	2.0870 5	3758.0	4857.9	1.01795	1.65937	0.71497
	2100	11336.2	7.7127	6.968	2.1983 5	3862.7	4990.2	0.87165	1.66234	0.71529
	2200	11419.4	7.7518	6.956	2.3068 5	3960.2	5114.4	0.79974	1.66392	0.71545
	2300	11497.4	7.7873	6.950	2.4139 5	4052.9	5233.1	0.76286	1.66481	0.71554
	2400	11572.6	7.8192	6.946	2.5202 5	4142.2	5347.8	0.74366	1.66531	0.71559
	2500	11646.4	7.8485	6.944	2.6260 5	4228.9	5459.4	0.73299	1.66560	0.71561
	2600	11719.3	7.8768	6.943	2.7315 5	4313.5	5568.4	0.72602	1.66579	0.71563
	2700	11791.8	7.9041	6.942	2.8370 5	4396.3	5675.1	0.72223	1.66592	0.71564
	2800	11863.9	7.9303	6.941	2.9423 5	4477.3	5779.6	0.72031	1.66600	0.71565
	2900	11935.9	7.9557	6.941	3.0475 5	4556.8	5882.2	0.71861	1.66606	0.71565
	3000	12007.7	7.9804	6.941	3.1528 5	4634.8	5982.8	0.71815	1.66605	0.71569
	3100	12079.5	8.0042	6.941	3.2579 5	4711.6	6082.0	0.71714	1.66617	0.71563
	3200	12151.2	8.0273	6.940	3.3631 5	4787.0	6179.8	0.71734	1.66636	0.71552
	3300	12222.9	8.0498	6.940	3.4683 5	4861.5	6274.1	0.71604	1.66558	0.71604
	3400	12294.5	8.0716	6.940	3.5734 5	4934.7	6365.9	0.71692	1.66422	0.71692
	3500	12366.3	8.0925	6.940	3.6785 5	5006.7	6456.9	0.71761	1.66317	0.71761
	3600	12438.3	8.1118	6.940	3.7836 5	5077.8	6550.0	0.71710	1.66396	0.71710

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 1900 DEG R VAPOR PRESSURE 3.8544767-2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	1900	1817.0	2.4388	6.940	3.4972-2					0.99139
SAT VAP	1900	10990.5	7.2669	7.176	7.3717 4	3573.2	4639.0	2.13280	1.63524	0.71236
					SUPERHEAT					
	2000	11165.6	7.3563	7.068	7.8783 4	3718.0	4815.8	1.45593	1.64895	0.71390
	2100	11291.7	7.4178	7.013	8.3378 4	3838.7	4965.3	1.10894	1.65628	0.71469
	2200	11392.8	7.4652	6.983	8.7721 4	3945.4	5099.1	0.93105	1.66029	0.71511
	2300	11481.1	7.5052	6.966	9.1927 4	4043.6	5223.5	0.83786	1.66255	0.71534
	2400	11562.1	7.5397	6.957	9.6053 4	4136.0	5341.5	0.78832	1.66385	0.71546
	2500	11639.3	7.5704	6.951	1.0013 5	4224.7	5455.1	0.76085	1.66462	0.71553
	2600	11714.4	7.5995	6.948	1.0419 5	4310.5	5565.4	0.74449	1.66511	0.71558
	2700	11788.3	7.6274	6.945	1.0824 5	4394.1	5672.9	0.73455	1.66544	0.71561
	2800	11861.4	7.6540	6.944	1.1227 5	4475.7	5778.0	0.72835	1.66565	0.71562
	2900	11934.1	7.6796	6.943	1.1630 5	4555.6	5881.0	0.72429	1.66580	0.71564
	3000	12006.4	7.7044	6.942	1.2032 5	4634.0	5981.9	0.72178	1.66586	0.71567
	3100	12078.4	7.7284	6.942	1.2434 5	4710.9	6081.3	0.72023	1.66602	0.71562
	3200	12150.4	7.7515	6.941	1.2836 5	4786.5	6179.2	0.71899	1.66625	0.71551
	3300	12222.2	7.7740	6.941	1.3237 5	4860.9	6273.7	0.71853	1.66549	0.71603
	3400	12294.0	7.7959	6.941	1.3639 5	4934.3	6365.6	0.71791	1.66415	0.71692
	3500	12365.9	7.8168	6.941	1.4040 5	5006.4	6456.6	0.71876	1.66311	0.71761
	3600	12438.0	7.8361	6.941	1.4442 5	5077.6	6549.8	0.71710	1.66391	0.71710

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 2000 DEG R VAPOR PRESSURE 9.2134777-2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2000	1916.1	2.4892	6.940	3.5294-2					0.99053
SAT VAP	2000	11009.2	7.0357	7.232	3.2213 4	3640.7	4730.9	2.25116	1.62817	0.71174
					SUPERHEAT					
	2100	11197.5	7.1276	7.109	3.4410 4	3789.4	4912.7	1.58068	1.64359	0.71343
	2200	11335.3	7.1921	7.041	3.6397 4	3914.0	5066.2	1.20539	1.65246	0.71437
	2300	11445.1	7.2417	7.002	3.8261 4	4023.3	5202.4	0.99876	1.65762	0.71489
	2400	11538.7	7.2815	6.980	4.0051 4	4122.5	5327.5	0.88594	1.66062	0.71518
	2500	11623.5	7.3153	6.967	4.1798 4	4215.3	5445.4	0.82217	1.66243	0.71535
	2600	11703.5	7.3464	6.958	4.3522 4	4303.9	5558.5	0.78394	1.66359	0.71545
	2700	11780.6	7.3755	6.953	4.5232 4	4389.3	5668.0	0.76040	1.66436	0.71552
	2800	11855.9	7.4028	6.949	4.6932 4	4472.2	5774.4	0.74574	1.66488	0.71557
	2900	11930.0	7.4290	6.947	4.8625 4	4553.0	5878.2	0.73635	1.66523	0.71560
	3000	12003.3	7.4541	6.945	5.0314 4	4631.9	5979.8	0.73036	1.66542	0.71565
	3100	12076.1	7.4783	6.944	5.2001 4	4709.3	6079.7	0.72619	1.66568	0.71560
	3200	12148.6	7.5016	6.943	5.3685 4	4785.3	6177.9	0.72336	1.66598	0.71550
	3300	12220.8	7.5243	6.942	5.5368 4	4860.0	6272.7	0.72160	1.66528	0.71602
	3400	12292.9	7.5463	6.942	5.7050 4	4933.4	6364.7	0.72104	1.66398	0.71691
	3500	12364.9	7.5672	6.942	5.8731 4	5005.8	6455.9	0.72050	1.66298	0.71760
	3600	12437.2	7.5866	6.941	6.0411 4	5077.0	6549.2	0.71931	1.66380	0.71710

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 2100 DEG R VAPOR PRESSURE 2.0299995-1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2100	2015.2	2.5369	6.940	3.5617-2					0.98971
SAT VAP	2100	11024.8	6.8272	7.292	1.5226 4	3703.7	4816.7	2.34183	1.62070	0.71113
					SUPERHEAT					
	2200	11224.9	6.9207	7.154	1.6257 4	3855.8	5003.1	1.69348	1.63758	0.71295
	2300	11374.1	6.9878	7.074	1.7189 4	3984.1	5160.8	1.30184	1.64795	0.71401
	2400	11491.7	7.0379	7.027	1.8056 4	4095.7	5299.3	1.07587	1.65418	0.71462
	2500	11591.4	7.0778	6.999	1.8884 4	4196.5	5425.8	0.94396	1.65801	0.71497
	2600	11681.2	7.1127	6.980	1.9691 4	4290.5	5544.6	0.86319	1.66051	0.71520
	2700	11764.9	7.1443	6.969	2.0483 4	4379.6	5657.9	0.81290	1.66216	0.71535
	2800	11844.5	7.1732	6.961	2.1266 4	4465.1	5767.0	0.78118	1.66328	0.71545
	2900	11921.6	7.2004	6.955	2.2043 4	4547.6	5872.7	0.76087	1.66404	0.71551
	3000	11996.9	7.2262	6.951	2.2816 4	4627.8	5975.6	0.74758	1.66453	0.71558
	3100	12071.2	7.2509	6.949	2.3585 4	4706.1	6076.3	0.73858	1.66500	0.71556
	3200	12144.8	7.2745	6.947	2.4353 4	4782.8	6175.3	0.73236	1.66545	0.71546
	3300	12217.8	7.2975	6.945	2.5119 4	4857.9	6270.6	0.72848	1.66486	0.71599
	3400	12290.5	7.3196	6.944	2.5884 4	4931.8	6363.0	0.72626	1.66364	0.71689
	3500	12363.0	7.3406	6.943	2.6649 4	5004.3	6454.5	0.72482	1.66271	0.71758
	3600	12435.6	7.3601	6.943	2.7412 4	5075.7	6548.0	0.72286	1.66357	0.71708

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 2200 DEG R VAPOR PRESSURE 4.1594257-1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2200	2114.2	2.5828	6.940	3.5939-2					0.98897
SAT VAP	2200	11039.6	6.6398	7.353	7.7194 3	3763.6	4897.9	2.40134	1.61310	0.71056
					SUPERHEAT					
	2300	11249.1	6.7337	7.204	8.2378 3	3917.8	5087.9	1.78881	1.63114	0.71246
	2400	11406.6	6.8008	7.114	8.7048 3	4048.4	5248.4	1.40029	1.64259	0.71359
	2500	11532.3	6.8514	7.058	9.1388 3	4162.4	5389.6	1.15994	1.64990	0.71428
	2600	11639.6	6.8931	7.022	9.5534 3	4265.8	5518.6	1.00726	1.65476	0.71474
	2700	11735.1	6.9292	6.998	9.9549 3	4361.6	5639.0	0.90991	1.65804	0.71503
	2800	11822.9	6.9611	6.982	1.0347 4	4451.6	5753.0	0.84752	1.66027	0.71522
	2900	11905.6	6.9902	6.971	1.0734 4	4537.5	5862.1	0.80706	1.66180	0.71535
	3000	11984.9	7.0174	6.963	1.1116 4	4620.0	5967.4	0.78041	1.66283	0.71547
	3100	12061.9	7.0430	6.958	1.1496 4	4700.0	6070.0	0.76227	1.66368	0.71547
	3200	12137.5	7.0673	6.954	1.1873 4	4777.9	6170.2	0.74972	1.66442	0.71540
	3300	12212.1	7.0907	6.951	1.2249 4	4854.1	6266.5	0.74144	1.66405	0.71594
	3400	12285.9	7.1132	6.949	1.2625 4	4928.6	6359.8	0.73604	1.66300	0.71685
	3500	12359.3	7.1345	6.947	1.2999 4	5001.8	6451.8	0.73220	1.66218	0.71755
	3600	12432.5	7.1541	6.946	1.3373 4	5073.6	6545.8	0.72857	1.66313	0.71706

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 2300 DEG R VAPOR PRESSURE 7.9884432-1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2300	2213.0	2.6274	6.940	3.6261-2					0.98826
SAT VAP	2300	11055.4	6.4719	7.415	4.1671 3	3821.3	4975.5	2.43127	1.60560	0.71006
					SUPERHEAT					
	2400	11268.3	6.5626	7.259	4.4415 3	3974.9	5166.1	1.87451	1.62404	0.71193
	2500	11433.1	6.6292	7.160	4.6906 3	4107.1	5329.2	1.49670	1.63644	0.71312
	2600	11568.3	6.6820	7.094	4.9236 3	4224.5	5474.3	1.24177	1.64500	0.71394
	2700	11683.6	6.7255	7.050	5.1453 3	4330.7	5606.2	1.07238	1.65091	0.71448
	2800	11785.0	6.7624	7.019	5.3588 3	4428.4	5728.4	0.96081	1.65501	0.71483
	2900	11877.3	6.7949	6.999	5.5666 3	4519.7	5843.4	0.88700	1.65786	0.71507
	3000	11963.4	6.8244	6.984	5.7705 3	4606.3	5953.0	0.83766	1.65982	0.71526
	3100	12045.4	6.8516	6.974	5.9717 3	4689.2	6058.7	0.80394	1.66135	0.71532
	3200	12124.6	6.8770	6.966	6.1709 3	4769.3	6161.2	0.78051	1.66259	0.71529
	3300	12201.9	6.9013	6.961	6.3689 3	4847.1	6259.3	0.76442	1.66260	0.71586
	3400	12277.8	6.9244	6.957	6.5659 3	4923.0	6353.9	0.75339	1.66184	0.71679
	3500	12352.7	6.9461	6.953	6.7621 3	4997.1	6447.0	0.74555	1.66125	0.71750
	3600	12427.0	6.9661	6.951	6.9576 3	5069.7	6541.7	0.73898	1.66235	0.71702

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 2400 DEG R VAPOR PRESSURE 1.4530157 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2400	2311.8	2.6694	6.940	3.6583-2					0.98701
SAT VAP	2400	11066.8	6.3173	7.482	2.3691 3	3874.7	5046.9	2.45193	1.59762	0.70952
					SUPERHEAT					
	2500	11281.9	6.4045	7.322	2.5219 3	4026.8	5237.5	1.95068	1.61626	0.71136
	2600	11456.2	6.4727	7.211	2.6631 3	4161.8	5404.7	1.58054	1.62982	0.71267
	2700	11600.5	6.5272	7.134	2.7952 3	4282.4	5553.5	1.31852	1.63954	0.71359
	2800	11723.1	6.5717	7.082	2.9202 3	4391.1	5688.4	1.13810	1.64647	0.71418
	2900	11830.6	6.6096	7.045	3.0402 3	4490.8	5812.7	1.01497	1.65137	0.71460
	3000	11927.7	6.6428	7.020	3.1565 3	4583.6	5929.0	0.93082	1.65482	0.71492
	3100	12017.7	6.6726	7.001	3.2703 3	4671.3	6039.7	0.87250	1.65746	0.71507
	3200	12102.9	6.6999	6.988	3.3823 3	4755.0	6146.1	0.83156	1.65951	0.71510
	3300	12184.6	6.7256	6.978	3.4930 3	4835.5	6247.1	0.80274	1.66016	0.71571
	3400	12264.0	6.7497	6.970	3.6028 3	4913.6	6344.0	0.78247	1.65989	0.71667
	3500	12341.5	6.7722	6.964	3.7118 3	4989.4	6438.9	0.76795	1.65966	0.71741
	3600	12417.7	6.7927	6.960	3.8202 3	5063.2	6534.9	0.75667	1.66103	0.71695

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 2500 DEG R VAPOR PRESSURE 2.5189166 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2500	2410.4	2.7089	6.940	3.6905-2					0.98527
SAT VAP	2500	11074.4	6.1745	7.555	1.4098 3	3924.0	5112.6	2.46251	1.58921	0.70894
					SUPERHEAT					
	2500	11295.1	6.2608	7.385	1.4999 3	4076.5	5305.3	2.00422	1.60841	0.71086
	2700	11477.2	6.3296	7.264	1.5836 3	4213.5	5475.7	1.64950	1.62290	0.71226
	2800	11628.9	6.3848	7.179	1.6617 3	4336.2	5627.7	1.38886	1.63361	0.71320
	2900	11758.4	6.4303	7.119	1.7356 3	4447.1	5765.1	1.20255	1.64142	0.71387
	3000	11871.8	6.4691	7.076	1.8063 3	4548.8	5891.5	1.07090	1.64705	0.71439
	3100	11974.0	6.5029	7.045	1.8748 3	4643.3	6009.9	0.97750	1.65133	0.71467
	3200	12068.3	6.5331	7.022	1.9415 3	4732.4	6122.1	0.91080	1.65464	0.71479
	3300	12157.1	6.5609	7.005	2.0071 3	4817.2	6227.7	0.86286	1.65627	0.71547
	3400	12241.8	6.5866	6.992	2.0718 3	4898.5	6328.2	0.82844	1.65676	0.71649
	3500	12323.4	6.6103	6.982	2.1357 3	4976.9	6425.8	0.80356	1.65711	0.71726
	3600	12402.7	6.6317	6.975	2.1990 3	5052.6	6523.8	0.78485	1.65890	0.71683

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 2600 DEG R VAPOR PRESSURE 4.1704873 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2600	2508.9	2.7480	6.940	3.7228-2					0.98363
SAT VAP	2600	11086.6	6.0471	7.624	8.7756 2	3973.5	5177.5	2.44808	1.58136	0.70852
					SUPERHEAT					
	2700	11310.4	6.1316	7.447	9.3292 2	4125.4	5371.0	2.03409	1.60082	0.71047
	2800	11497.3	6.1995	7.319	9.8441 2	4262.7	5543.2	1.70244	1.61592	0.71183
	2900	11654.9	6.2549	7.227	1.0326 3	4386.7	5697.3	1.44977	1.62733	0.71283
	3000	11790.2	6.3011	7.160	1.0782 3	4499.4	5837.0	1.26265	1.63582	0.71361
	3100	11909.3	6.3405	7.111	1.1219 3	4602.9	5965.8	1.12525	1.64235	0.71408
	3200	12016.6	6.3749	7.074	1.1641 3	4699.2	6086.3	1.02463	1.64742	0.71434
	3300	12115.6	6.4058	7.046	1.2052 3	4789.9	6198.5	0.95056	1.65045	0.71512
	3400	12208.3	6.4339	7.025	1.2454 3	4876.0	6304.2	0.89632	1.65205	0.71621
	3500	12296.0	6.4593	7.009	1.2850 3	4958.1	6405.9	0.85662	1.65325	0.71704
	3600	12379.8	6.4820	6.997	1.3239 3	5036.7	6506.9	0.82705	1.65566	0.71666

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 2700 DEG R VAPOR PRESSURE 6.6395305 0 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2700	2607.2	2.7861	6.940	3.7550-2					0.98206
SAT VAP	2700	11103.1	5.9327	7.688	5.6763 2	4023.3	5241.8	2.41613	1.57405	0.70824
					SUPERHEAT					
	2800	11326.8	6.0140	7.509	6.0268 2	4172.9	5434.4	2.04707	1.59347	0.71005
	2900	11516.5	6.0807	7.376	6.3548 2	4309.7	5607.1	1.74207	1.60881	0.71144
	3000	11678.5	6.1359	7.278	6.6631 2	4434.3	5762.6	1.50180	1.62065	0.71254
	3100	11819.1	6.1823	7.204	6.9555 2	4548.3	5904.6	1.31697	1.62996	0.71325
	3200	11943.5	6.2221	7.149	7.2353 2	4653.5	6035.7	1.17677	1.63729	0.71369
	3300	12056.3	6.2573	7.106	7.5061 2	4751.8	6156.8	1.07050	1.64219	0.71462
	3400	12159.9	6.2886	7.074	7.7692 2	4844.1	6269.7	0.99077	1.64530	0.71581
	3500	12256.2	6.3165	7.049	8.0258 2	4931.3	6377.0	0.93144	1.64767	0.71672
	3600	12346.4	6.3410	7.030	8.2767 2	5013.7	6482.3	0.88720	1.65094	0.71640

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 2800 DEG R VAPOR PRESSURE 1.0282178 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2800	2705.6	2.8211	6.940	3.7872-2					0.98046
SAT VAP	2800	11118.8	5.8258	7.755	3.7684 2	4070.7	5302.6	2.37855	1.56677	0.70788
					SUPERHEAT					
	2900	11341.0	5.9039	7.575	3.9958 2	4217.6	5493.4	2.05241	1.58582	0.70968
	3000	11532.3	5.9691	7.438	4.2099 2	4353.2	5665.9	1.77483	1.60117	0.71114
	3100	11698.2	6.0238	7.333	4.4123 2	4478.1	5822.9	1.54809	1.61361	0.71215
	3200	11843.7	6.0703	7.253	4.6047 2	4593.1	5967.0	1.36788	1.62363	0.71282
	3300	11974.1	6.1108	7.191	4.7897 2	4700.3	6099.2	1.22605	1.63085	0.71391
	3400	12092.1	6.1464	7.143	4.9683 2	4800.4	6221.5	1.11635	1.63590	0.71524
	3500	12199.8	6.1777	7.106	5.1410 2	4894.0	6336.3	1.03281	1.63983	0.71627
	3600	12298.9	6.2047	7.078	5.3085 2	4981.5	6447.4	0.96985	1.64427	0.71604

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 2900 DEG R VAPOR PRESSURE 1.5437610 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	2900	2803.5	2.8550	6.940	3.8194-2					0.97886
SAT VAP	2900	11136.5	5.7284	7.821	2.5779 2	4117.4	5361.8	2.33379	1.55970	0.70762
					SUPERHEAT					
	3000	11355.8	5.8031	7.641	2.7294 2	4261.0	5549.7	2.04743	1.57814	0.70945
	3100	11547.8	5.8664	7.501	2.8732 2	4395.0	5721.9	1.79604	1.59364	0.71077
	3200	11716.6	5.9203	7.391	3.0098 2	4519.6	5879.9	1.58448	1.60650	0.71170
	3300	11867.4	5.9671	7.304	3.1407 2	4635.9	6024.8	1.41009	1.61633	0.71300
	3400	12002.7	6.0078	7.236	3.2664 2	4744.5	6158.0	1.27000	1.62365	0.71450
	3500	12124.5	6.0432	7.183	3.3872 2	4845.5	6282.1	1.16011	1.62947	0.71566
	3600	12234.7	6.0733	7.143	3.5034 2	4939.1	6400.4	1.07568	1.63536	0.71555

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 3000 DEG R VAPOR PRESSURE 2.2497839 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	3000	2900.9	2.8884	6.940	3.8517-2					0.97726
SAT VAP	3000	11156.8	5.6403	7.884	1.8153 2	4163.8	5419.7	2.28371	1.55285	0.70755
					SUPERHEAT					
	3100	11372.7	5.7115	7.705	1.9192 2	4303.9	5604.9	2.03201	1.57091	0.70917
	3200	11564.4	5.7726	7.563	2.0183 2	4436.0	5776.2	1.80564	1.58640	0.71036
	3300	11736.6	5.8260	7.448	2.1136 2	4560.6	5934.0	1.60867	1.59884	0.71189
	3400	11891.0	5.8724	7.356	2.2048 2	4677.3	6079.2	1.44318	1.60858	0.71357
	3500	12029.1	5.9125	7.284	2.2922 2	4786.0	6213.6	1.30854	1.61648	0.71489
	3600	12152.5	5.9464	7.229	2.3755 2	4886.2	6340.4	1.20228	1.62404	0.71492

SATURATION TEMPERATURE 3100 DEG R VAPOR PRESSURE 3.1988934 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	3100	2998.2	2.9207	6.940	3.8839-2					0.97566
SAT VAP	3100	11178.9	5.5596	7.945	1.3090 2	4209.5	5476.4	2.23070	1.54639	0.70740
					SUPERHEAT					
	3200	11391.0	5.6272	7.769	1.3819 2	4346.1	5658.8	2.00955	1.56401	0.70883
	3300	11583.6	5.6868	7.623	1.4523 2	4476.9	5828.4	1.80501	1.57878	0.71058
	3400	11757.4	5.7390	7.505	1.5199 2	4600.7	5985.4	1.62403	1.59086	0.71246
	3500	11912.9	5.7841	7.410	1.5846 2	4716.4	6130.6	1.47032	1.60091	0.71396
	3600	12050.8	5.8221	7.338	1.6460 2	4823.2	6266.5	1.34485	1.61024	0.71414

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 3200 DEG R VAPOR PRESSURE 4.4498241 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	3200	3095.8	2.9518	6.940	3.9161-2					0.97406
SAT VAP	3200	11202.7	5.4852	8.006	9.6404 1	4254.5	5532.1	2.17609	1.54031	0.70718
					SUPERHEAT					
	3300	11412.9	5.5502	7.829	1.0166 2	4388.7	5711.3	1.98049	1.55690	0.70913
	3400	11604.6	5.6077	7.682	1.0674 2	4517.4	5878.7	1.79716	1.57101	0.71119
	3500	11777.2	5.6577	7.564	1.1160 2	4638.9	6034.3	1.63364	1.58306	0.71287
	3600	11930.2	5.7000	7.471	1.1622 2	4751.4	6179.2	1.49472	1.59414	0.71322

SATURATION TEMPERATURE 3300 DEG R VAPOR PRESSURE 6.0843035 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	3300	3193.2	2.9812	6.940	3.9483-2					0.97246
SAT VAP	3300	11229.1	5.4163	8.063	7.2187 1	4299.4	5586.1	2.12100	1.53392	0.70756
					SUPERHEAT					
	3400	11435.9	5.4783	7.889	7.6021 1	4430.6	5761.7	1.94876	1.54958	0.70979
	3500	11624.0	5.5328	7.745	7.9715 1	4555.9	5926.1	1.78652	1.56331	0.71163
	3600	11791.4	5.5792	7.630	8.3221 1	4672.7	6079.4	1.64219	1.57595	0.71216

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 3400 DEG R VAPOR PRESSURE 8.1758655 1 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	3400	3290.5	3.0092	6.940	3.9805-2					0.97086
SAT VAP	3400	11257.9	5.3526	8.119	5.4970 1	4344.1	5638.8	2.06631	1.52749	0.70831
					SUPERHEAT					
	3500	11458.5	5.4107	7.950	5.7789 1	4471.0	5809.9	1.91594	1.54245	0.71030
	3600	11638.5	5.4607	7.814	6.0476 1	4590.4	5970.1	1.77513	1.55633	0.71099

SATURATION TEMPERATURE 3500 DEG R VAPOR PRESSURE 1.0771457 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	3500	3387.6	3.0367	6.940	4.0128-2					0.96926
SAT VAP	3500	11288.6	5.2942	8.173	4.2669 1	4388.5	5691.2	2.01249	1.52152	0.70893
					SUPERHEAT					
	3600	11478.4	5.3470	8.016	4.4746 1	4508.7	5856.2	1.88294	1.53623	0.70976

TABLE 6
THERMODYNAMIC PROPERTIES - LITHIUM

SATURATION TEMPERATURE 3600 DEG R VAPOR PRESSURE 1.3844806 2 PSIA

	TEMP	H	S	M	V	A(EQ)	A(FR)	CP(EQ)	GAMF	CP(FR)
SAT LIQ	3600	3484.6	3.0651	6.940	4.0450-2					0.96766
SAT VAP	3600	11320.4	5.2417	8.226	3.3925 1	4432.2	5744.4	1.95954	1.51683	0.70855

VI. ACKNOWLEDGEMENT

The author wishes to express his appreciation to the following people for their assistance in preparing this report:

T. A. Entzminger	for setting up the IBM program for the original edition
J. McCullough	for drawing the Mollier diagrams
J. Lee	for drawing the Mollier diagrams (Revision 1)
M. McCarthy	for drawing the Mollier diagrams (Revision 2)
S. Perin	for typing the text material
H. Brown	for his suggestions on the organization of the report
G. J. Carr and W. L. Booher	for setting up the revised IBM programs
W. G. Browne	for his valuable consultation and suggestions for the revised edition

VII. REFERENCES

The references consulted in the preparation of this report were:

1. B. F. Dodge, Chemical Engineering Thermodynamics, McGraw-Hill, 1944.

2. Liquid-Metals Handbook, June 1952.

3. A. G. Gaydon, Dissociation Energies and Spectra of Diatomic Molecules, 1953.

4. Advances in Chemistry Series, Volume 18, 1956.

5. Hougen and Watson, Chemical Process Principles, Wiley and Sons, 1943.

6. M. Sittig, Sodium, Its Manufacture, Properties, and Uses, 1956.

7. D. H. Brown, Heat Transfer for Condensing and Boiling Liquid Metals, Memorandum Report, January 30, 1959.

8. L. A. Sheldon, Thermodynamic Properties of Mercury Vapor, Report DF-76054, 1949.

9. K. K. Kelly, Bulletin 383 of the Bureau of Mines.

10. T. H. Inatomi, W. C. Parrish, NAA-SR-62, AEC Report, 1950.

11. H. N. Powell, IBM-704 Computer Program, Equilibrium Composition and Thermodynamic Properties of a Monopropellant System, G. E., FPLD, file number B-15, May 1, 1957.

12. H. A. Fremont, H. N. Powell, A. Shaffer, S. N. Suciu, Properties of Combustion Gases, Thermodynamic Properties, G. E. Copyright, 1955.

13. A. Shapiro, IBM Program for the Calculation of Equilibrium Composition and Thermodynamic Properties of Elements in the Liquid and Vapor Phase, General Electric, FPLD, DM 60-225.

VIII. APPENDIX

A. Calculation Theory

The fundamental relationships used in the calculation of the thermodynamic properties can be obtained from most standard references on Chemical Thermodynamics, for example reference (1).

Difficulties were encountered, however, due to the generally meager and scattered data available for the liquid and gas phases above temperatures of 1800°F. The following simplifying assumptions were therefore made:

1. The gas phase was assumed to obey the perfect gas laws.
2. Where experimental reference material was not available reasonable extrapolations from existing data were made.

Alterations to the first edition vapor equations were required for the alkali metal properties to properly account for the energy absorbed in changing the equilibrium composition in the vapor region. The alkali metal vapor properties were calculated with an existing monopropellant IBM computer program (reference 11). Since mercury was assumed not to dissociate or dimerize, the equations developed in the first edition were adequate for the calculation of mercury properties.

The development of the alkali metal equations are given first, after which the development of the mercury equations from the first edition are repeated.

1. Vapor Pressure

The equation describing the pressure change which accompanies a temperature change along the saturated vapor line is the Clapeyron equation:

$$\frac{dP}{dT} = \frac{J}{144} \quad \frac{\Delta h_v}{(V_v - V_L)\,T}$$

This differential equation gives the exact pressure-temperature interrelation. To integrate it one assumes that the heat of vaporization, Δh_v, varies linearly with temperature.

$\Delta h_v = (\Delta h_v)_o + DT$, where

$(\Delta h_v)_o$ = heat of vaporization at T = 0°R, and

D = a constant, mainly the difference between the specific heats of the liquid and the gas.

Also, it is assumed that the specific volume of the liquid is much smaller than that of the vapor and can be neglected, and that the vapor is an ideal gas. Then,

$$V_v = \frac{J}{144}\,\frac{R\,T}{M\,P}, \text{ and}$$

$$\frac{dP}{dT} = \frac{J}{144}\left[\frac{(\Delta h_v)_o + DT}{\frac{J}{144}\,\frac{R\,T^2}{M\,P}}\right] = \frac{P\left[(\Delta h_v)_o + DT\right]}{\left(\frac{R}{M}\right)T^2}$$

The integration of the Clapeyron equation then gives,

$$\ln P = -\frac{(\Delta h_v)_o}{\left(\frac{R}{M}\right)T} + \frac{P}{(R/M)}\ln T + \ln A$$

A is an integration constant.

The vapor pressure curve was then calculated using the derived formula,

$$\ln \frac{P}{b_1} = \frac{b_2}{T} + b_3 \ln T + b_4$$

The constants b_2, b_3 and b_4 were taken from reference books, mostly (2). The constant b_1, is a unit conversion factor.

This vapor pressure equation with the characteristic constants for each metal was used as a starting pressure for the calculation of the alkali metal thermodynamic properties. The constants, however, are known to contain experimental inaccuracies, and use of the vapor pressure equation per se results in internal inconsistencies in the calculated data. In particular, a slight discrepancy between $\Delta H_v/T$ and ΔS_v resulted from the use of the original vapor pressure equation. Consequently, iterations were made on vapor pressure, until the discrepancy between $\Delta H_v/T$ and ΔS_v was removed. Details are given in Reference 13. The variation between the finalized and starting vapor pressures are shown in Figures 1 thru 5.

2. Molecular Weight

a. Liquid - Since no dimerization occurs in the liquid, the molecular weight of the liquid is exactly equal to the monatomic molecular weight.

$$M_L = M_{Z_1}$$

b. Vapor - The molecular weight of alkali metal or related metal vapors is a function of temperature and pressure due to the effect of dimerization or dissociation.

Dimerization or association is the opposite of dissociation. It means that under certain conditions two atoms of alkali metal vapor combine together to form one diatomic molecule and release heat during the performance of the process. This chemical fusion has its analogue in the atomic fusion which produces a heavy nucleus from some single nuclei, simultaneously releasing a large amount of energy. During the dimerization process two atoms come so close that their single outer electrons orbit around the two atoms together, rather than around each atom separately. This state represents a state of lower energy level or a state of a higher amount of stability. The heat released by the dimerization is the negative amount of the heat of dissociation.

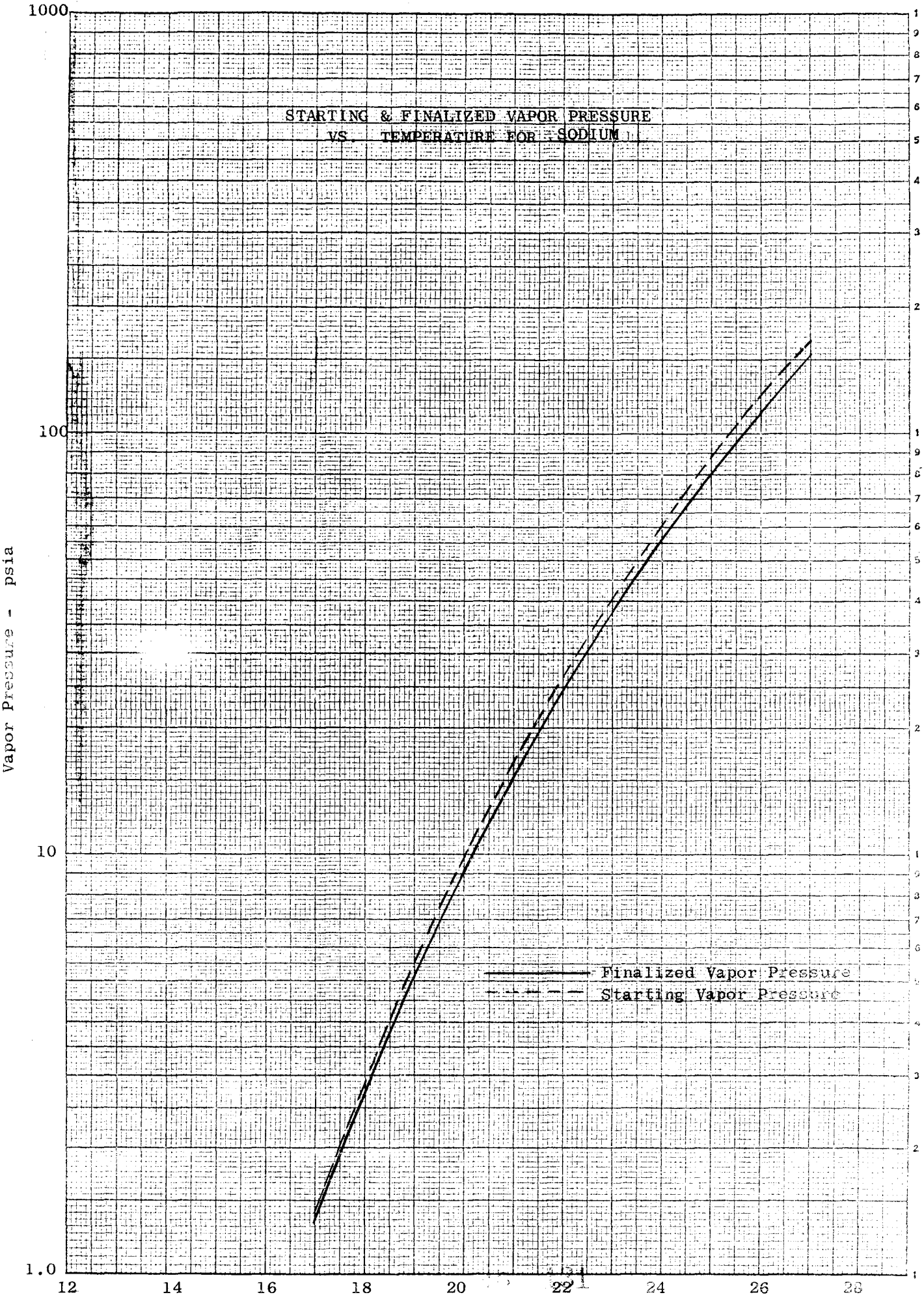


Figure 1 Saturation Temperature, °R x 10^{-2}

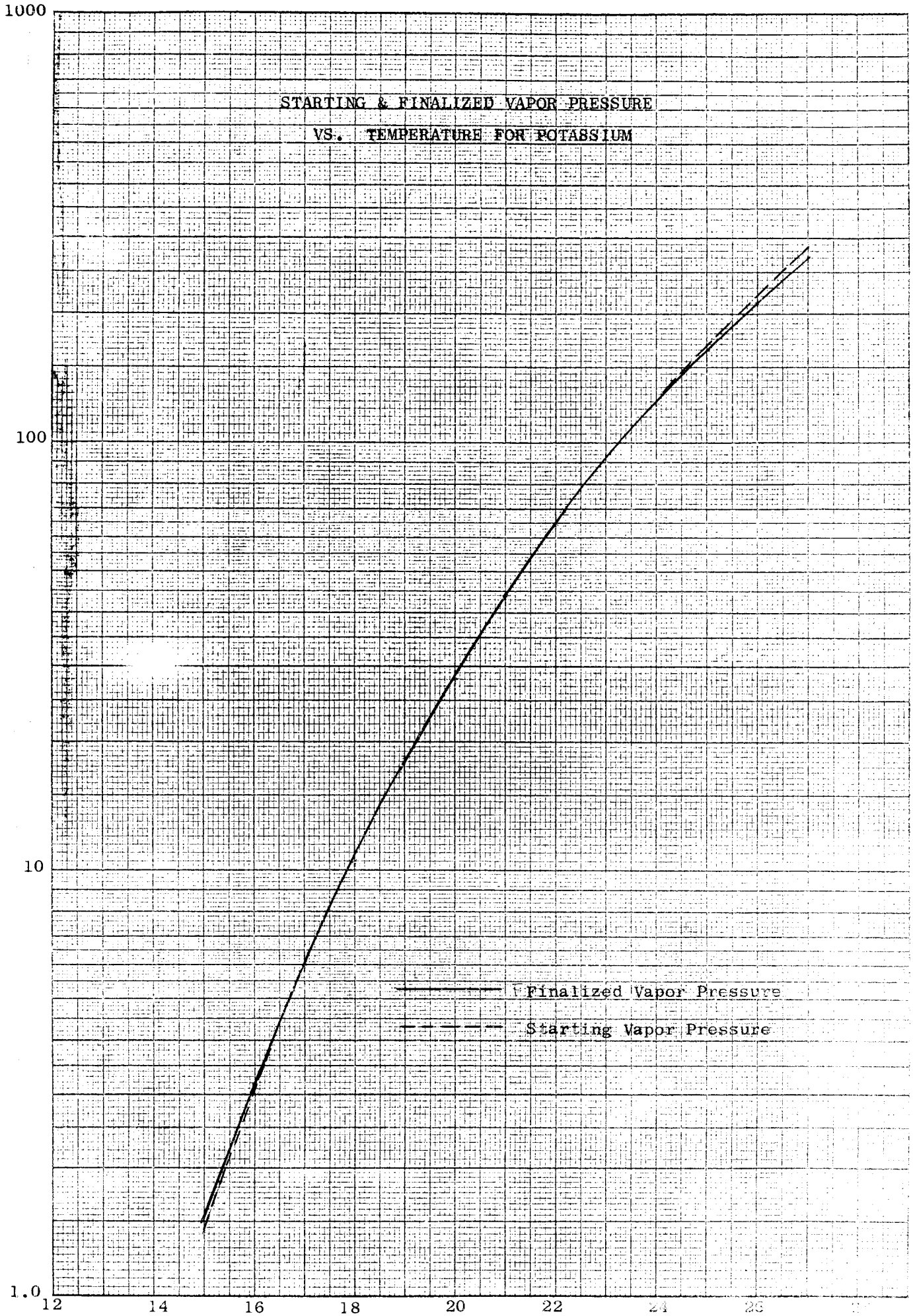


Figure 2

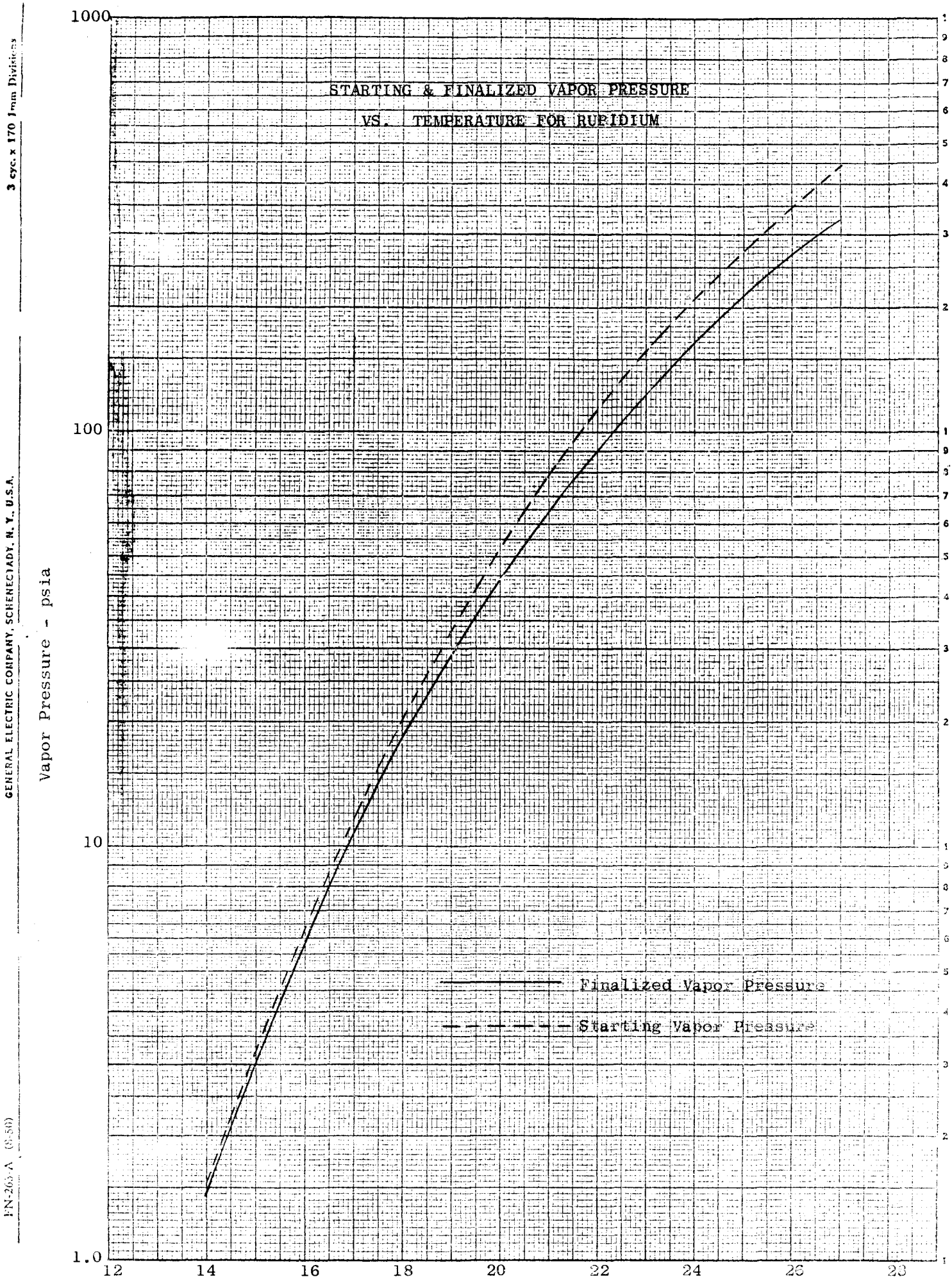

STARTING & FINALIZED VAPOR PRESSURE
VS. TEMPERATURE FOR RUBIDIUM
Vapor Pressure - psia
1000
100
10
1.0
12
14
16
18
20
22
24
26
28
Finalized Vapor Pressure
Starting Vapor Pressure
Saturation Temperature - °R x 10^-2
3 cyc. x 170 mm Divisions
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., U.S.A.
PN-260-A (8-59)

Figure 3

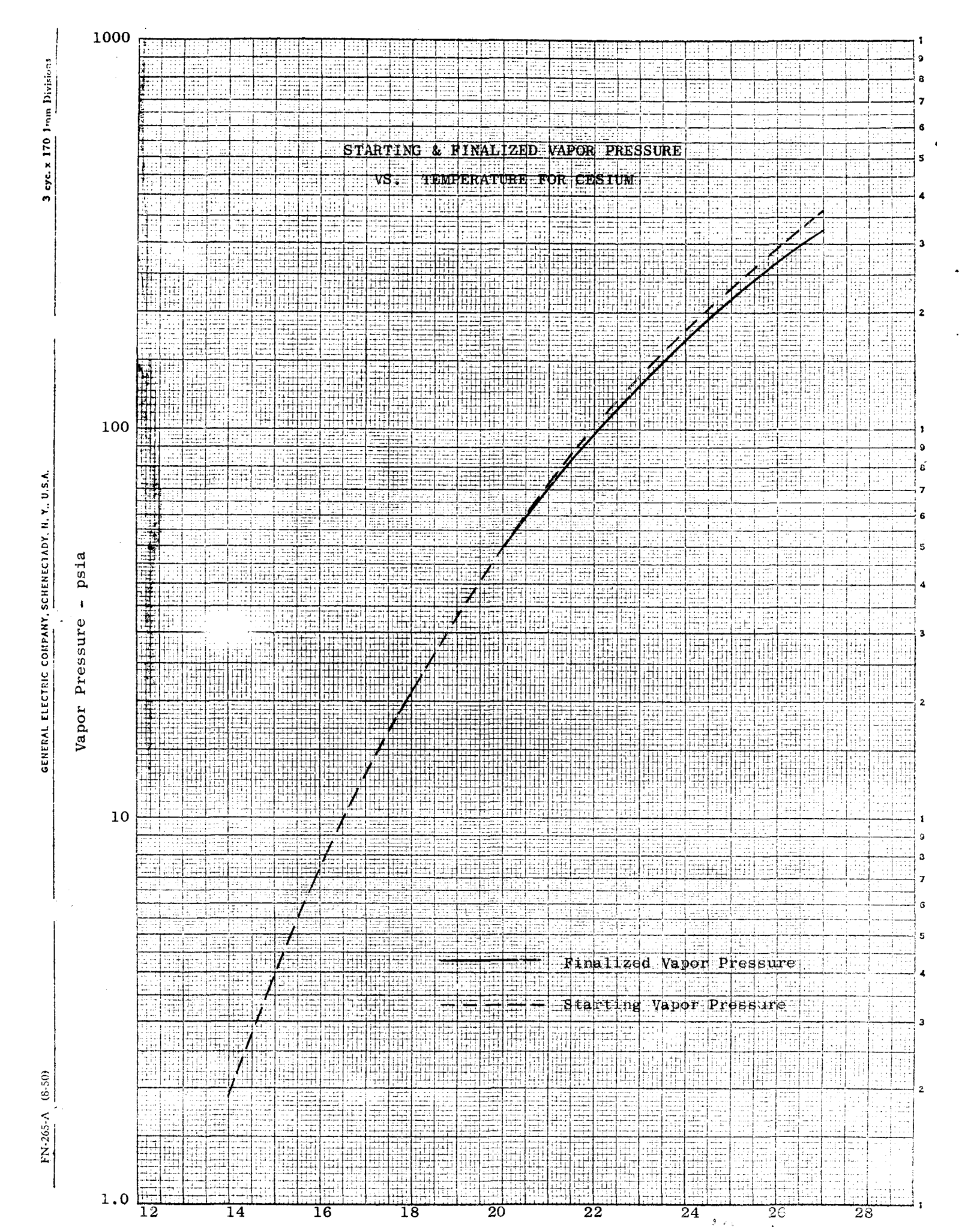

STARTING & FINALIZED VAPOR PRESSURE
VS. TEMPERATURE FOR CESIUM
Vapor Pressure - psia
1000
100
10
1.0
12
14
16
18
20
22
24
26
28
Finalized Vapor Pressure
Starting Vapor Pressure
Saturation Temperature - °R x 10-2
3 cyc. x 170 mm Divisions
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., U.S.A.
FN-265-A (8-50)

Figure 4

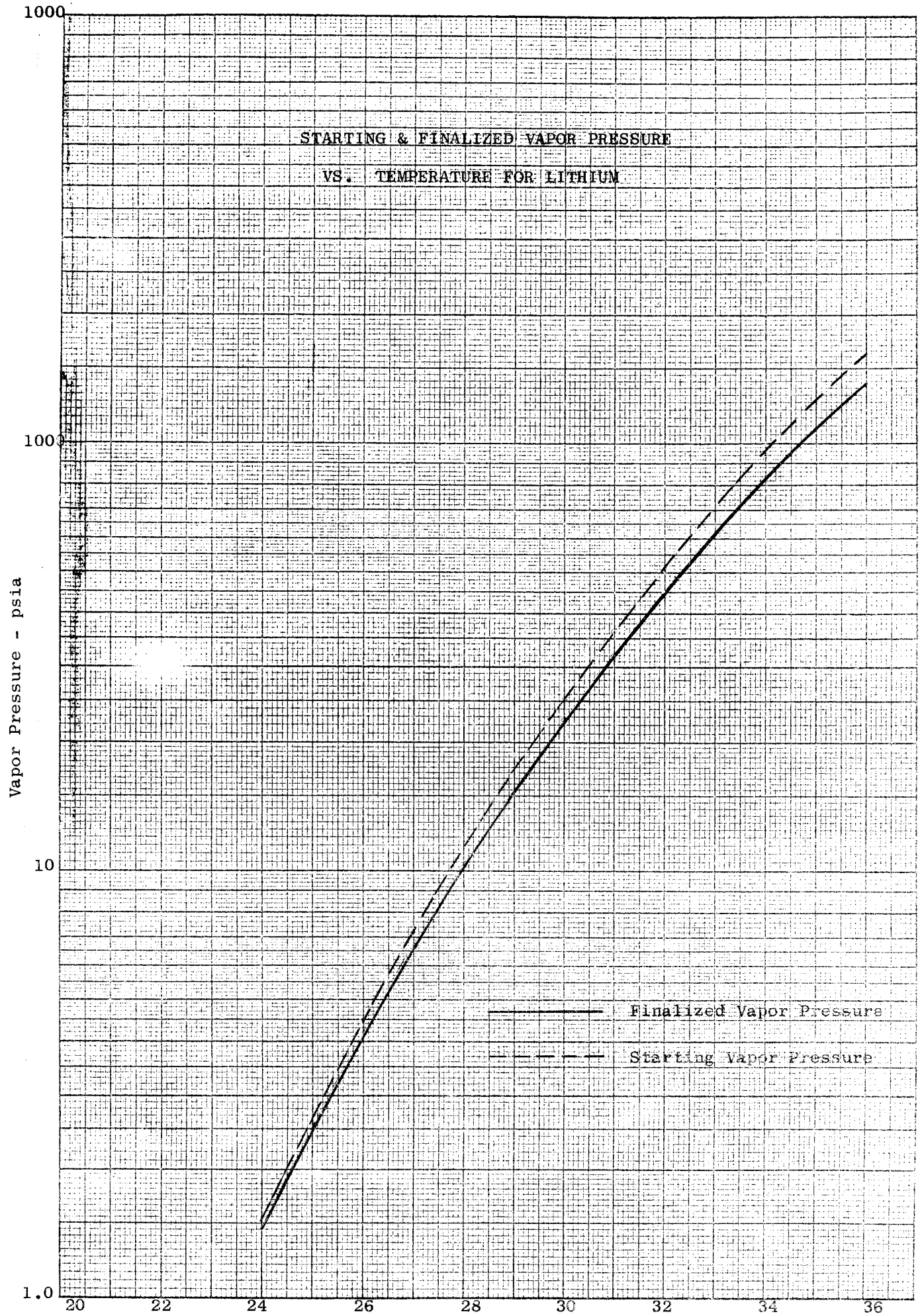

STARTING & FINALIZED VAPOR PRESSURE
VS. TEMPERATURE FOR LITHIUM
Vapor Pressure - psia
1000
100
10
1.0
20
22
24
26
28
30
32
34
36
Saturation Temperature - °R x 10^-2
Finalized Vapor Pressure
Starting Vapor Pressure

Figure 5

If P_{z_1} is the partial pressure of the monatomic gas and P_{z_2} the partial pressure of the diatomic gas, the equilibrium constant for any homogeneous chemical reaction such as

$$Na_2 \rightleftharpoons Na + Na$$

is defined as the ratio of partial pressures in the following way:

$$K = \frac{(P_{z_1})^2}{P_{z_2}}$$

The mole fractions of monatomic and diatomic gas are given by the ratio of partial pressure to total pressure. Thus,

$$X_{z_1} = \frac{P_{z_1}}{P}\ ;\ X_{z_2} = \frac{P_{z_2}}{P}\ ,\ \text{where } P = P_{z_1} + P_{z_2}$$

The combination of the expressions for mole fractions and equilibrium constant gives

$$X_{z_1} = \frac{-K + \sqrt{K^2 + 4KP}}{2P}$$

where P must be expressed in atmospheres. When the equilibrium constant and the total pressure are known, the mole fractions for monatomic and diatomic gases can be calculated.

The equilibrium constant is generally a function of pressure and temperature. For a perfect gas it is only a function of temperature and may be calculated from the free energies of the constituents which make up the mixture

$$K = \exp\left\{2\left(\frac{-F^\circ}{RT}\right)_{z_1} - \left(\frac{-F^\circ}{RT}\right)_{z_2}\right\}$$

Free energies of the alkali metals were obtained from Reference (4).

Since the total pressure P and the equilibrium constant K are now known, the mole fractions, X_{z_1} and X_{z_2} may be calculated. Finally, the molecular weight can be found from

$$M = M_{z_1} X_{z_1} + M_{z_2} X_{z_2} \; ; \; M_{z_2} = 2M_{z_1}$$

$$M = M_{z_1} (2 - X_{z_1}) \; ; \; X_{z_2} = 1 - X_{z_1}$$

3. Liquid Specific Heat

The specific heat of a liquid can be approximated with very good accuracy by a parabola.

$$C_{pL} = C_1 + C_2 T + C_3 T^2$$

For the two liquid metals, R_b and C_s, no specific heat measurements at high temperatures have been carried out, so the specific heat of these liquids had been set equal to a constant.

In the case of lithium, C_{pL} was directly available from Reference 4, for the temperature range evaluated.

4. Enthalpy

a. Liquid - The enthalpy was based on the arbitrary assumption that its value at 0°R is equal to zero. This is in accordance with many gas tables for example those from Keenan and Kaye. The enthalpy of the liquid is obtained by integrating the liquid C_p versus T curve from the melting temperature to the desired temperature. If the enthalpy of the solid and the heat of melting are added, the enthalpy with its reference point at 0°R is obtained.

$$h_L = C_1 (T-T_m) + \frac{C_2}{2} (T^2-T_m^2) + \frac{C_3}{3} (T^3-T_m^3)$$

$$+ \Delta h_m + C_{ps} (T_m-536) + (h_s)_{536}$$

In this equation the enthalpy of the solid consists of two terms, $C_{ps}\ (T_m-536)$ and $(h_s)_{536}$. The last term $(h_s)_{536}$, gives the enthalpy difference between 0° and 536°R (298°K). Since many enthalpies are based on 298°K, it is desirable to know this enthalpy difference. The value of $(h_s)_{536}$ in some cases is not well known as a result of doubtful specific heats of the solid state at low temperatures. It is therefore subject to revision. The quantity $C_{ps}\ (T_m-536)$ is the enthalpy difference between the melting point and 298°K, assuming constant specific heat of the solid. This assumption is sufficiently exact, especially when considering the small temperature difference (T_m-536).

For lithium, the liquid enthalpy was directly available from Reference (4) over the temperature range evaluated.

b. Vapor - The enthalpy of the vapor is the sum of the enthalpies of its monatomic and diatomic constituents. Thus,

$$H = \frac{\Sigma_i\ X_i\ H_i}{M} \quad \text{or}$$

$$H = RT\ \frac{\Sigma_i\ X_i\ (H_i^\circ/RT)}{M}$$

Values of H_i° were obtained from Reference (4).

5. Entropy

a. Liquid - The entropy change of a substance is

$$ds = \frac{dQ_{REV}}{T}$$

For a liquid dQ_{REV} is expressed by,

$$dQ_{REV} = C_{pL}\ (T)\ dT$$

In accordance with the third law of thermodynamics the entropy at 0°R is zero. The integrated entropy change is then,

$$S_L = \int_0^T ds = \int_{T_m}^T ds + \int_0^{T_m} ds$$

$$S_L = C_1 \ln \left(\frac{T}{T_m}\right) + C_2 (T - T_m) + \frac{C_3}{2} (T^2 - T_m^2) + (S_L)_{T_m}$$

$(S_L)_{T_m} = \int_0^{T_m} ds$ was obtained from Reference (4).

For the case of lithium, liquid entropy was calculated directly from the liquid free energy and enthalpy given in Reference (4). That is,

$$S_L = \frac{H_L - F_L}{T}$$

b. Vapor - The entropy of the vapor is obtained from summing the entropies of the monatomic and diatomic constituents. It is given by,

$$S = \frac{R}{M} \Sigma_i \left\{ X_i \left[\frac{H_i^\circ}{RT} + \left(\frac{-F_i^\circ}{RT}\right) - \ln X_i \right] - \ln P \right\}$$

Values for H_i° and $\left(\frac{-F_i^\circ}{T}\right)$ as a function of temperature were obtained from Reference (4).

6. Vapor Specific Heats

Two specific heats were calculated for the alkali metal vapors. The frozen specific heat is a state point property calculated by adding the separate contributions of the monatomic and diatomic vapors for a given equilibrium composition; the equilibrium specific heat applies to the rigorous definition of specific heat given by $(\partial H/\partial T)_P$, and includes the energy required to alter the degree of equilibrium as a result of dissociation (Reference 12).

The frozen specific heat is given by,

$$C_{p(f)} = \frac{R \sum_i X_i \, (C_{p_i}^\circ)/R}{M}$$

Values of $C_{p_i}^\circ$ were obtained from Reference (4)

The equilibrium specific heat is more complicated. Defining α and β as

$$\alpha = \left(\frac{\partial \ln M}{\partial \ln T}\right)_P \qquad \text{and,}$$

$$\beta = \left[\frac{\partial \ln M}{\partial \ln P}\right]_T ,$$

It may be shown that

$$\beta = -\frac{M_{z_1} \, K}{2MP} \left[1 - \frac{K + 2P}{\sqrt{K^2 + 4KP}}\right]$$

and

$$\alpha = \beta \left[\left(\frac{H^\circ}{RT}\right)_{z_2} - 2 \left(\frac{H^\circ}{RT}\right)_{z_1}\right]$$

Then, the equilibrium specific heat is resolved as

$$C_{p(e)} = \frac{\alpha R}{M_{z_1}} \left[\left(\frac{H^\circ}{RT}\right)_{z_2} - \left(\frac{H^\circ}{RT}\right)_{z_1}\right] - \frac{\alpha}{T} H + C_{p(f)}$$

7. Sonic Velocities

Two sonic velocities are included in the alkali metal vapor tables (Reference 12). The frozen sonic velocity assumes that the composition of the mixture is frozen insofar as the passage of a sound wave through the gas is concerned. It is given by

$$a_f = \sqrt{\gamma_f \, g \, \frac{R}{M} \, T} = \sqrt{\frac{49706.6 \, \gamma_f T}{M}} \qquad \text{ft/sec.}$$

The quantity γ_f is the ratio of the frozen specific heats:

$$\gamma_f = \frac{C_{p(f)}}{C_{v(f)}} = \frac{C_{p(f)}}{C_{p(f)} - R/M}$$

The equilibrium sonic velocity, on the other hand, assumes that the gas is at all times in a state of chemical and thermal equilibrium. The velocity of a sound wave of infinitesimal amplitude through a gas is rigorously defined as

$$a_e = \sqrt{\left(\frac{\partial P}{\partial \rho}\right)_s}, \quad \text{where } \rho \text{ is the density.}$$

The equilibrium sonic velocity is then given by,

$$a_e = \sqrt{\frac{49706.6 \, T}{M \left[1 + \beta - \frac{R}{C_p M} (1 - \alpha)^2\right]}}$$

8. Specific Volume

a. Liquid - The specific volume of the liquid was assumed to vary linearly with temperature

$$V_L = e_1 T + e_2$$

This is a fairly good assumption which fits the scattered experimental values given in Reference (2).

b. Vapor - The specific volume of the vapor was calculated from the perfect gas relationship

$$V = \frac{RT}{MP} \frac{J}{144}$$

9. Mercury Vapor Properties

The vapor pressure and liquid properties of mercury were calculated in the same manner as that of the alkali metals. The vapor properties were calculated as follows:

a. Molecular Weight - Since mercury was assumed not to dimerize or dissociate, the molecular weight remained constant at the value given for the liquid.

$$M = M_L = M_{z_1}$$

b. Vapor Specific Heat - The specific heat of a monatomic vapor is given by

$$C_{Pv} = \frac{R}{M} \left(1 + \frac{f}{2}\right)$$

where

f = the number of degrees of freedom.

For a monatomic perfect gas f = 3, i.e., only three translational degrees of freedom are possible.

Thus $C_{Pv} = \frac{R}{M} (5/2)$

c. Enthalpy - The enthalpy of the saturated vapor is equal to the enthalpy of the liquid plus the heat of vaporization. The heat of vaporization is a function of temperature. The usual assumption of linear correlation seemed to satisfy experimental value from Reference (8) with sufficient accuracy.

$$\Delta h_v = d_2 T + d_1$$

The enthalpy of the gas in the superheat region can be calculated from

$$h_g = h_v + \int_{T_v}^{T_g} C_{Pv}\, dT$$

The integration is performed along a line of constant vapor pressure.

d. Entropy - One receives the entropy of dry saturated vapor by adding to the liquid entropy the entropy change due to the vaporization process.

$$S_V = S_L + \Delta S_V$$

Since vaporization is a reversible process,

$$\Delta S = \frac{\Delta Q_{REV}}{T} = \frac{\Delta h_v}{T}$$

For the superheat region, the entropy change of an ideal gas in terms of pressure and temperature is

$$ds = \frac{C_p}{T}\, dT - \frac{R}{J}\, \frac{dP}{P}$$

On a constant pressure line the integration results in

$$\int_0^{S_g} ds = \int_0^{T_g} C_p\, \frac{dT}{T}$$

$$(S_g)_{T_g} = (S_v)_{T_v} + \int_{T_v}^{T_g} C_{pg}\, \frac{dT}{T}$$

e. Specific Volume - The specific volume was obtained in the same way as for the alkali metals.

B. Deviations from Ideal Gas Behavior

The following equation of state for a perfect gas

$$V_g = \frac{R\,T\,J}{M\,144P}$$

is an approximate equation for any real gas. The approximation improves with smaller gas pressures and higher specific volumes.

A measure of how perfect a gas is, can be expressed by the compressibility factor Z, which is the ratio

$$\frac{144\,V_g\,P}{\frac{R}{M}\,T\,J} = Z$$

$$Z = Z\ (P_{Reduced},\ T_{Reduced});$$

with P in psi, T in °R, V_g in ft^3/lb, $\frac{R}{M}$ in $\frac{ft}{°R}$

For a perfect gas Z = 1, for a real gas Z can be smaller or larger than unity. The closer the gas pressure comes to the critical pressure, the more Z will deviate from 1.

It is useful to plot Z versus the ratio of gas pressure to critical pressure (called "reduced pressure") for lines of constant reduced temperature.

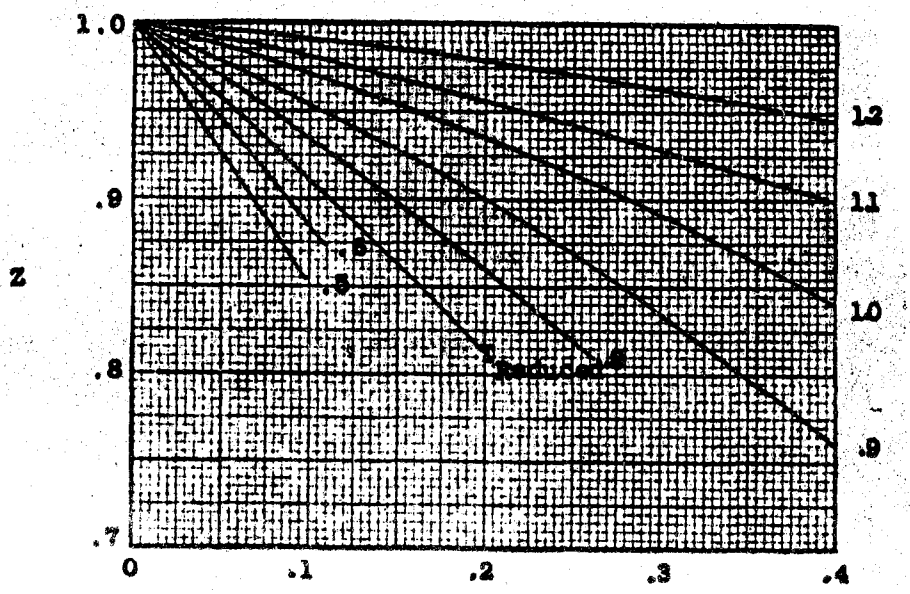
$$P_{Reduced} = \frac{P}{P_{crit}}$$

$$T_{Reduced} = \frac{T}{T_{crit}}$$

This graph is shown in Figure 1.

It appears that the greatest deviation of alkali metal vapor from the perfect gas state occurs at the largest calculated temperature. The vapor pressure at this temperature for each alkali metal as well as reduced temperature and pressure is listed in Figure 1.

COMPRESSIBILITY FACTOR OF GAS AND VAPOR



(from ref. (5))

$P_{Reduced}$

Critical pressure and temperature of alkali metal vapor:

P_{crit} about 300 atmospheres = 4410 PSI

T_{crit} about 2500 °K = 4500 °R

All alkali metal vapors have approximately the same critical values.

Alkali	Maximum Temp. (°R)	$T_{Reduced}$	Maximum Pressure (PSI)	$P_{Reduced}$	Z
N_a	2700	.6	187	.038	.957
K	2700	.5	286	.065	.930
R_b	2700	.4	448	.102	.885
C_s	2700	.6	363	.802	.902
Li	3600	.8	138	.031	.980

Figure 1

No critical values were available for mercury, so it was not possible to compare its compressibility Z with unity. The deviation of mercury vapor from perfect gas behavior, however, should be larger than for the alkali metal vapor, since the critical values for mercury are certainly lower than those for the alkali metals.

C. Summary of Constants Used for Calculation

1. Fixed Constants

$R = 1.98588$ $\quad \frac{BTU}{lb\ mole\ ^{\circ}R}$

Atmosphere Pressure = 14.69594 psi

$J = 778.26$ $\quad (\frac{ft - lb}{BTU})$

$b_1 = 1.9337 \times 10^{-2}$ $\quad (\frac{psi}{mm\ Hg})$

2. Material Constants

Symbol	Unit	Metals					
		Sodium, Na	Potassium, K	Rubidium, Rb	Cesium, Cs	Mercury, Hg	Lithium, Li
* b_2	1/°R	-23 073	-18 867	-16 496	-15 289	-13 711	-33 750
b_3		-.5	-.5	0	0	-.8	0
b_4		21.558	20.54	16.16	15.503	24.356	18.421
M_L		22.991	39.1	85.48	132.91	200.61	6.94
C_1	(BTU/lb°R)	.38964	.2271	.0877	.0572	.03631	---
C_2	(BTU/lb°R^2)	-1.1064×10^{-4}	-6.44×10^{-5}	0	0	-7.943×10^{-6}	---
C_3	(BTU/lb°R^3)	3.411×10^{-8}	2.30×10^{-8}	0	0	3.913×10^{-9}	---
T_M	°R	668	606	562	543	422	---
C_{PS}	(BTU/lb°R)	.307	.1836	.0883	.0567	0	---
$(h_S)_{536}$	(BTU/lb)	119.94	78.03	37.69	25.18	20.054	---
Δh_m	(BTU/lb)	48.68	25.50	11.79	6.907	0	---
d_1	(BTU/lb mole)	---	---	---	---	26 246	---
d_2	(BTU/lb mole°R)	---	---	---	---	-0.90174	---
$(S_L)T_m$	(BTU/lb°R)	.67	.455	.238	.1651	.0832	---
e_1	(ft^3/lb°R)	3.16×10^{-6}	4×10^{-6}	1.2×10^{-6}	$.764 \times 10^{-6}$	$.132 \times 10^{-7}$	3.2222×10^{-6}
e_2	(ft^3/lb)	.01502	.01669	.0101	.00823	.001109	.02885

* b_2, b_3 and b_4 refer to the starting pressure, and not the finalized pressure.

R60FPD358-A

D. Mollier Diagram and Supplemental Curves

In order to facilitate the application of these data to thermodynamic cycle calculations, conventional Mollier diagrams have been prepared for each of the metal-vapor systems included in this report. These diagrams can be furnished to any recipient of this report upon request. The diagrams have been revised to conform to the data contained herein.

The diagrams have been prepared in a size sufficient for the accuracy required in most preliminary investigations. If more precise results are required, use should be made of either the tables or the digital computer system from which the data were calculated.

In addition, the following curves for each of the metals are included at the end of the report to aid calculation:

1. Vapor pressure versus temperature.

2. Vapor specific volume versus temperature for lines of constant superheat.

3. Liquid specific heat versus temperature.

4. Equilibrium and frozen sonic velocity versus temperature for lines of constant superheat.

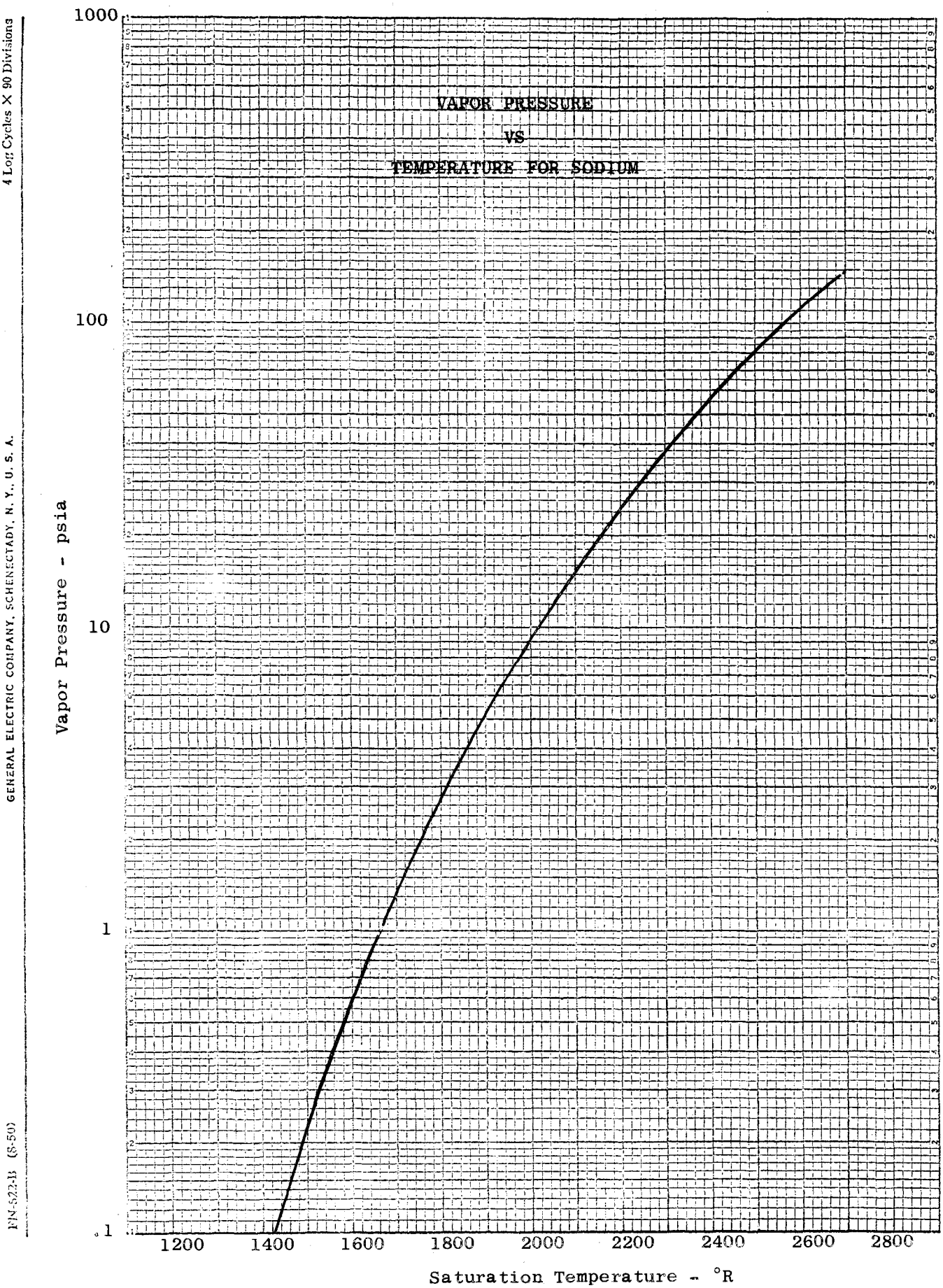

VAPOR PRESSURE
VS
TEMPERATURE FOR SODIUM
Vapor Pressure - psia
1000
100
10
1
.1
1200
1400
1600
1800
2000
2200
2400
2600
2800
Saturation Temperature - °R
4 Log Cycles X 90 Divisions
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., U. S. A.
PN-522-B (8-50)

Figure 6

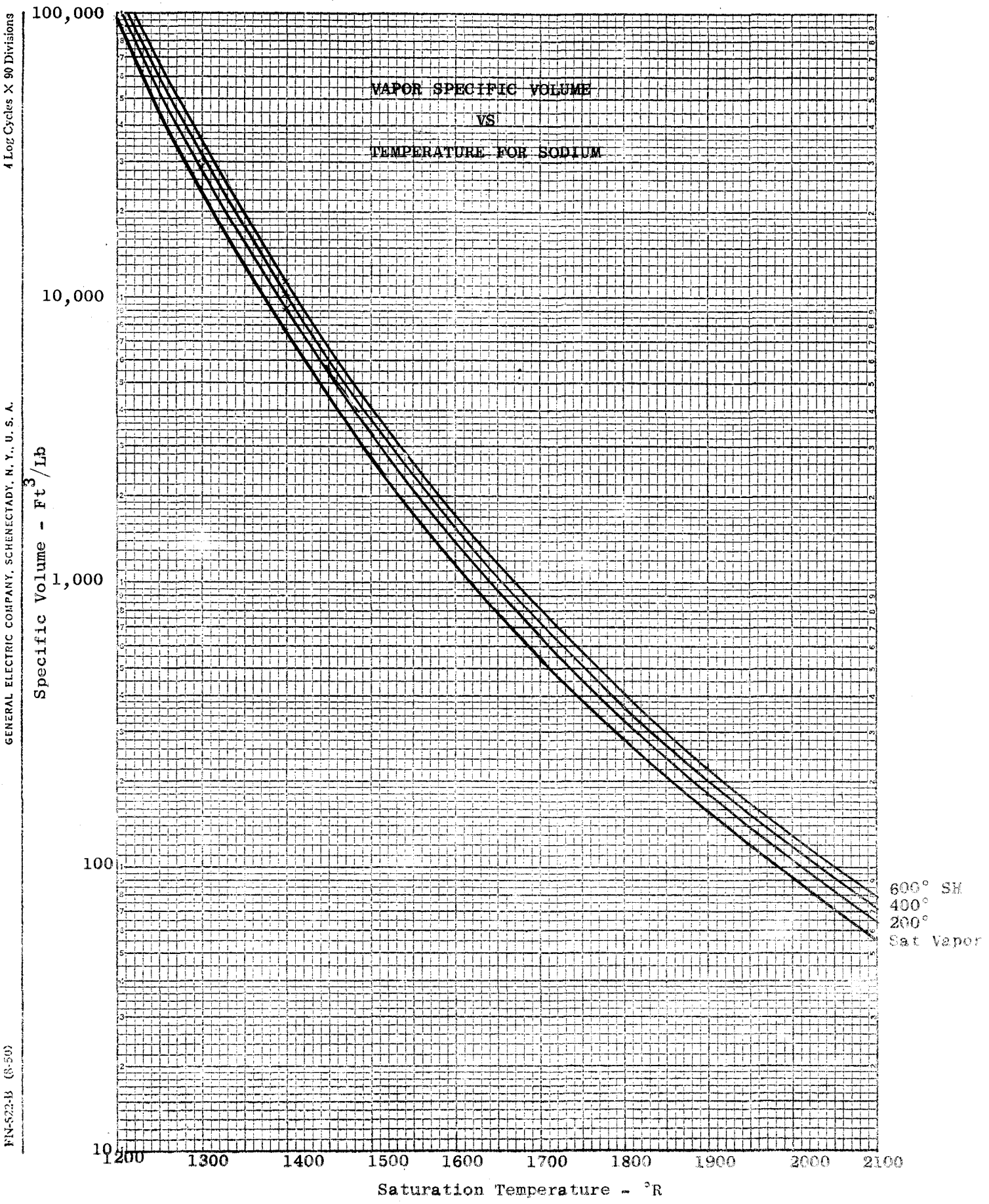

VAPOR SPECIFIC VOLUME
VS
TEMPERATURE FOR SODIUM
Specific Volume - Ft³/Lb
100,000
10,000
1,000
100
10
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
Saturation Temperature - °R
600° SH
400°
200°
Sat Vapor
4 Log Cycles X 90 Divisions
GENERAL ELECTRIC COMPANY, SCHENECTADY, N.Y., U.S.A.
FN-522-B (8-59)

Figure 7

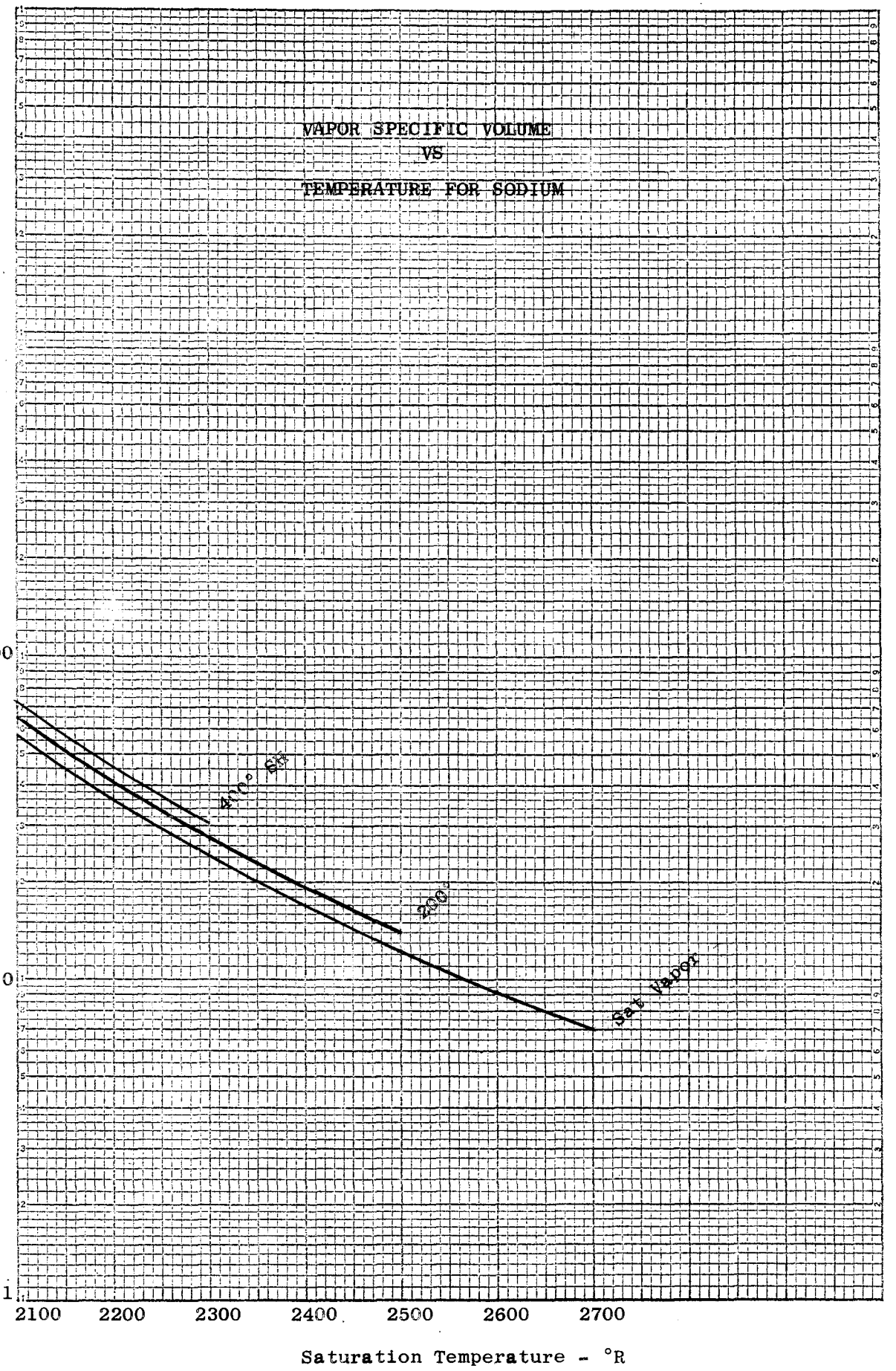


Figure 8

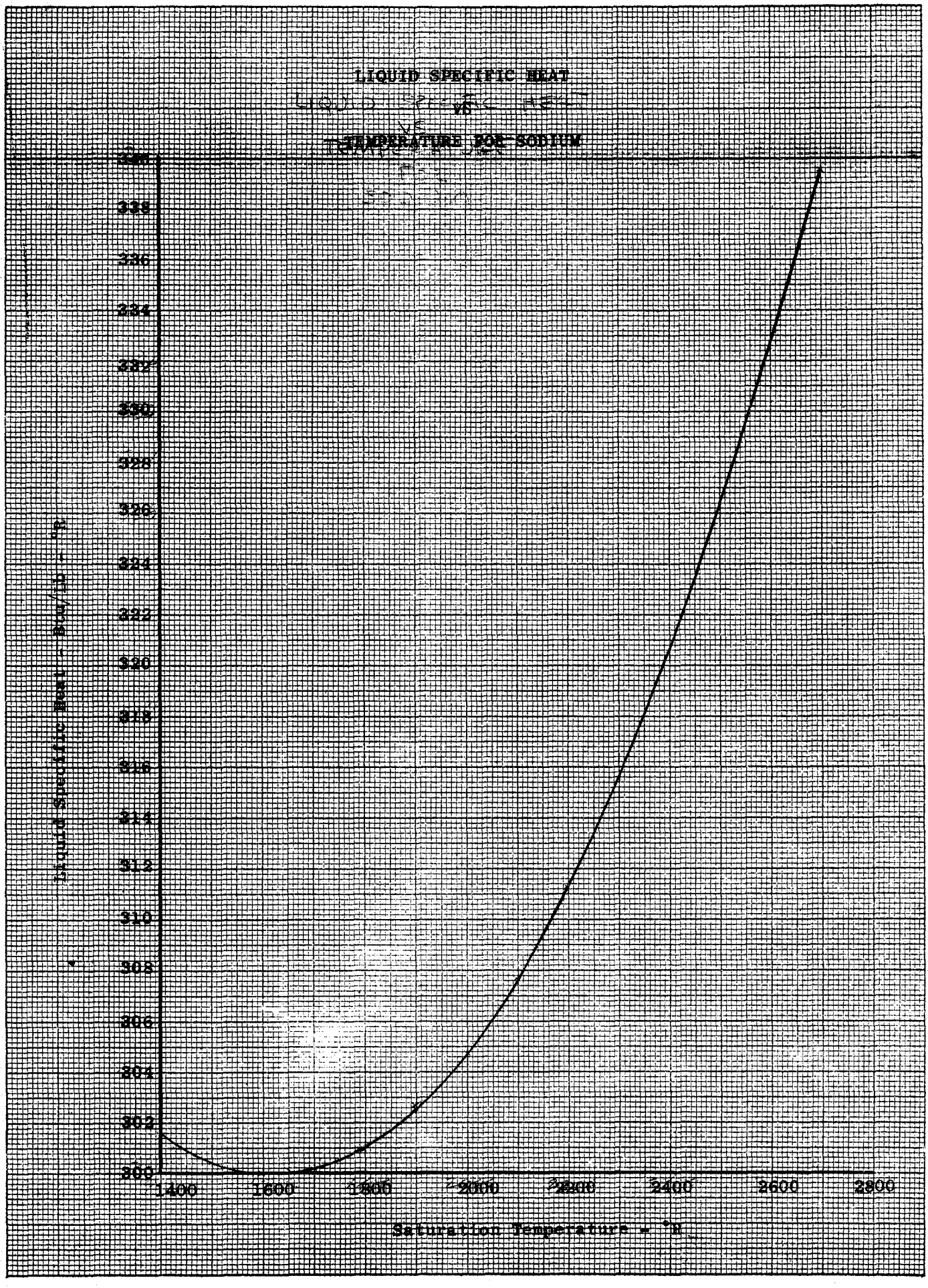


Figure 9

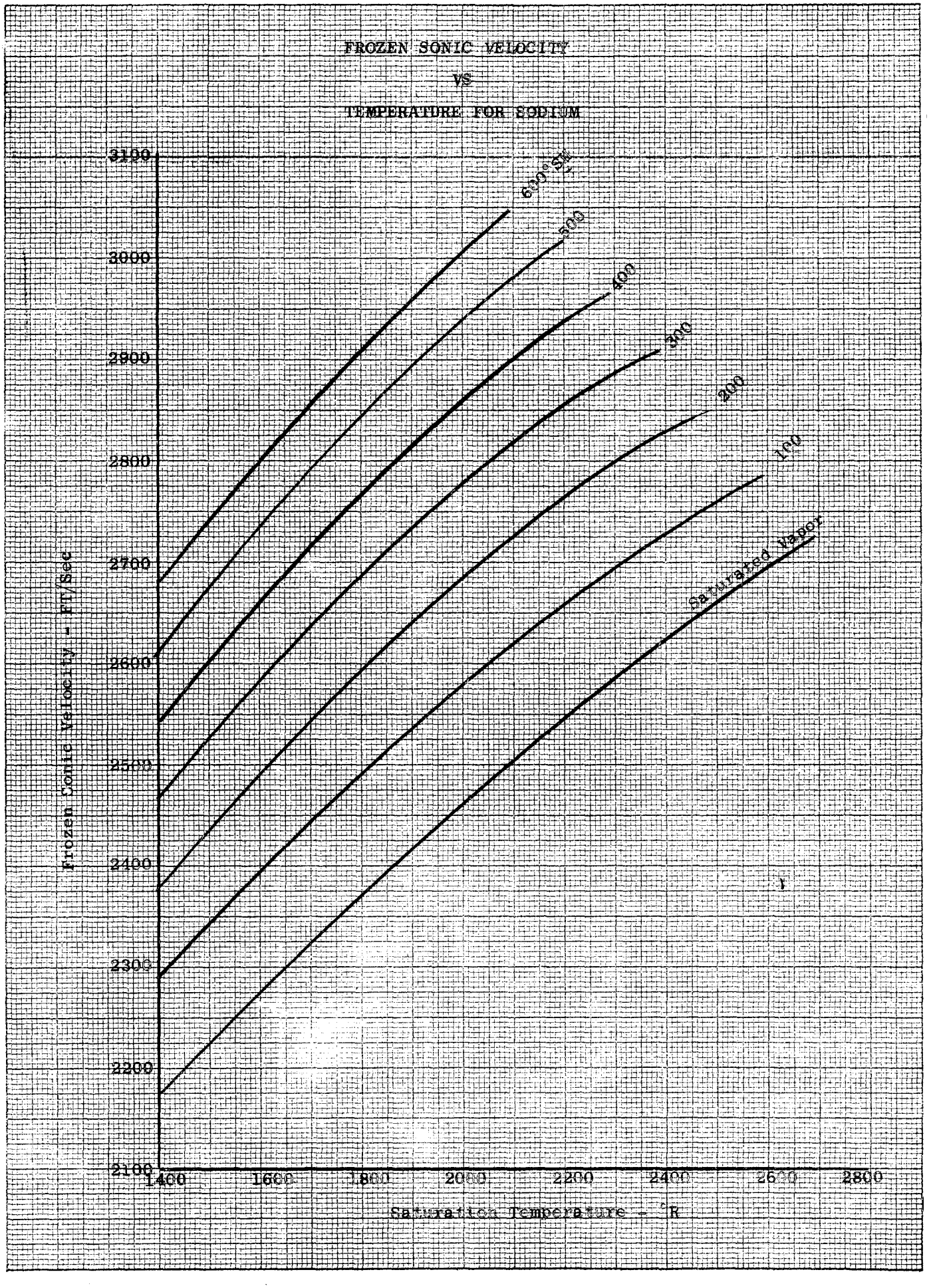


Figure 10

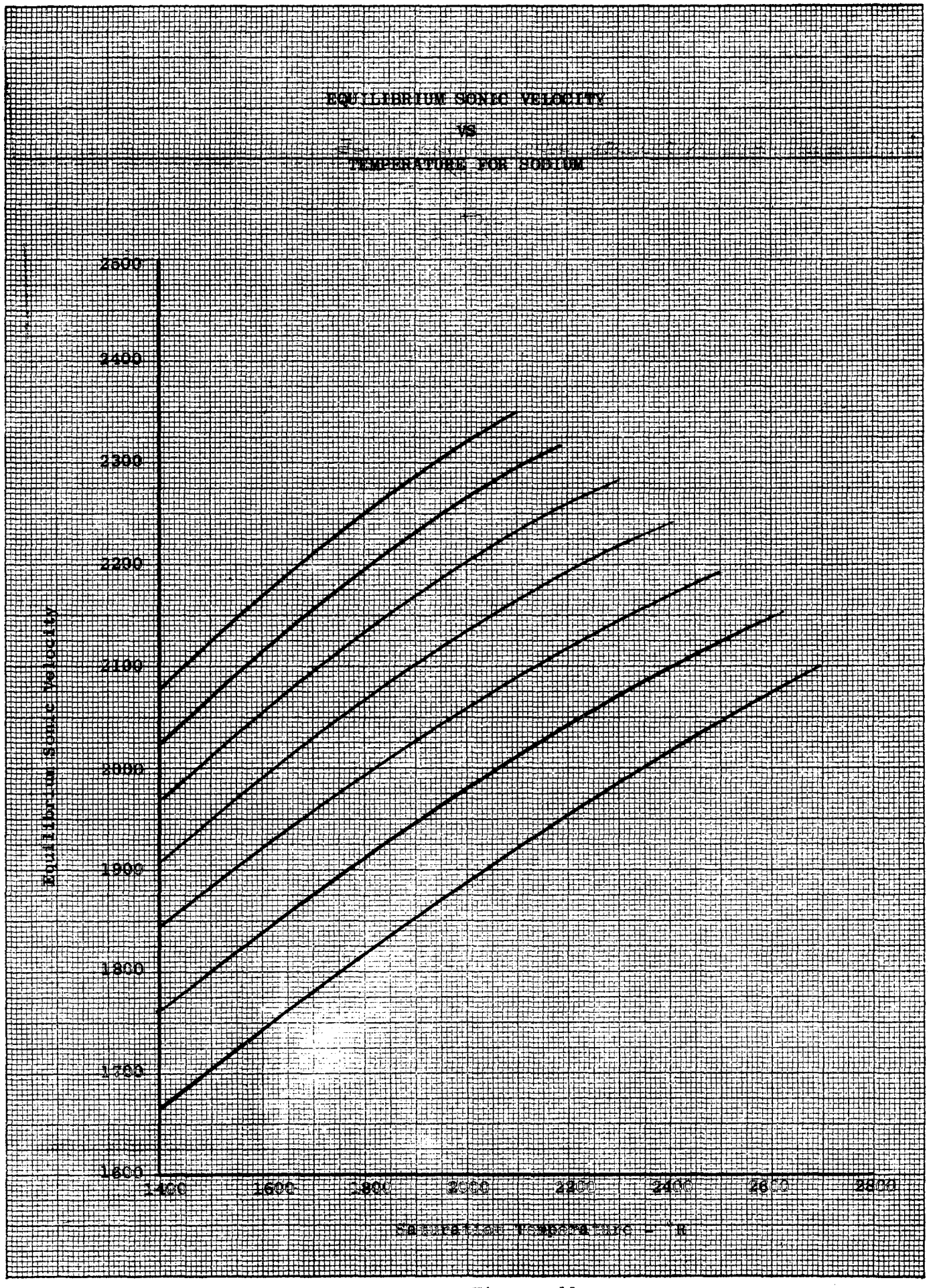


Figure 11

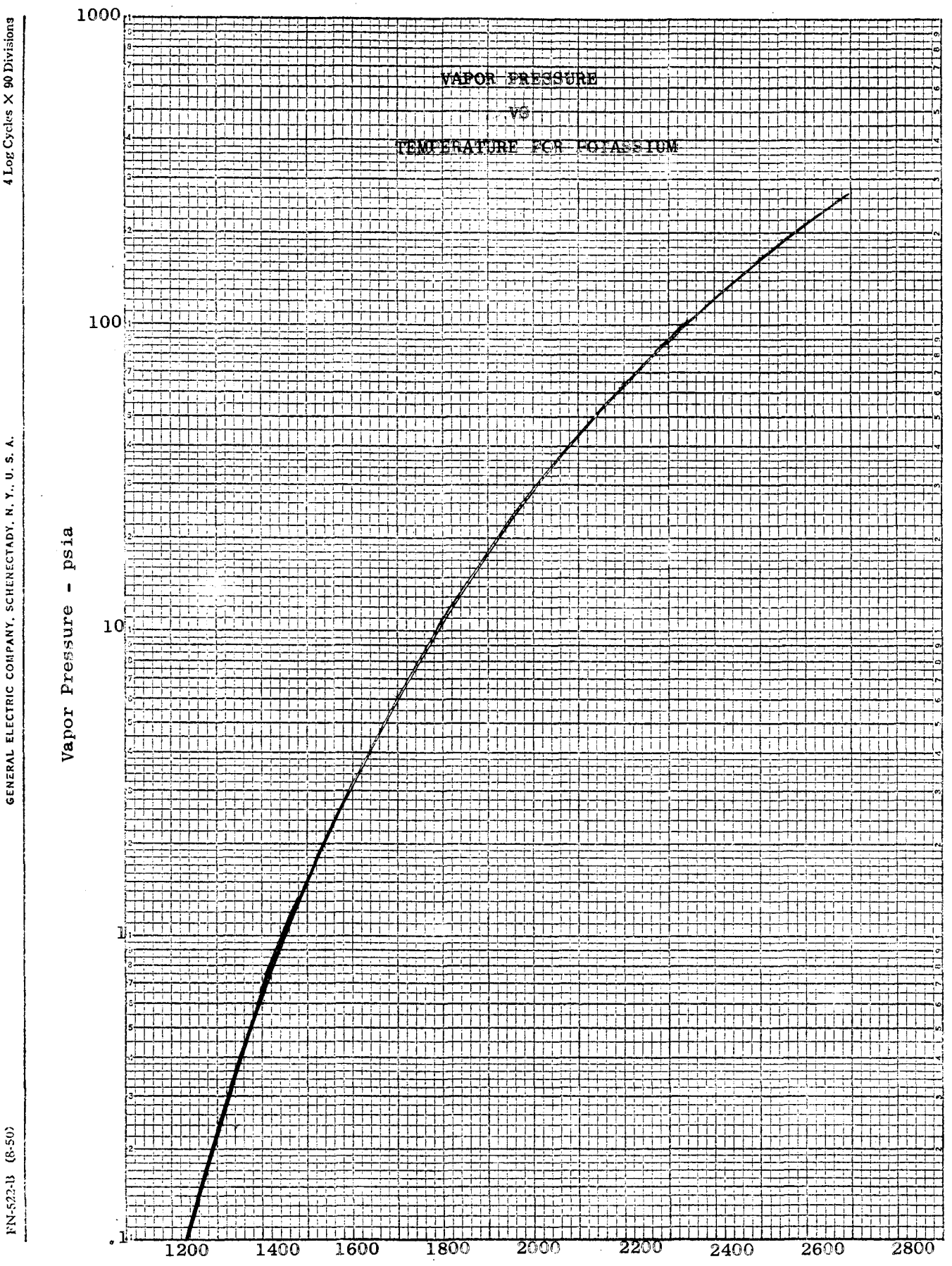

VAPOR PRESSURE
VS
TEMPERATURE FOR POTASSIUM
Vapor Pressure - psia
1000
100
10
1
.1
1200
1400
1600
1800
2000
2200
2400
2600
2800
Saturated Temperature - °R
4 Log Cycles X 90 Divisions
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., U. S. A.
FN-522-1 (8-50)

Figure 12

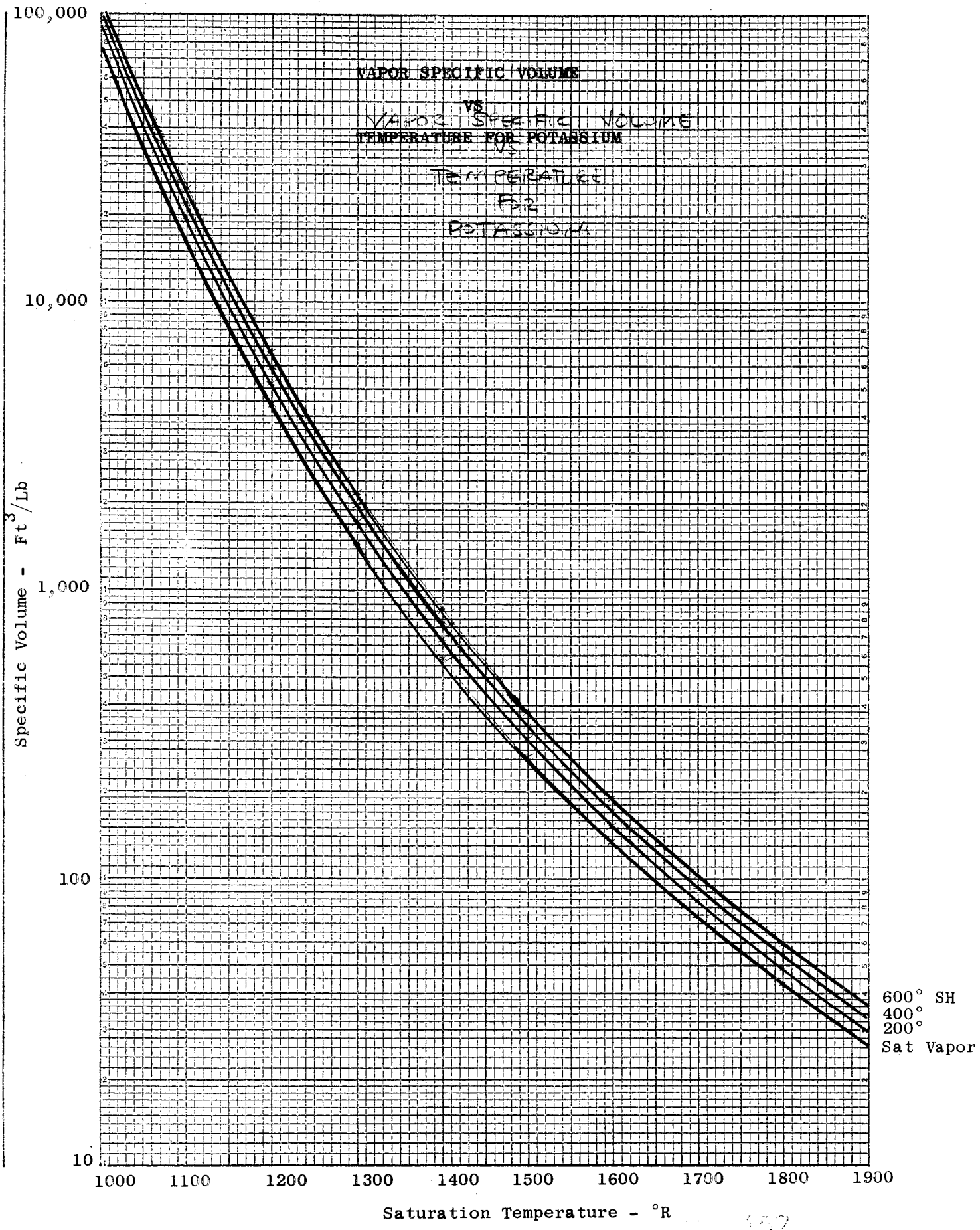

VAPOR SPECIFIC VOLUME
VS
TEMPERATURE FOR POTASSIUM
VAPOR SPECIFIC VOLUME
VS
TEMPERATURE
FOR
POTASSIUM
4 Log Cycles X 90 Divisions
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., U. S. A.
PN-522-B (8-50)
100,000
10,000
1,000
100
10
Specific Volume - Ft³/Lb
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
Saturation Temperature - °R
600° SH
400°
200°
Sat Vapor

Figure 13

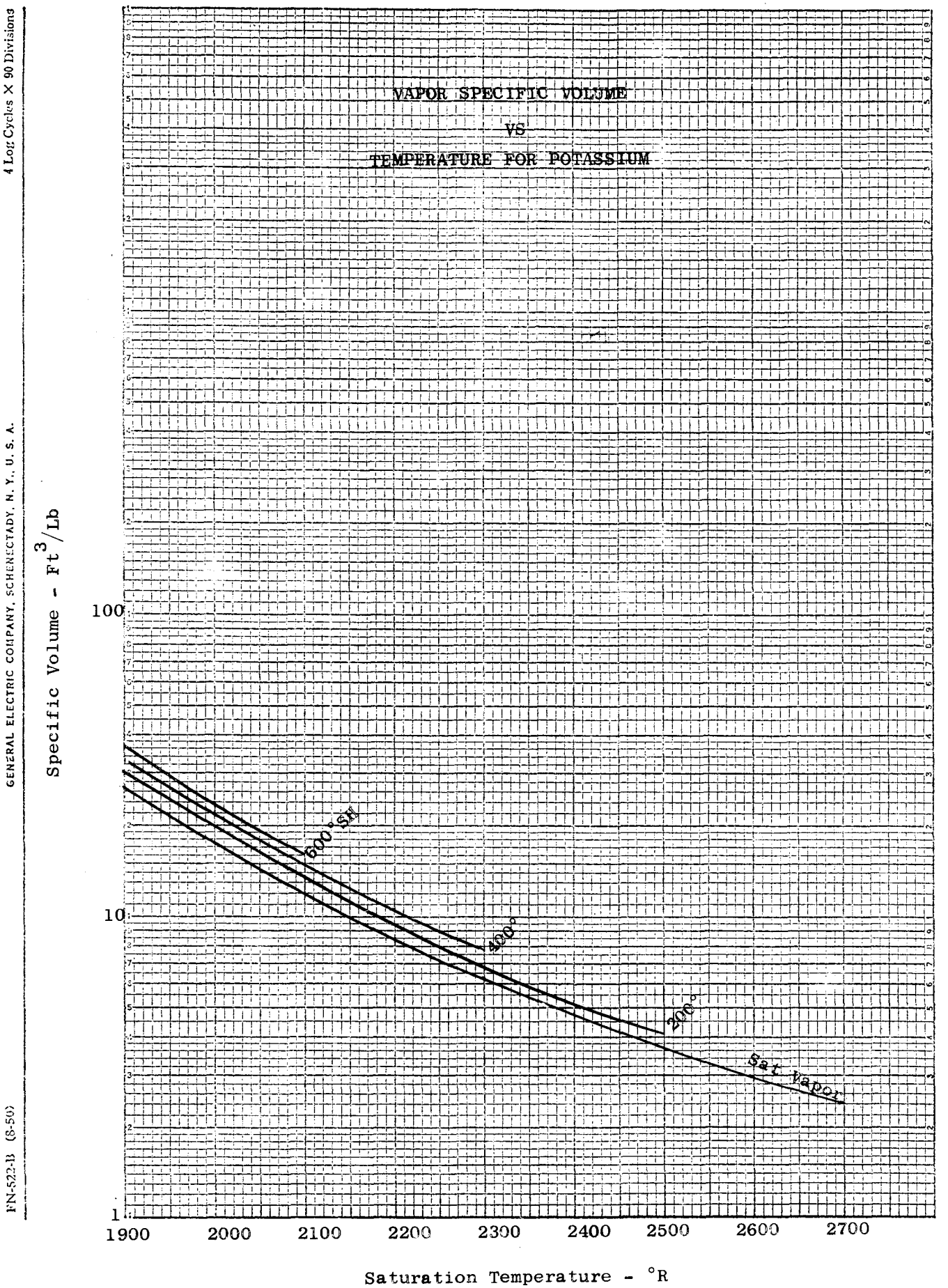

VAPOR SPECIFIC VOLUME
VS
TEMPERATURE FOR POTASSIUM
Specific Volume - Ft³/Lb
100
10
1
600°SH
400°
200°
Sat Vapor
1900
2000
2100
2200
2300
2400
2500
2600
2700
Saturation Temperature - °R
4 Log Cycles X 90 Divisions
GENERAL ELECTRIC COMPANY, SCHENECTADY, N.Y., U.S.A.
PN-522-B (8-50)

Figure 14

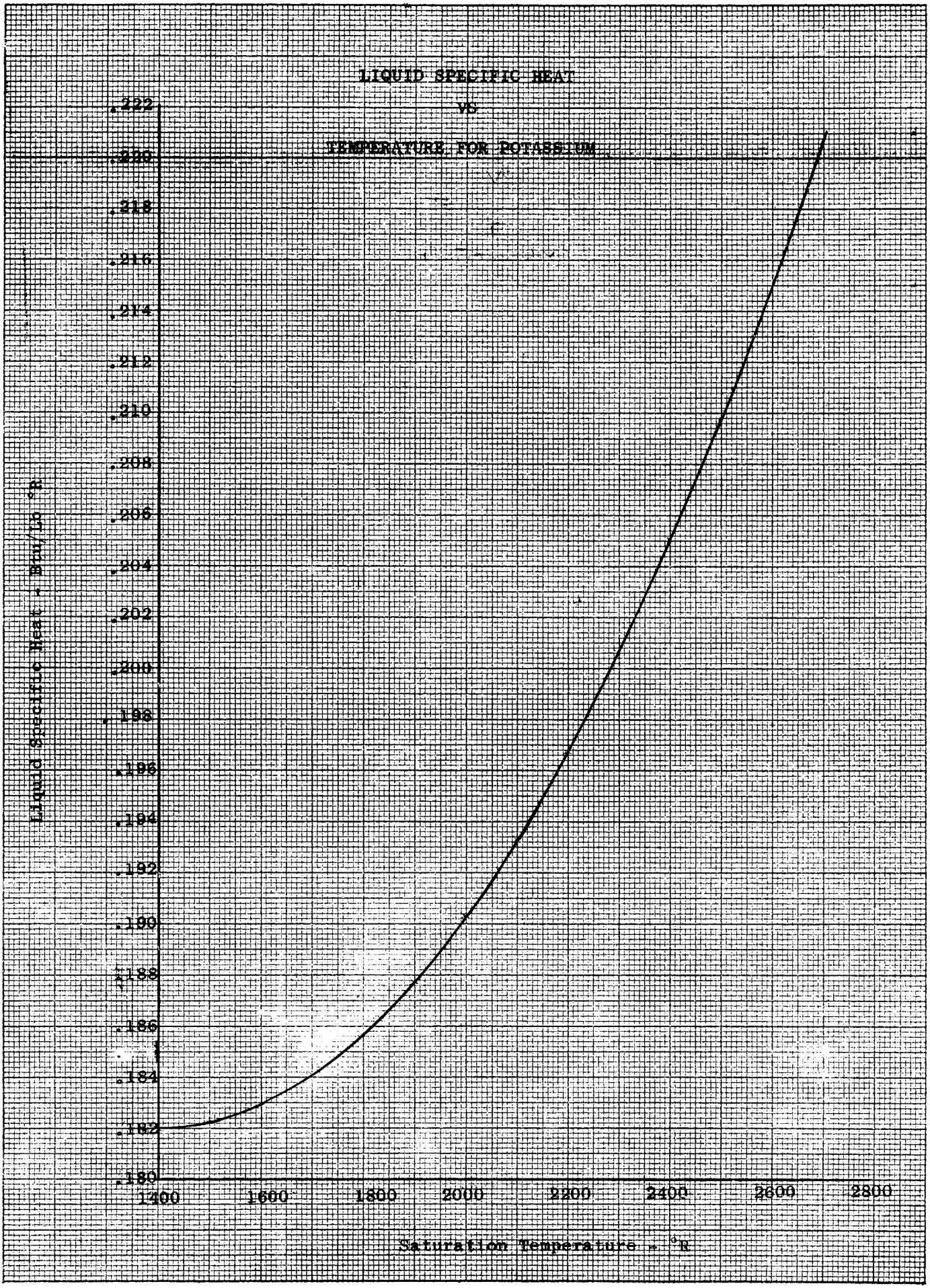

LIQUID SPECIFIC HEAT
VS
TEMPERATURE FOR POTASSIUM
Liquid Specific Heat - Btu/Lb °R
.222
.220
.218
.216
.214
.212
.210
.208
.206
.204
.202
.200
.198
.196
.194
.192
.190
.188
.186
.184
.182
.180
1400
1600
1800
2000
2200
2400
2600
2800
Saturation Temperature - °R

Figure 15

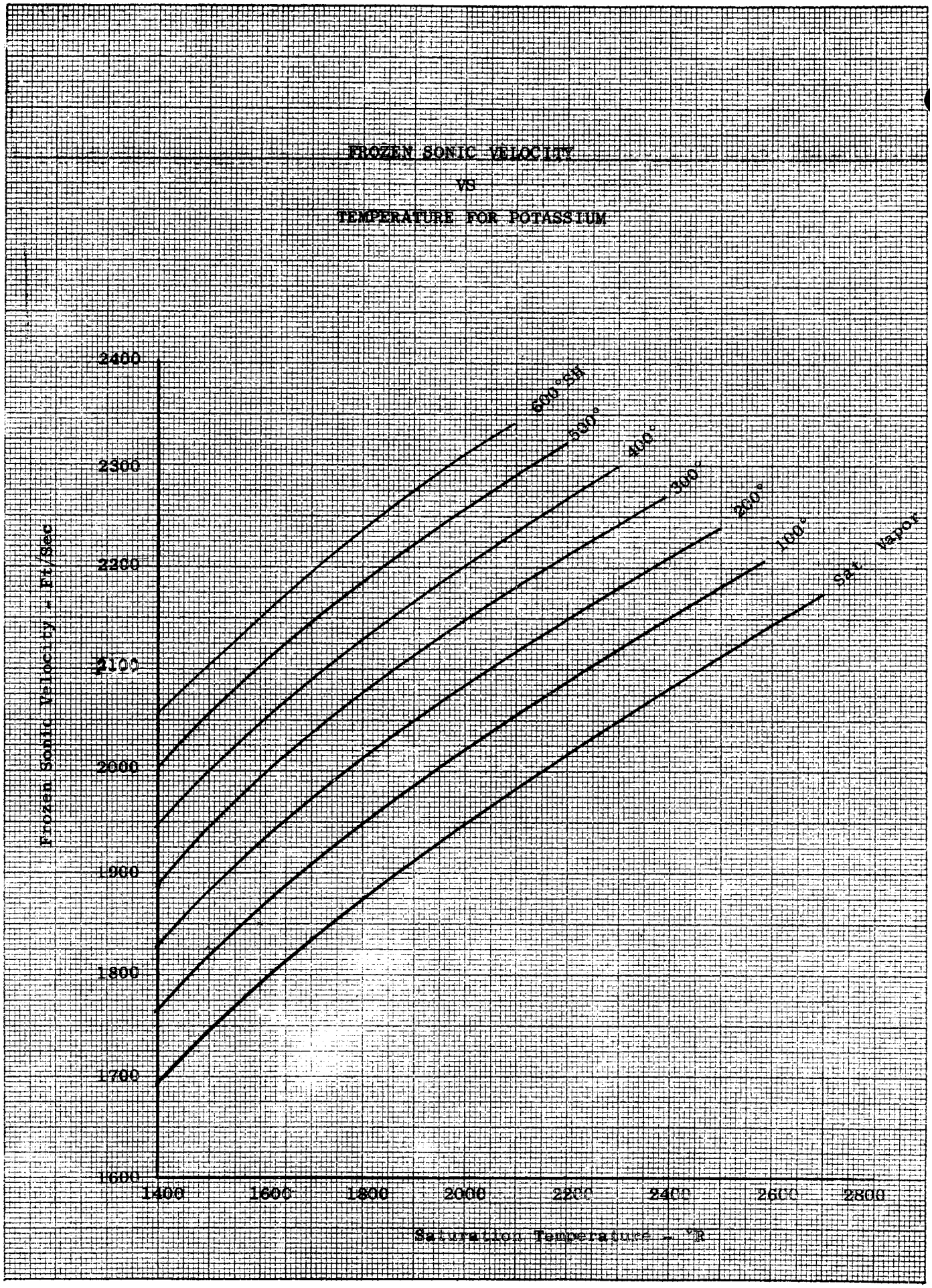


Figure 16

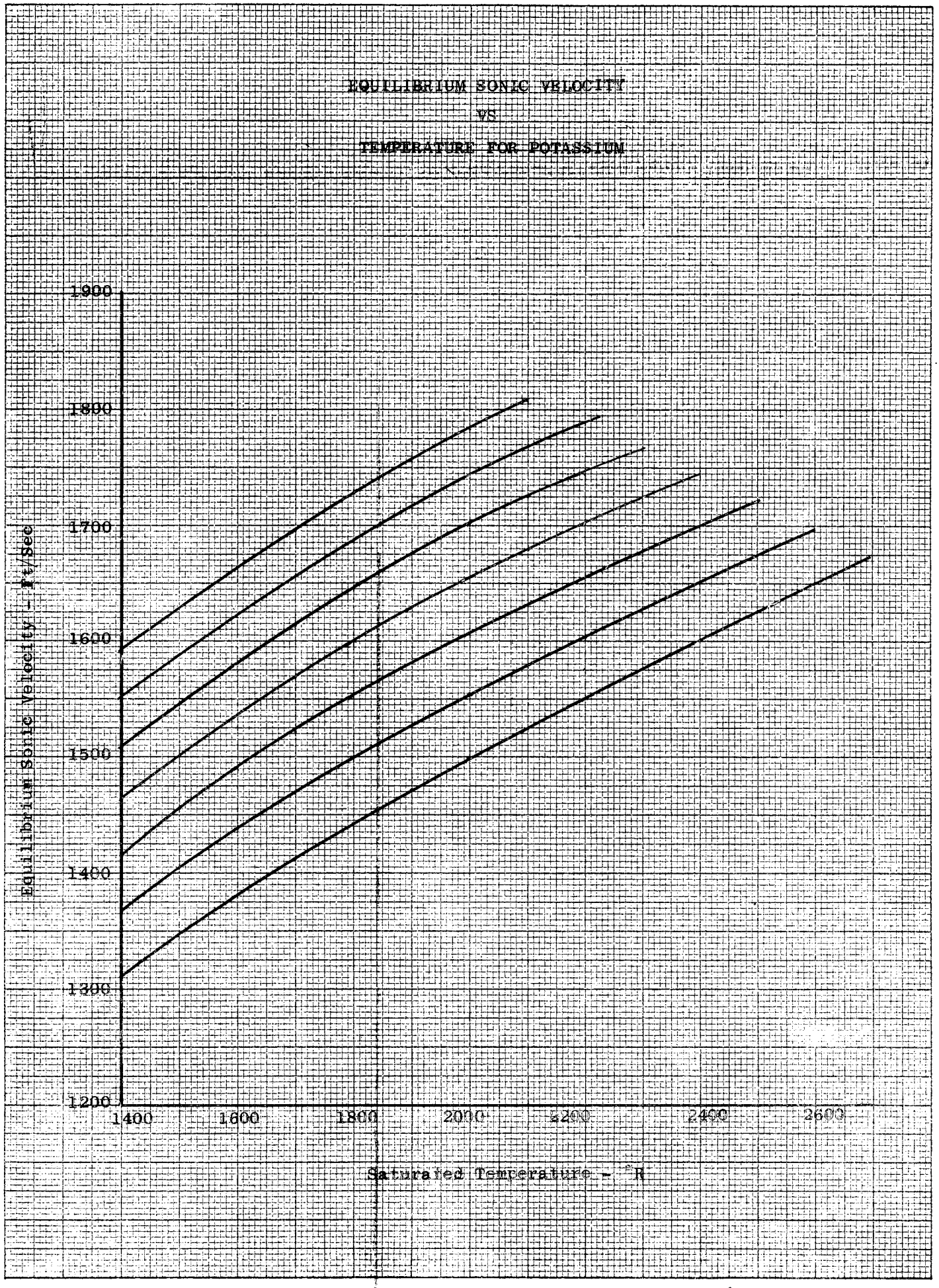


Figure 17

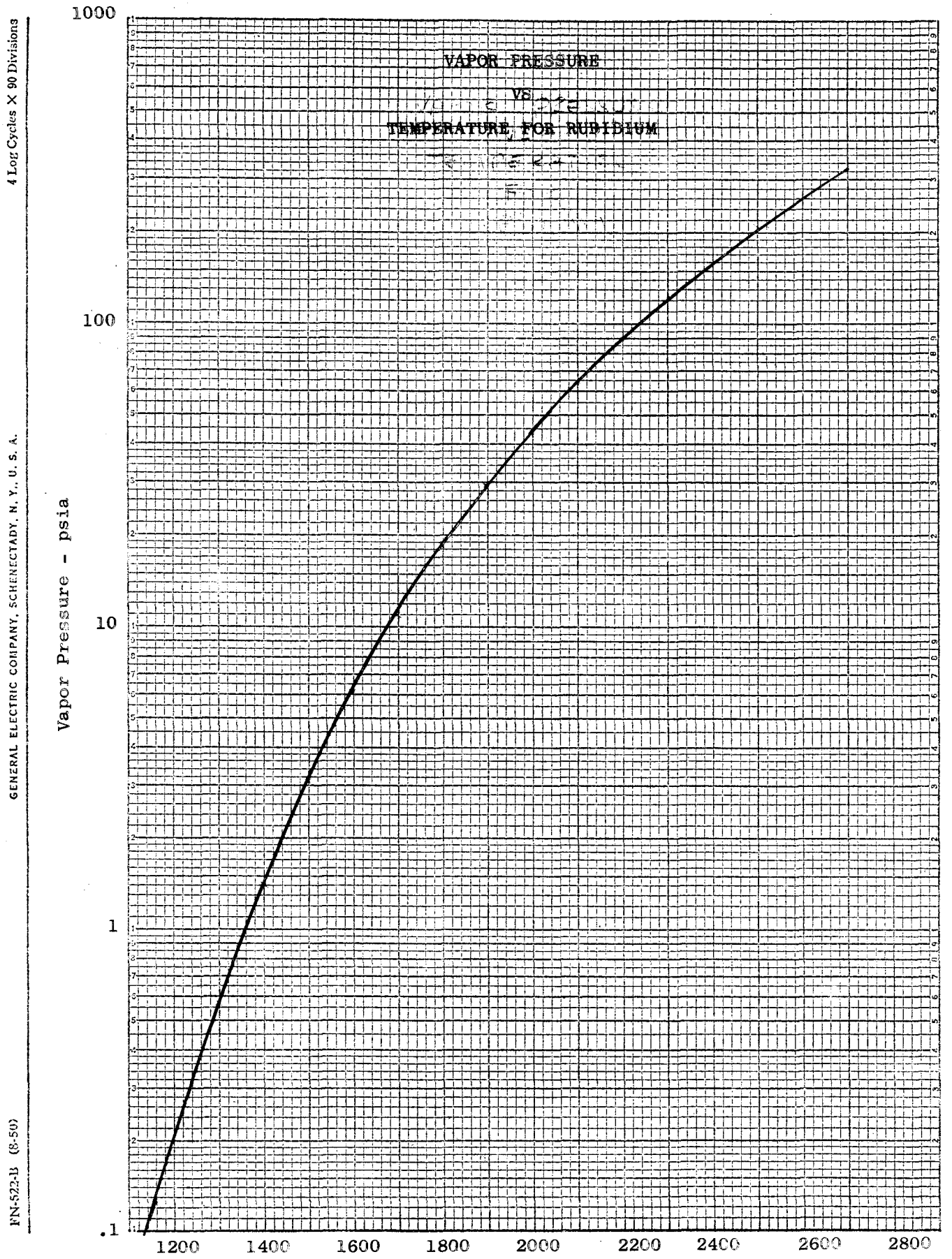

VAPOR PRESSURE
VS
TEMPERATURE FOR RUBIDIUM
Vapor Pressure - psia
1000
100
10
1
.1
1200
1400
1600
1800
2000
2200
2400
2600
2800
Saturation Temperature - °R
4 Log Cycles X 90 Divisions
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., U. S. A.
FN-522-B (8-50)

Figure 18

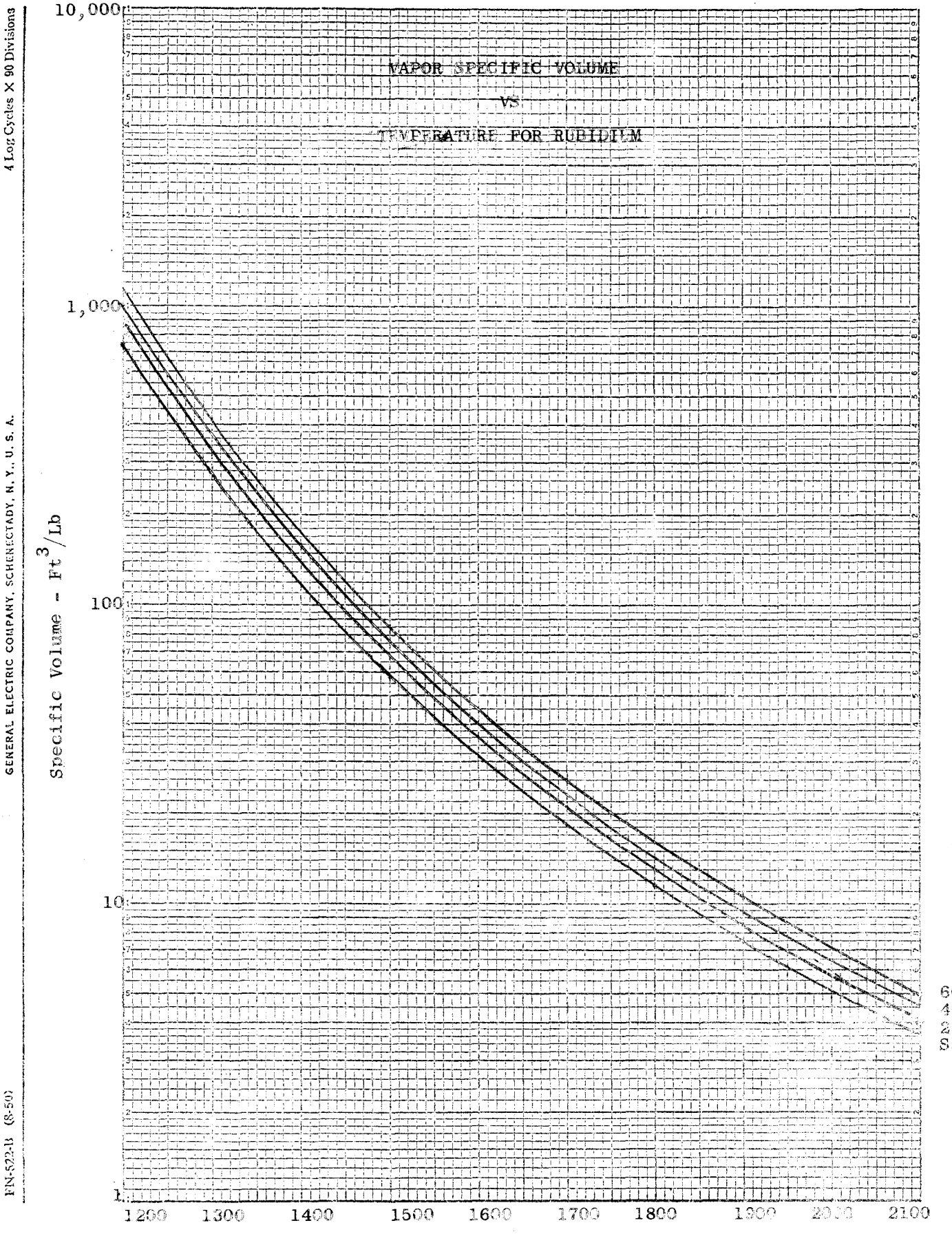

VAPOR SPECIFIC VOLUME
VS
TEMPERATURE FOR RUBIDIUM
10,000
1,000
100
10
1
Specific Volume - Ft³/Lb
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
Saturation Temperature - °R
600°SH
400°
200°
Sat Vapor
4 Log Cycles X 90 Divisions
GENERAL ELECTRIC COMPANY, SCHENECTADY, N.Y., U.S.A.
FN-522-B (8-50)

Figure 19

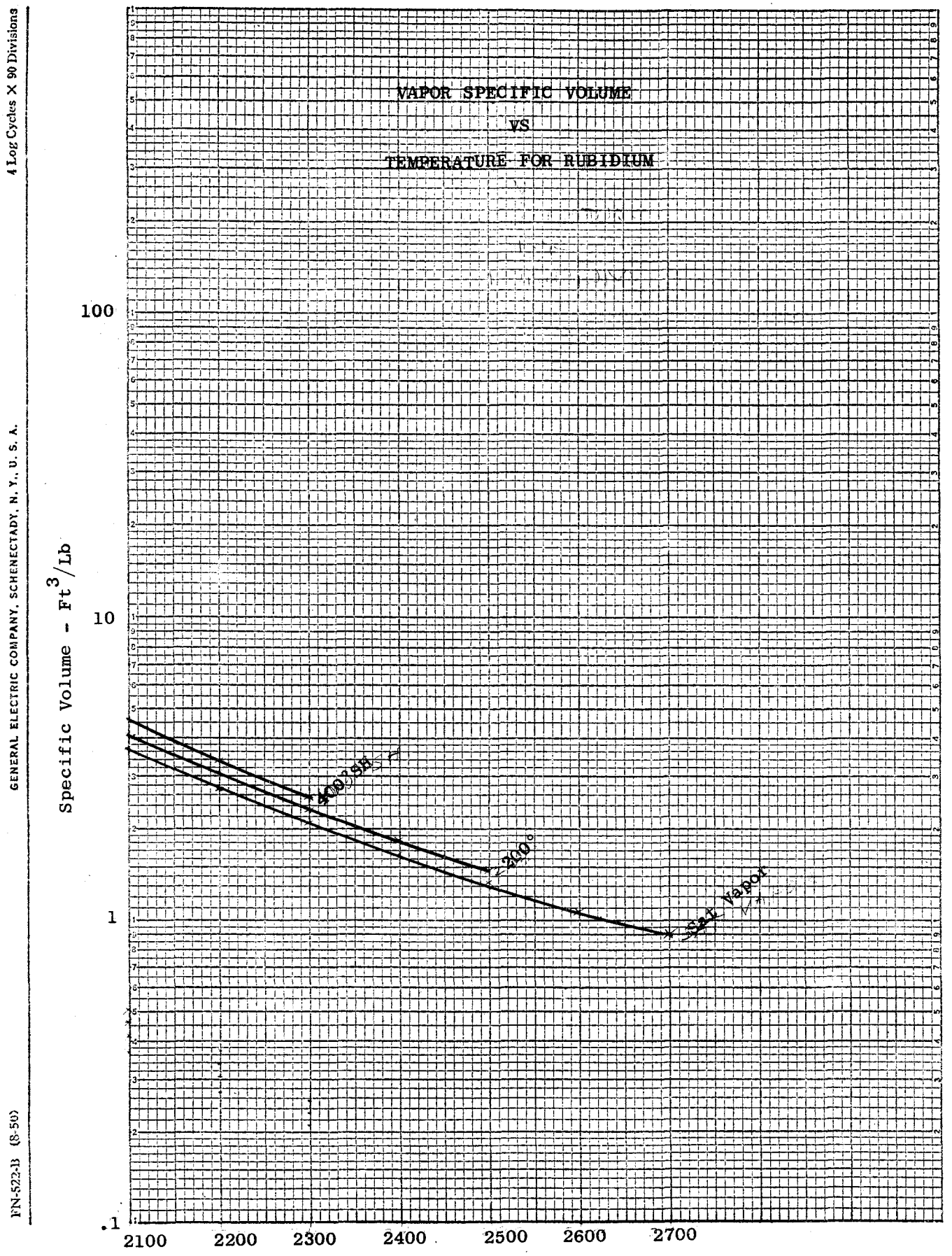

VAPOR SPECIFIC VOLUME
VS
TEMPERATURE FOR RUBIDIUM
Specific Volume - Ft³/Lb
100
10
1
.1
2100
2200
2300
2400
2500
2600
2700
Saturation Temperature - °R
400°
300°
200°
Sat. Vapor
4 Log Cycles X 90 Divisions
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., U. S. A.
FN-522-1B (8-50)

Figure 20

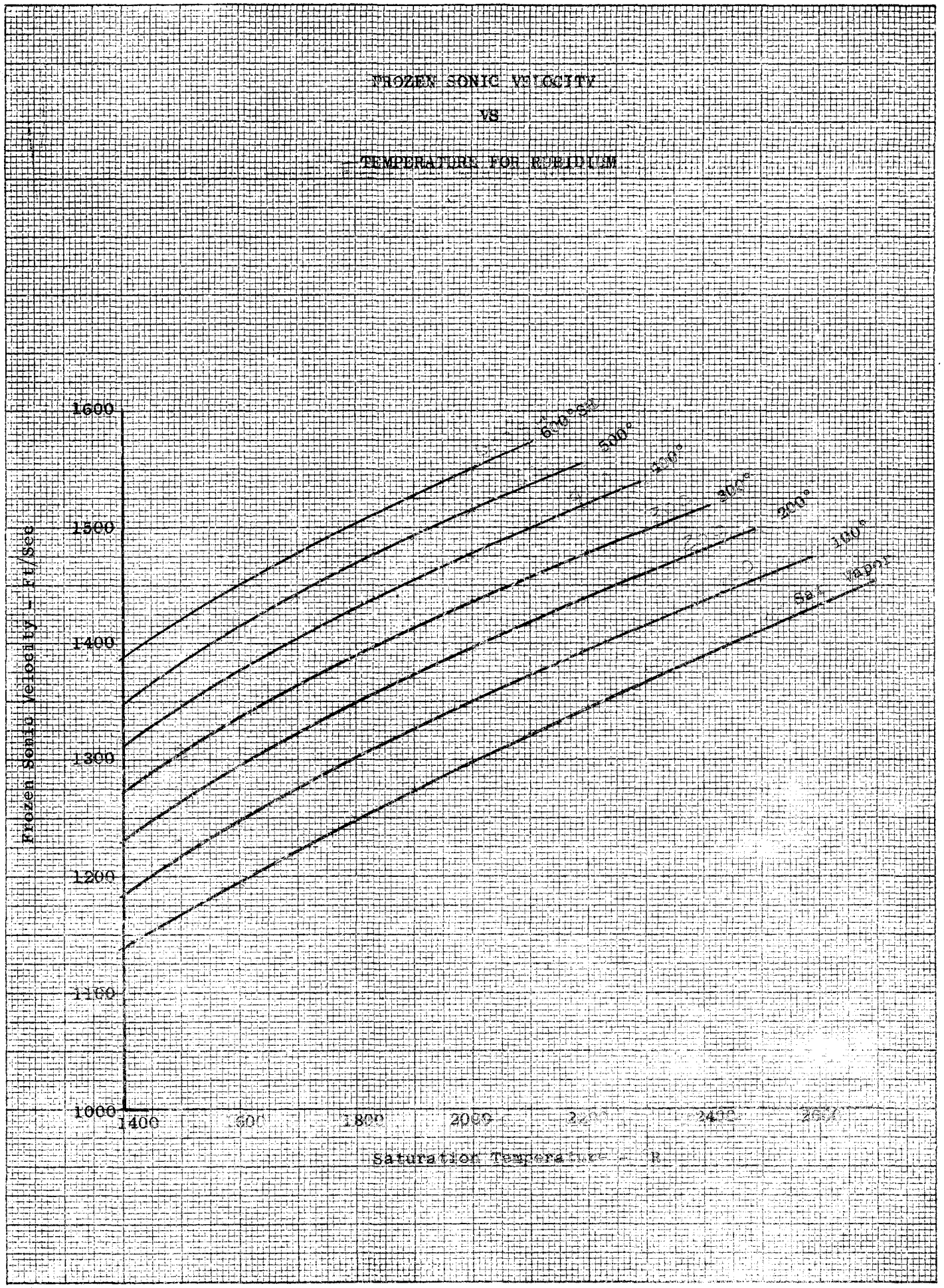


Figure 21

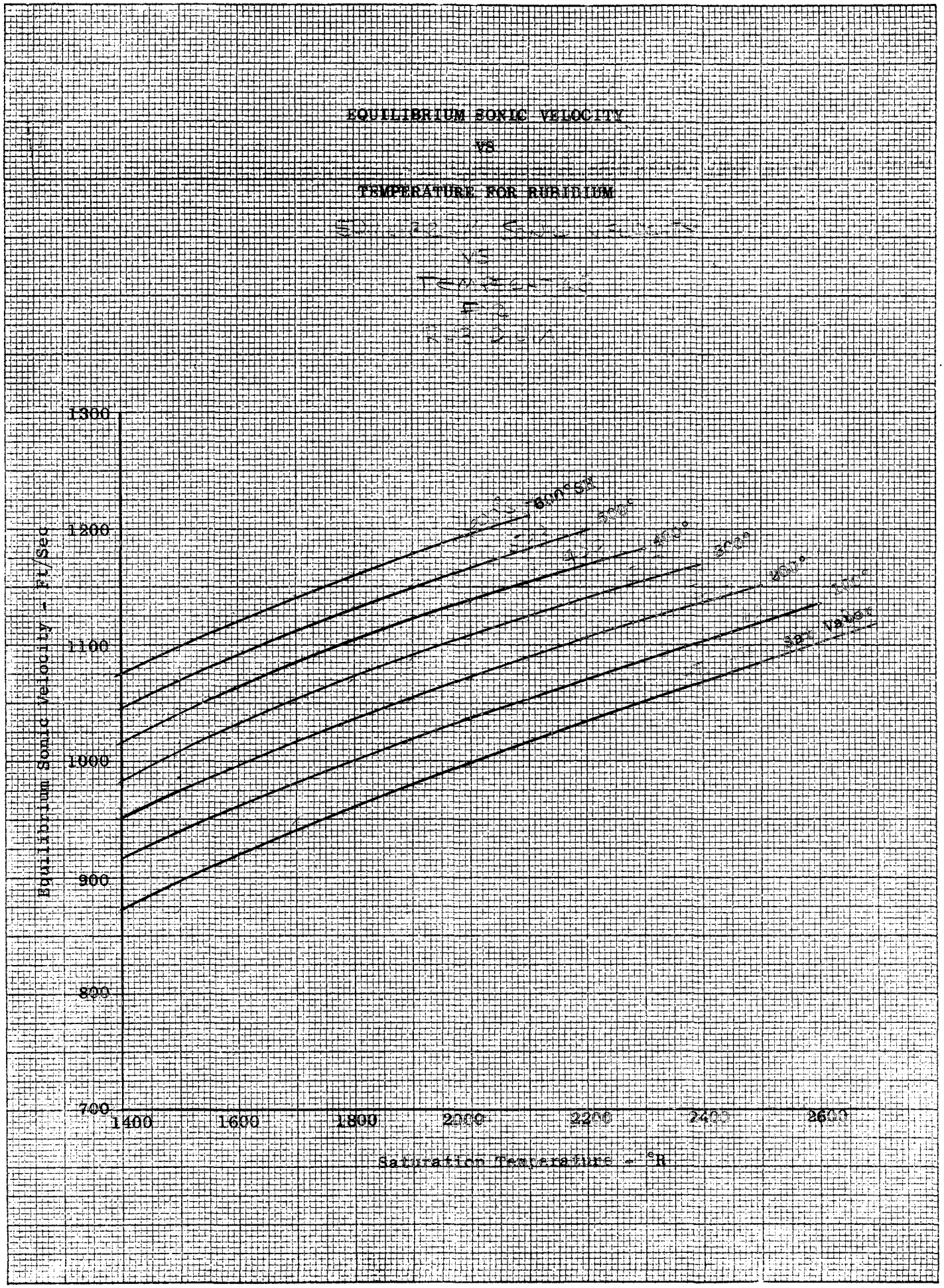


Figure 22

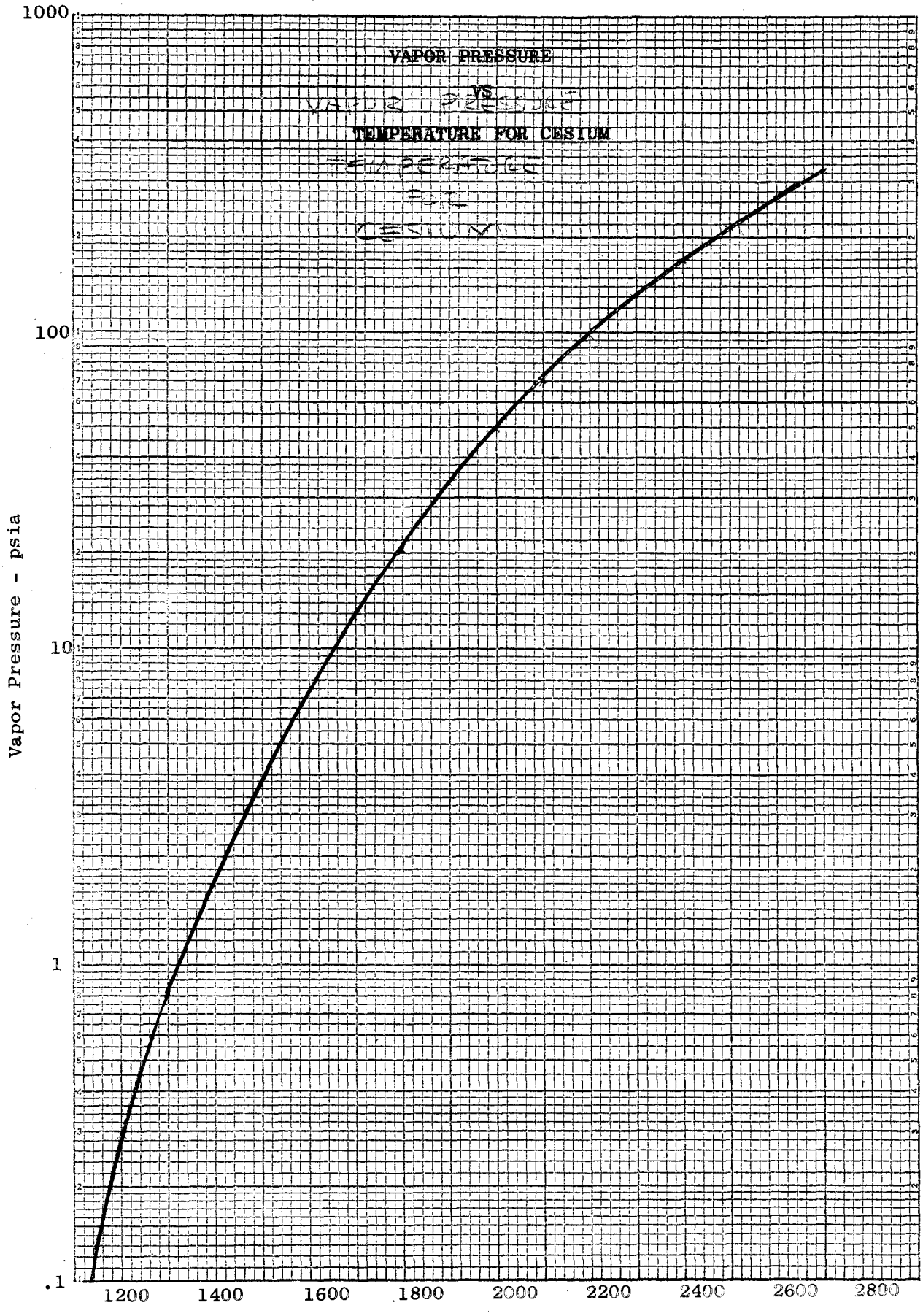


Figure 23

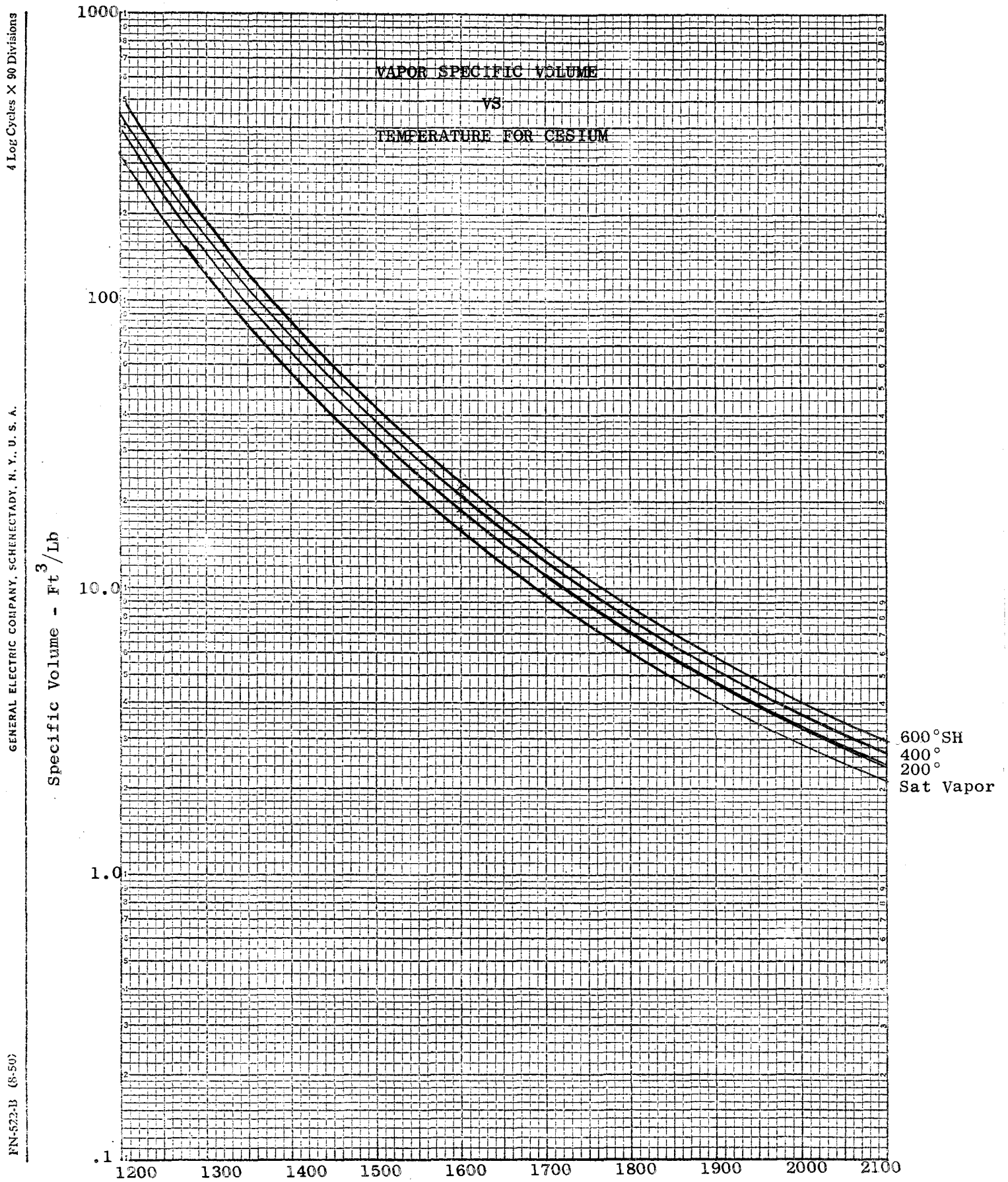

VAPOR SPECIFIC VOLUME
VS
TEMPERATURE FOR CESIUM
Specific Volume - Ft³/Lb
1000
100
10.0
1.0
.1
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
Saturation Temperature - °R
600°SH
400°
200°
Sat Vapor
4 Log Cycles X 90 Divisions
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., U. S. A.
FN-522-B (8-50)

Figure 24

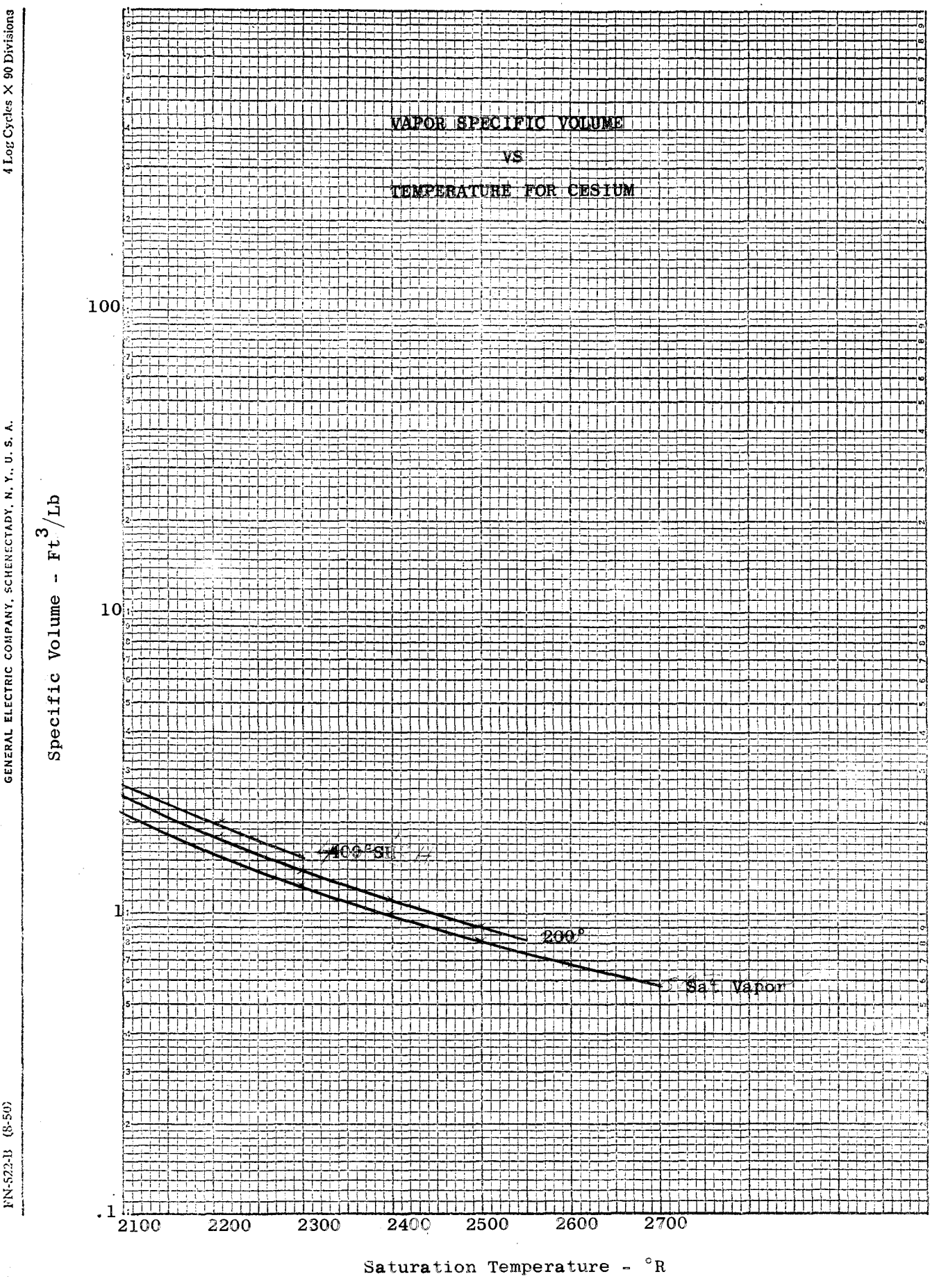


Figure 25

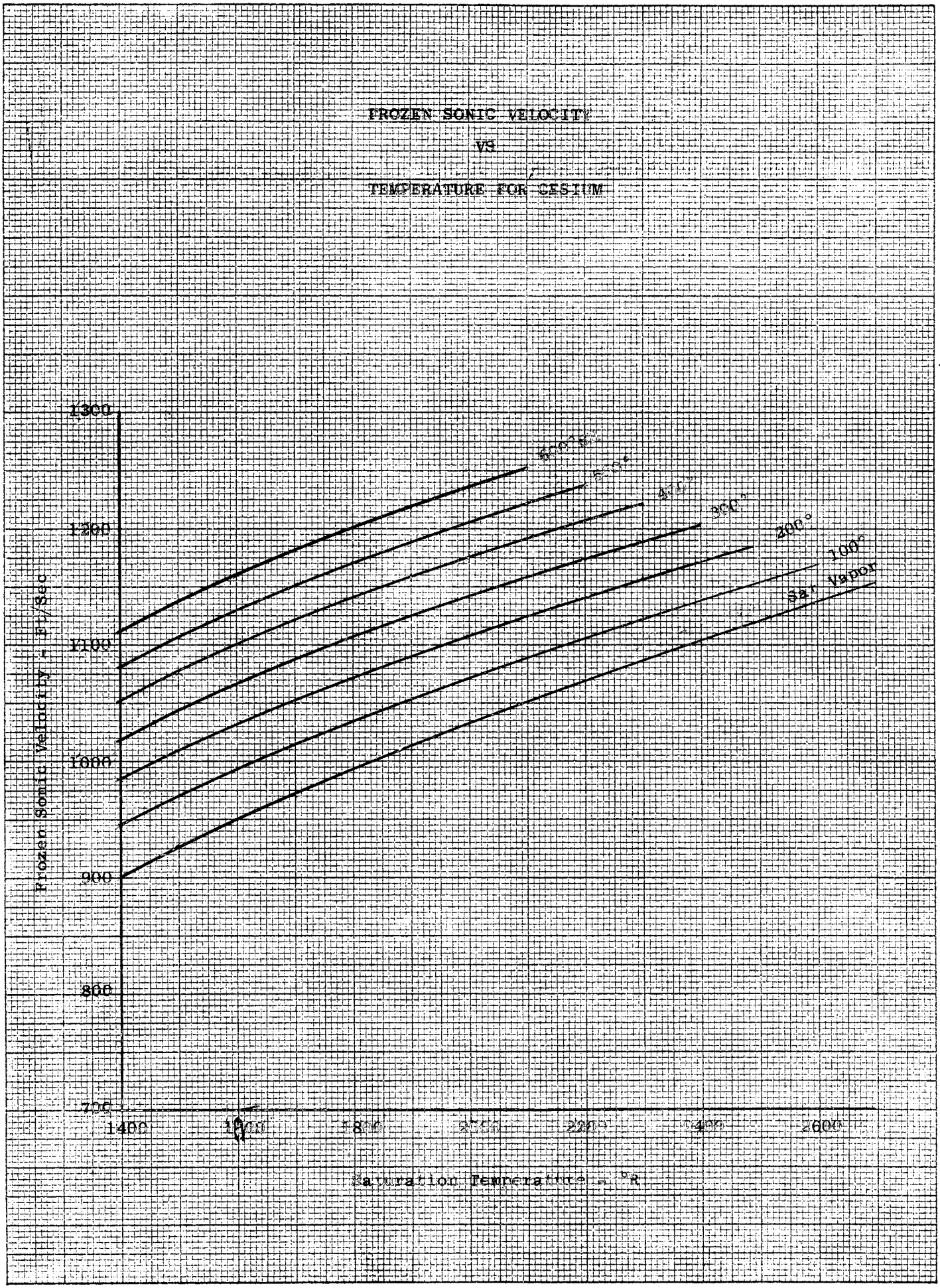


Figure 26

170

EQUILIBRIUM SONIC VELOCITY
VS
TEMPERATURE FOR CESIUM

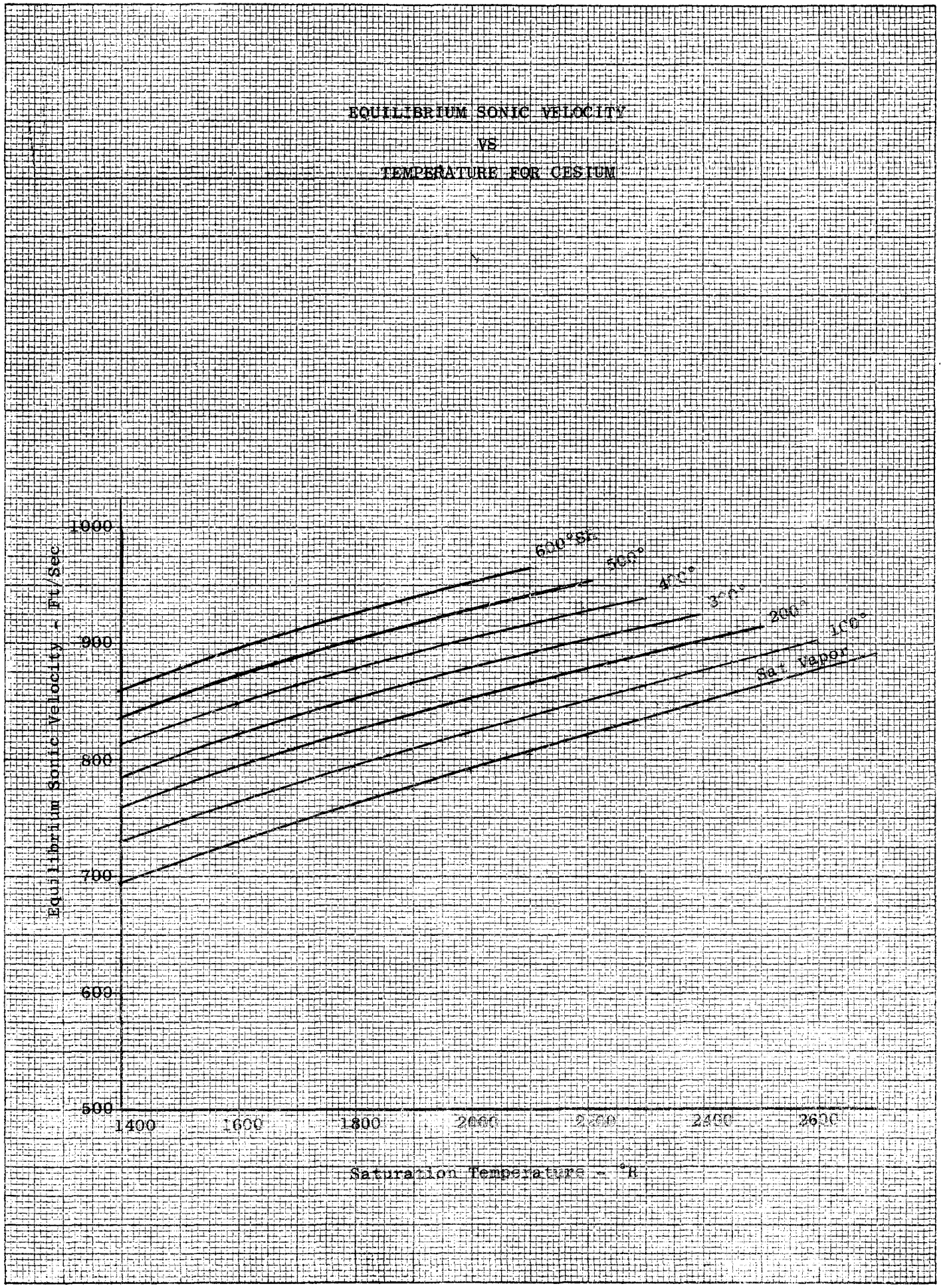


Figure 27

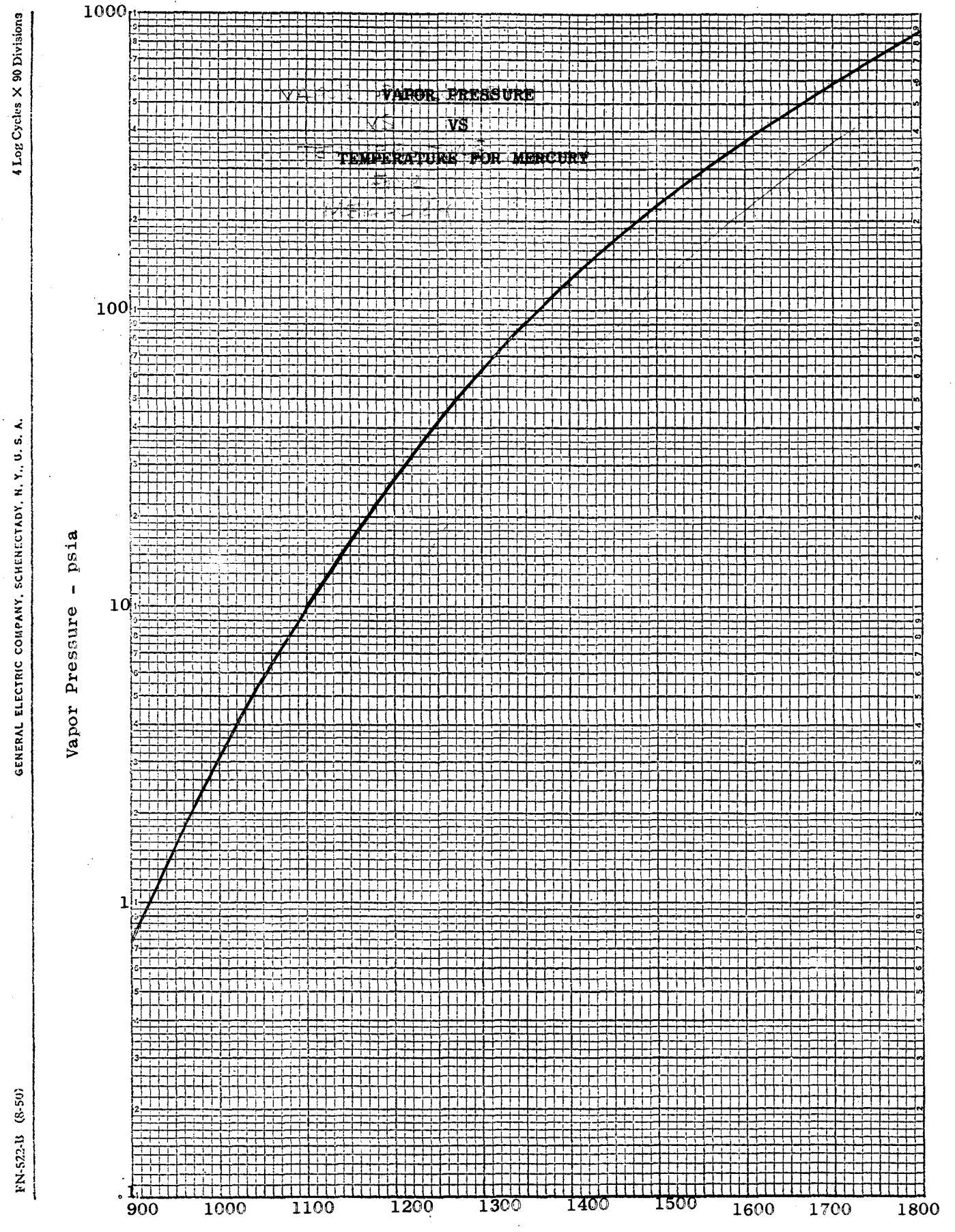

VAPOR PRESSURE
VS
TEMPERATURE FOR MERCURY
Vapor Pressure - psia
1000
100
10
1
.1
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
Saturation Temperature - °R
4 Log Cycles X 90 Divisions
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., U. S. A.
FN-522-B (8-50)

Figure 28

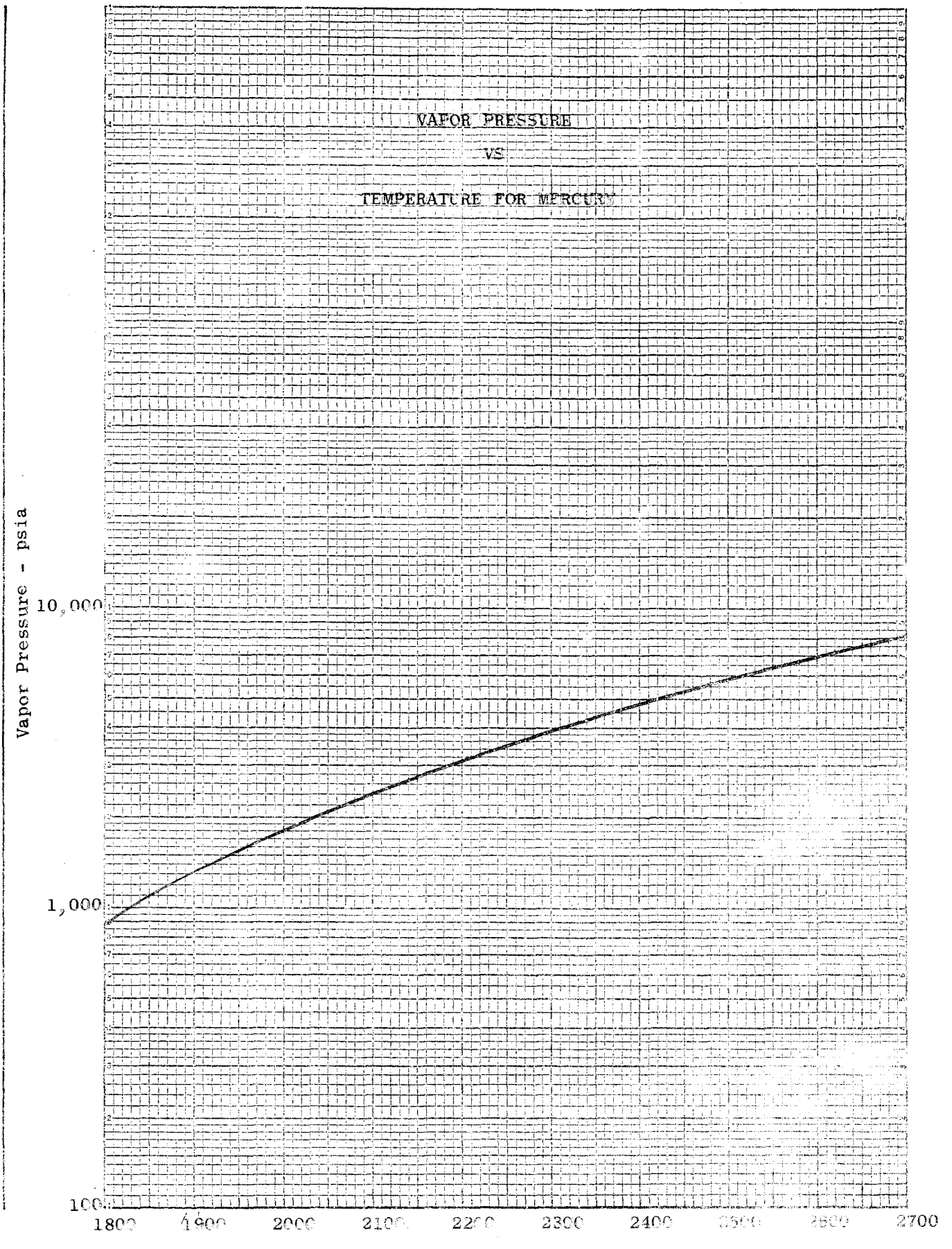


Figure 29

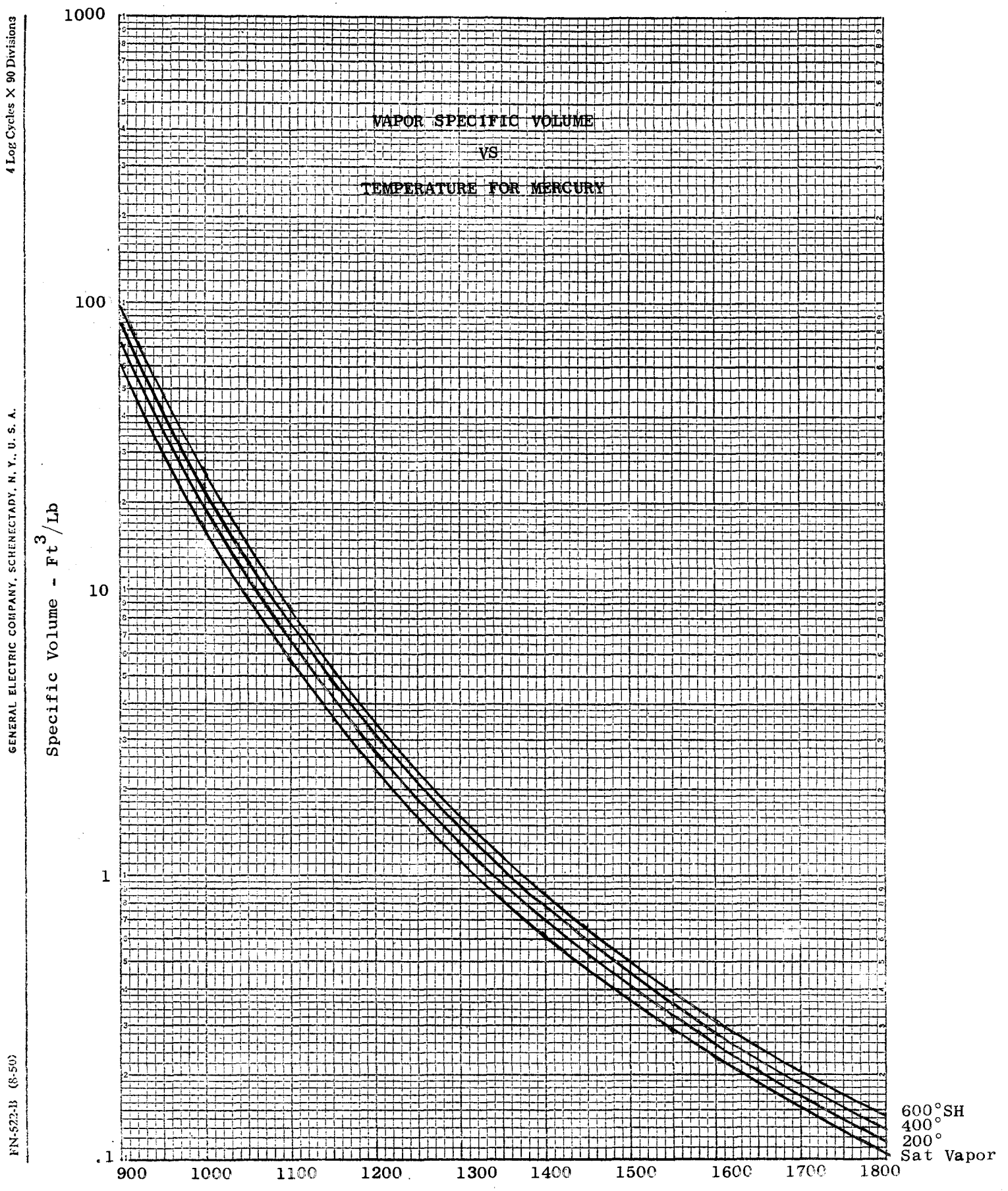

VAPOR SPECIFIC VOLUME
VS
TEMPERATURE FOR MERCURY
Specific Volume - Ft³/Lb
1000
100
10
1
.1
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
600°SH
400°
200°
Sat Vapor
Saturation Temperature - °R
4 Log Cycles X 90 Divisions
GENERAL ELECTRIC COMPANY, SCHENECTADY, N.Y., U.S.A.
FN-522-B (8-50)

Figure 30

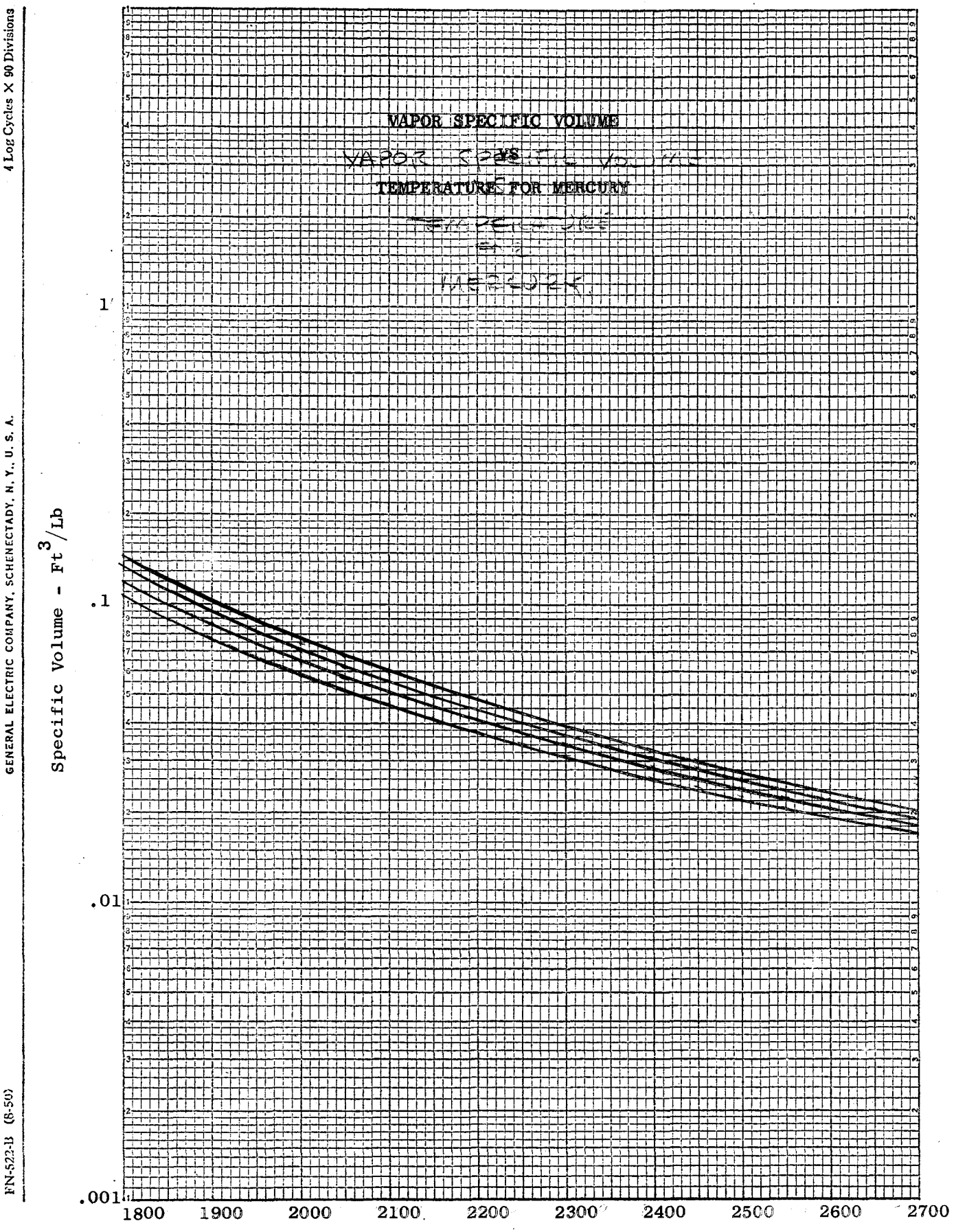


Figure 31

175

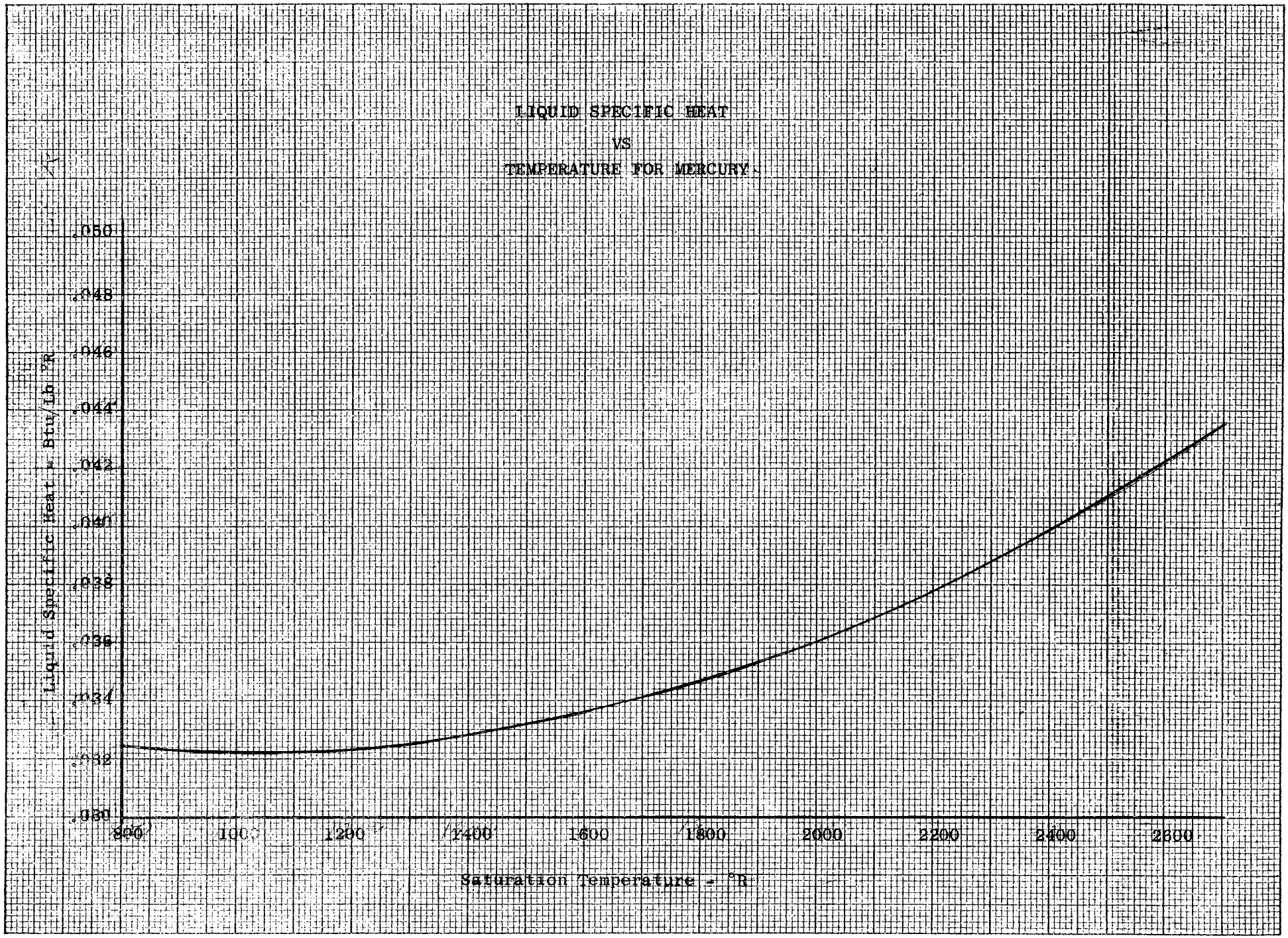

LIQUID SPECIFIC HEAT
VS
TEMPERATURE FOR MERCURY
Liquid Specific Heat - Btu/Lb °R
.050
.048
.046
.044
.042
.040
.038
.036
.034
.032
.030
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
Saturation Temperature - °R

Figure 32

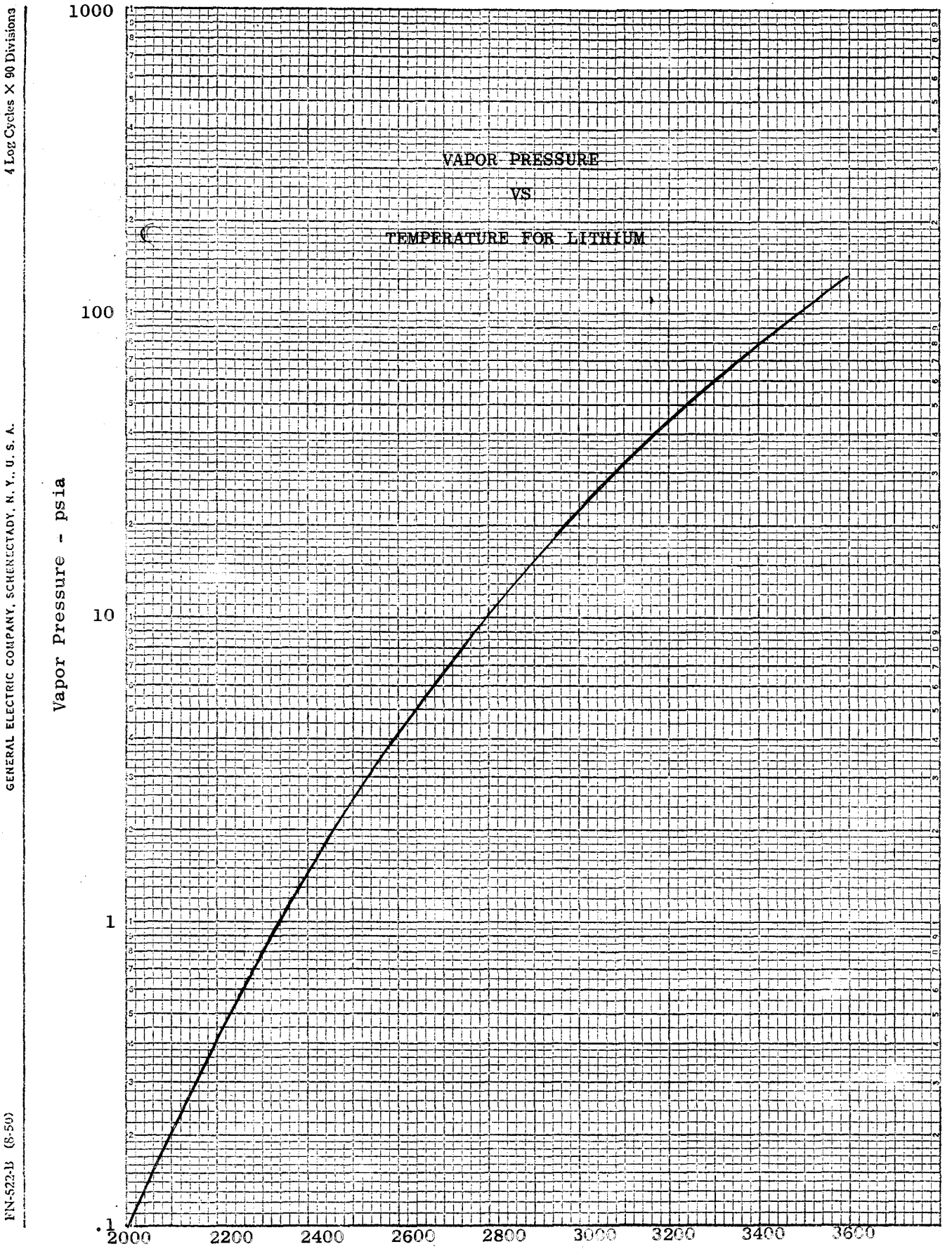

VAPOR PRESSURE
VS
TEMPERATURE FOR LITHIUM
Vapor Pressure - psia
1000
100
10
1
.1
2000
2200
2400
2600
2800
3000
3200
3400
3600
Saturation Temperature - °R
GENERAL ELECTRIC COMPANY, SCHENECTADY, N.Y., U.S.A.
4 Log Cycles X 90 Divisions
FN-522-B (8-50)

Figure 33

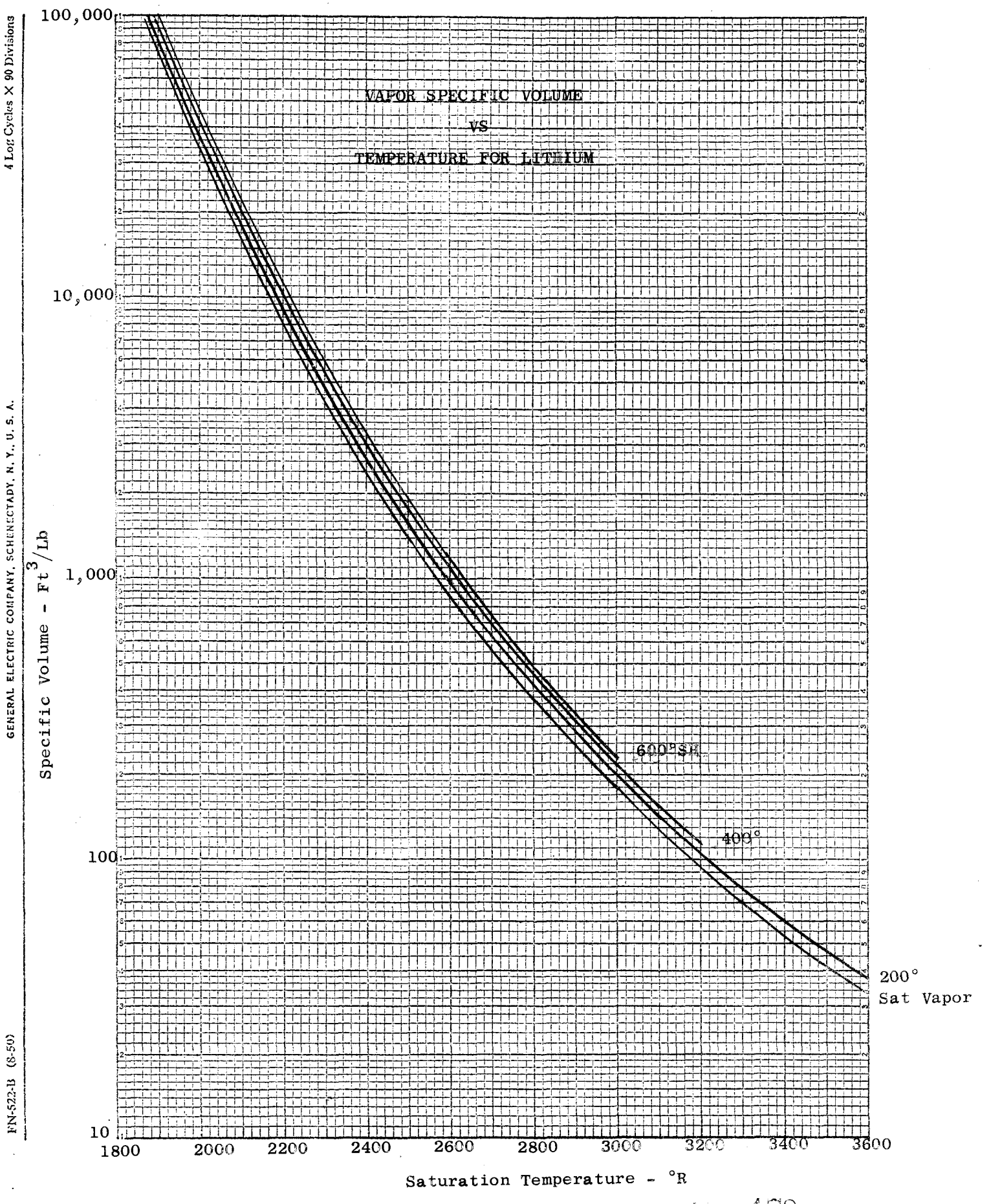

VAPOR SPECIFIC VOLUME
VS
TEMPERATURE FOR LITHIUM
100,000
10,000
1,000
100
10
Specific Volume - Ft³/Lb
600°SH
400°
200°
Sat Vapor
1800
2000
2200
2400
2600
2800
3000
3200
3400
3600
Saturation Temperature - °R
4 Log Cycles X 90 Divisions
GENERAL ELECTRIC COMPANY, SCHENECTADY, N.Y., U.S.A.
FN-522-B (8-50)

Figure 34

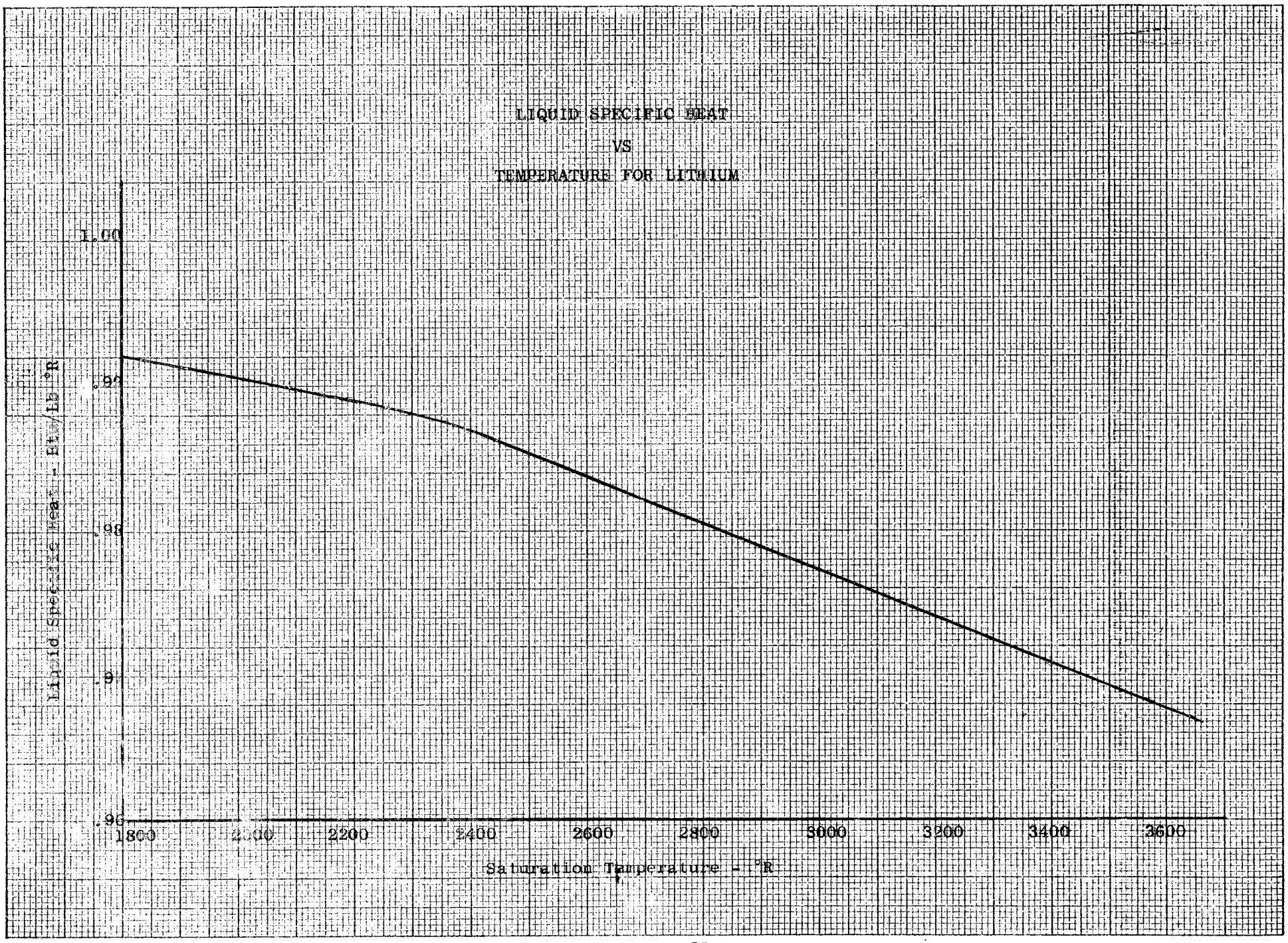

LIQUID SPECIFIC HEAT
VS
TEMPERATURE FOR LITHIUM
Liquid Specific Heat - Btu/Lb °R
1.00
.98
.96
1800
2000
2200
2400
2600
2800
3000
3200
3400
3600
Saturation Temperature - °R

Figure 35

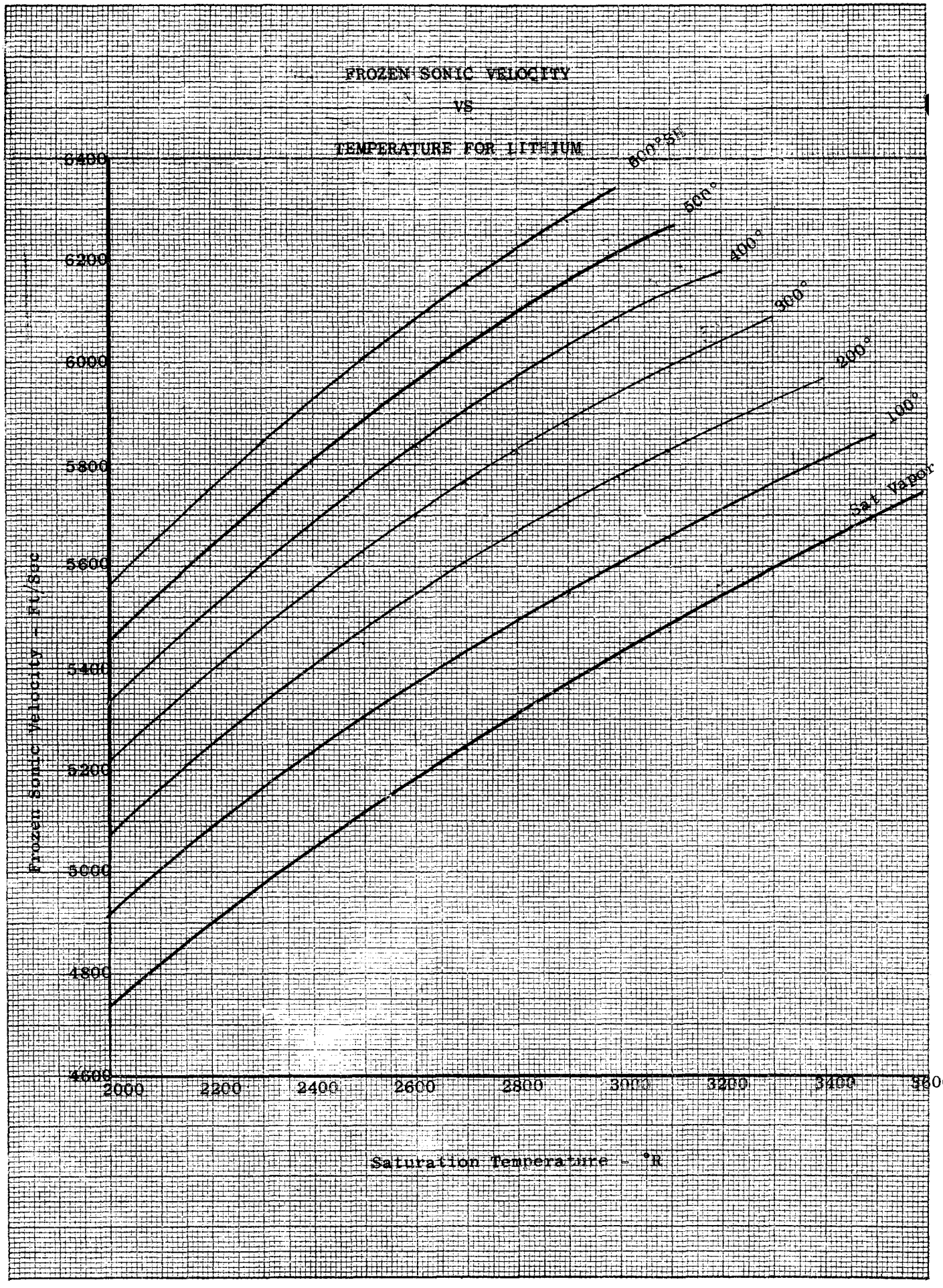


Figure 36

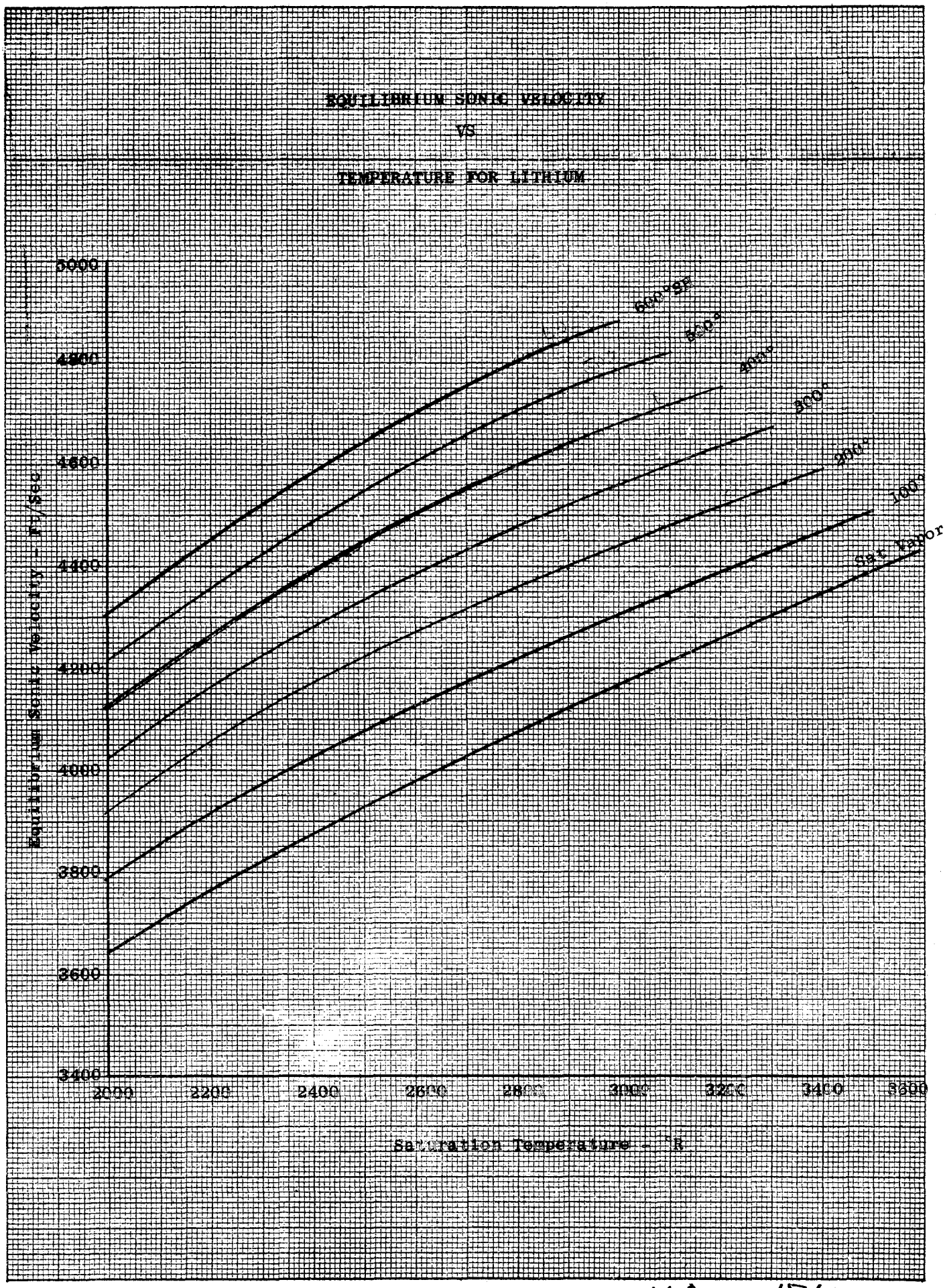


Figure 37

GENERAL ELECTRIC COMPANY
TECHNICAL INFORMATION SERIES
CONTENTS PAGE

CONTENTS OF REPORT

NO. PAGES TEXT

NO. CHARTS

DRAWING NOS.

PHOTO NOS.

DISTRIBUTION

FPLD - Bldg. 100

R.D. Brooks
H. Brown
W.R. Chase
H. Ernst
W.R. Lloyd
M.E. McCarthy
D.O. Nash
H.E. Nichols
R.J. Rossbach
A.W. Schnacke
E. Schnetzer
J.W. Semmel
A. Shapiro
C.K. Soestmeyer
J.P. Verkamp
W.H. Williamson
M.A. Zipkin

W.G. Browne, Bldg. 300
W.H. Booher, Bldg. 305
G.J. Carr, Bldg. 305
T.F. Foy, Bldg. 300
M.L. Ghai, Bldg. 200
L. Luft, Bldg. 200

LJED - Bldg. 500

R.P. Wanger,
R.K. Kintner

LARGE STEAM TURBINE & GENERATOR

H.A. Catoldi
S. Chesnejef
D. Ebling
W.L. Marshall

LYNN - AATD

R.L. Benford
D.W. Craft
J. Shinn

APED

J. Jacobson
H. Miller

GEL

H.D. Briggs
D. Brown
E. Lustenader
F. Neugebauer

MSVD

F. Altman
R.W. Karcher
D.L. Kerr
D.L. Purdy

EXTERNAL

A.J. Glassman - NASA
P.E. Liley - Purdue University
E.S. Sowa, Argon National Laboratory
W.D. Weatherford, Southwest Research Institute

FOR USE OF G-E EMPLOYEES ONLY

GENERAL ELECTRIC

TECHNICAL INFORMATION SERIES

Title Page

AUTHOR	SUBJECT CLASSIFICATION	NO.
C.J. Meisl and A. Shapiro	Thermodynamic Properties	R60FPD358-A
		DATE 11/9/60

TITLE

Thermodynamic Properties of Alkali Metal Vapors and Mercury - Revised

ABSTRACT This report contains thermodynamic property data for the alkali metals - sodium, potassium, rubidium, cesium and lithium - and for mercury in the liquid, vapor and superheat phases. The effect of dimerization has been included in the calculation of the data. Properties presented include vapor pressure, frozen and equilibrium sonic velocities, molecular weight and

G.E. CLASS	REPRODUCIBLE COPY FILED AT	NO. PAGES
II	Technical Information Center Bldg. 305, Evendale, Ohio	179
GOV. CLASS. Unclassified		

Abstract (Cont'd) - specific heat ratio, all as a function of temperature. The data is presented in tabular form and as Mollier Charts, and supplemental curves. Revision of the original edition was required to properly account for the energy required to alter the equilibrium composition in the superheat region. The second revision made all data internally consistent by iterating on vapor pressure until the heat of vaporization divided by vaporization temperature equalled the entropy of vaporization.

By cutting out this rectangle and folding on the center line, the above information can be fitted into a standard card file.

For list of contents — drawings, photos, etc. and for distribution see next page (GT 2063-B1).

INFORMATION PREPARED FOR _____

TESTS MADE BY _____

COUNTERSIGNED E. Schnetzer E. Schnetzer OPERATION Space Power

DIVISION Flight Propulsion LOCATION Evendale, Ohio