TABLE 40-B THRESHOLD LIMIT VALUES FOR 1963 *(Continued)*

APPENDIX B (Continued)

1B. (continued)

$$T_m = 700 \times \frac{2}{9} = 155 \text{ ppm}$$

Solution applicable to "spot" solvent mixture usage, where all or nearly all, solvent evaporates.

2 A mixture of one part of (1) parathion (TLV, 0 1) and two parts of (2) EPN (TLV, 0 5)

$$\frac{C_1}{0\,1} + \frac{C_2}{0\,5} = \frac{C_m}{T_m}$$

$$C_2 = 2C_1$$

$$C_m = 3C_1$$

$$\frac{C_1}{0\,1} + \frac{2C_1}{0\,5} = \frac{3C_1}{T_m}$$

$$\frac{7C_1}{0\,5} = \frac{3C_1}{T_m}$$

$$T_m = \frac{1\,5}{7} = 0\,21 \text{ mg/m}^3$$

b. General exact solution for mixtures of n components with additive effects and different vapor pressures

(1) $\frac{C_1}{T_1} + \frac{C_2}{T_2} + . \quad + \frac{C_n}{T_n} = 1,$

(2) $C_1 + C_2 + . \ . + C_n = T,$

(2 1) $\frac{C_1}{T} + \frac{C_2}{T} + . . \ + \frac{C_n}{T} = 1$

By the Law of Partial Pressures,

(3) $C_i = ap_i,$

And by Raoult's Law,

(4) $p_i = F_i p_i°.$

Combine (3) and (4) to obtain

(5) $C_i = aF_i p_i°$

Combining (1), (2 1), and (5), we obtain

(6) $\frac{F_1 p_1°}{T} + \frac{F_2 p_2°}{T} + \ . . + \frac{F_n p_n°}{T} = \frac{F_1 p_1°}{T_1} + \frac{F_2 p_2°}{T_2} + \ . \ . \ . + \frac{F_n p_n°}{T_n} .$

and solving for T,

(6 1) $T = \frac{F_1 p_1° + F_2 p_2° + \quad . + F_n p_n°}{\frac{F_1 p_1°}{T_1} + \frac{F_2 p_2°}{T_2} + . \ . + \frac{F_n p_n°}{T_n}}$

(6 2) or $T = \frac{\sum_{i=1}^{i=n} F_i p_i°}{\sum_{i=1}^{i=n} \frac{F_i p_i°}{T_i}}$

where T = Threshold limit value in ppm.
C = Vapor concentration in ppm
p = Vapor pressure of component in solution
$p°$ = Vapor pressure of pure component
F = Mol fraction of component in solution
a = A constant of proportionality
Subscripts 1,2, n relate the above quantities to components 1,2, . . n, respectively
Subscript i refers to an arbitrary component from 1 to n
Absence of subscript relates the quantity to the mixture

Solution to be applied when there is a reservoir of the solvent mixture whose composition does not change appreciably by evaporation.

c Exact Arithmetic Solution of Specific Mixture

Mol wt	Density	T	$p°$ at 25 C	Mol fraction in half-and half solution by volume
Trichloroethylene (1)				
131 4	1 46 g/ml	100	73mm Hg	0 527
Methylchloroform (2)				
133 42	1 33 g/ml	350	125mm Hg	0 473

$F_1 p_1° = (0\,527)(73) = 38\,2$

$F_2 p_2° = (0\,473)(125) = 59\,2$

$$T = \frac{38\,2 + 59\,2}{\frac{38\,2}{100} + \frac{59\,2}{350}} = \frac{(97\,4)(350)}{133\,8 + 59\,2} = \frac{(97\,4)(350)}{193\,0} = 177 \text{ ppm}$$

(Note difference in TLV when account is taken of vapor pressure and mol fraction in comparison with 1B a 1 where such account is not taken)

1C INDEPENDENT EFFECTS

1. From naphtha (TLV, 500) containing 10 mole per cent benzene (TLV, 25) the narcotic effects can be considered as approximately the same as that of benzene-free naphtha.
The blood effects can be consid-