

10-2.1 Equivalent Air Depth Calculation.

The Equivalent Air Depth can be computed from the following formula:

$$\text{EAD} = \frac{(1 - \text{O}_2\%) (D + 33)}{0.79} - 33$$

Where:

EAD = equivalent depth on air (fsw)

D = diving depth on mixture (fsw)

O₂% = oxygen concentration in breathing medium (percentage decimal)

For example, while breathing a mixture containing 40 percent oxygen (O₂% = 0.40) at 70 fsw (D = 70), the equivalent air depth would be:

$$\begin{aligned} \text{EAD} &= \frac{(1 - 0.40)(70 + 33)}{0.79} - 33 \\ &= \frac{(0.60)(103)}{0.79} - 33 \\ &= \frac{61.8}{0.79} - 33 \\ &= 78.22 - 33 \\ &= \mathbf{45.2 \text{ fsw}} \end{aligned}$$

Note that with NITROX, the Equivalent Air Depth is always shallower than the diver's actual depth. This is the reason that NITROX offers a decompression advantage over air.

10-3 OXYGEN TOXICITY

Although the use of NITROX can increase the diver's bottom time and reduce the risk of nitrogen narcosis, using a NITROX mixture raises the concern for oxygen toxicity. For example, using air as the breathing medium, an oxygen partial pressure (ppO₂) of 1.6 ata is reached at a depth of 218 fsw. In contrast, when using the NITROX mixture containing 60 percent nitrogen and 40 percent oxygen, a ppO₂ of 1.6 ata is reached at 99 fsw. Therefore, oxygen toxicity must be considered when diving a NITROX mixture and is a limiting factor when considering depth and duration of a NITROX dive.

Generally speaking, there are two types of oxygen toxicity—central nervous system (CNS) oxygen and pulmonary oxygen toxicity. CNS oxygen toxicity is usually not encountered unless the partial pressure of oxygen approaches or exceeds 1.6 ata, but it can result in serious symptoms including potentially life-threatening convulsions. Pulmonary oxygen toxicity may result from conducting long-duration dives at oxygen partial pressures in excess of 1.0 ata. For example, a dive longer than 240 minutes at 1.3 ata or a dive longer than 320 minutes at 1.1 ata may place

the diver at risk if the exposure is on a daily basis. Pulmonary oxygen toxicity under these conditions can result in decrements of pulmonary function, but is not life threatening.

The NITROX Equivalent Air Depth (EAD) Decompression Selection Table (Table 10-1) was developed considering both CNS and pulmonary oxygen toxicity. Normal working dives that exceed a ppO_2 of 1.4 ata are not permitted, principally to avoid the risk of CNS oxygen toxicity. Dives with a ppO_2 less than 1.4 ata, however, can be conducted using the full range of bottom times allowed by the air tables without concern for CNS or pulmonary oxygen toxicity.

Supervisors must keep in mind that pulmonary oxygen toxicity may become an issue with frequent, repetitive diving. The effects of pulmonary oxygen toxicity can be cumulative and can reduce the underwater work performance of susceptible individuals after a long series of repetitive daily exposures. Fatigue, headache, flu-like symptoms, and numbness of the fingers and toes may also be experienced with repetitive exposures. Table 10-1 takes these repetitive exposures into account, and therefore problems with oxygen toxicity should not be encountered with its use. If symptoms are experienced, the diver should stop diving NITROX until they resolve.

- 10-3.1 Selecting the Proper NITROX Mixture.** Considerable caution must be used when selecting the proper NITROX mixture for a dive. The maximum depth of the dive must be known as well as the planned bottom time. Once the maximum depth is known, the various NITROX mixtures can be evaluated to determine which one will provide the least amount of decompression while also allowing for a maximum bottom time. If a diver's depth exceeds that allowed for a certain NITROX mixture, the diver is at great risk of life-threatening oxygen toxicity.

10-4 NITROX DIVING PROCEDURES

- 10-4.1 NITROX Diving Using Equivalent Air Depths.** NITROX diving is based upon the current Air Decompression Tables. The actual schedule used is adjusted for the oxygen percentage in the breathing gas. To use the EAD Decompression Selection Table (Table 10-1), find the actual oxygen percentage of the breathing gas in the heading and the diver's actual depth in the left column to determine the appropriate schedule to be used from the Air Decompression Tables. The EAD decompression schedule is where the column and row intersect. When using Table 10-1, round all gas mixtures using the standard rounding rule where gas mixes at or above 0.5% round up to the next whole percent and mixes of 0.1% to 0.4% round down to the next whole percent. Once an EAD is determined and an air table is selected, follow the rules of the air table using the EAD for the remainder of the dive.

Table 10-1. Equivalent Air Depth Table.

Diver's Actual Depth (fsw)	EAD Feet															
	25% O ₂	26% O ₂	27% O ₂	28% O ₂	29% O ₂	30% O ₂	31% O ₂	32% O ₂	33% O ₂	34% O ₂	35% O ₂	36% O ₂	37% O ₂	38% O ₂	39% O ₂	40% O ₂
20	20	20	20	20	20	20	20	15	15	15	15	15	10	10	10	10
30	30	30	30	30	30	30	30	25	25	25	20	20	20	20	20	20
40	40	40	40	40	40	40	40	35	30	30	30	30	30	30	25	25
50	50	50	50	50	50	50	50	40	40	40	40	40	35	35	35	35
60	60	60	60	60	60	60	50	50	50	50	50	50	50	50	40	40
70	70	70	70	70	70	60	60	60	60	60	60	60	50	50	50	50
80	80	80	80	80	70	70	70	70	70	70	70	60	60	60	60	60
90	90	90	90	90	80	80	80	80	80	80	70	70	70	70	70	70
100	100	100	100	90	90	90	90	90	90	80	80	80	80	80	80	70
110	110	110	110	100	100	100	100	100	100	90	90	90	90	90	90	90
120	120	120	120	110	110	110	110	110	110	100	100	100	100	100	100	100
130	130	130	120	120	120	120	120	120	110	110	110	110	110	110	110	110
140	140	140	130	130	130	130	130	130	130	130	130	130	130	130	130	130
150	150	150	140	140	140	140	140	140	140	140	140	140	140	140	140	140
160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160

EAD = Equivalent Air Depth - For Decompression Table Selection Only Rounded to Next Greater Depth

 = 1.4 ata Normal working limit.

 = Depth exceeds the normal working limit, requires the Commanding Officer's authorization and surface-supplied equipment. Repetitive dives are not authorized. Times listed in parentheses indicate maximum allowable exposure.

Note¹: Depths not listed are considered beyond the safe limits of NITROX diving.

Note²: The EAD, 1.4 ata Normal Working Limit Line and Maximum Allowable Exposure Time for dives deeper than the Normal Working Limit Line are calculated assuming the diver rounds the oxygen percentage in the gas mixture using the standard rounding rule discussed in [paragraph 10-4.1](#). The calculations also take into account the allowable ± 0.5 percent error in gas analysis.