



*The leaders in diver education!*



# Nitrox Diver



# *Nitrox Diver Course Overview*

- The benefits & concerns of nitrox diving
- Planning nitrox dives
- Operational aspects of nitrox diving



# *Benefits & Concerns of Nitrox Diving*

- ❑ **Historical perspective**
- ❑ **What is nitrox?**
- ❑ **Benefits of nitrox**
- ❑ **Concerns with nitrox**



# *Historical Perspective*

- **Nitrox is not a new diving gas**
  - **Germans use nitrox mixtures in 1912**
  - **Commercial divers begin using in 1950's**
  - **NOAA begins using in in the 1970's**
- **IANTD begins teaching courses in 1985**



# *What is Nitrox?*

- ❑ Any mixture of oxygen and nitrogen
- ❑ Enriched Air Nitrox contains a higher percentage of oxygen than air
- ❑ As an IANTD Enriched Air Diver you can dive blends from EAN22 to EAN40
- ❑ Nitrox blends over EAN40 are covered in the Advanced Nitrox Course and the Technical Diver Courses



# *Benefits of Nitrox*

- ❑ Longer no-stop dive times
- ❑ Less decompression time
- ❑ Long repetitive dive no-stop times
- ❑ Reduced interval between diving & flying
- ❑ More conservative with normal air tables



# *Benefits of Nitrox*

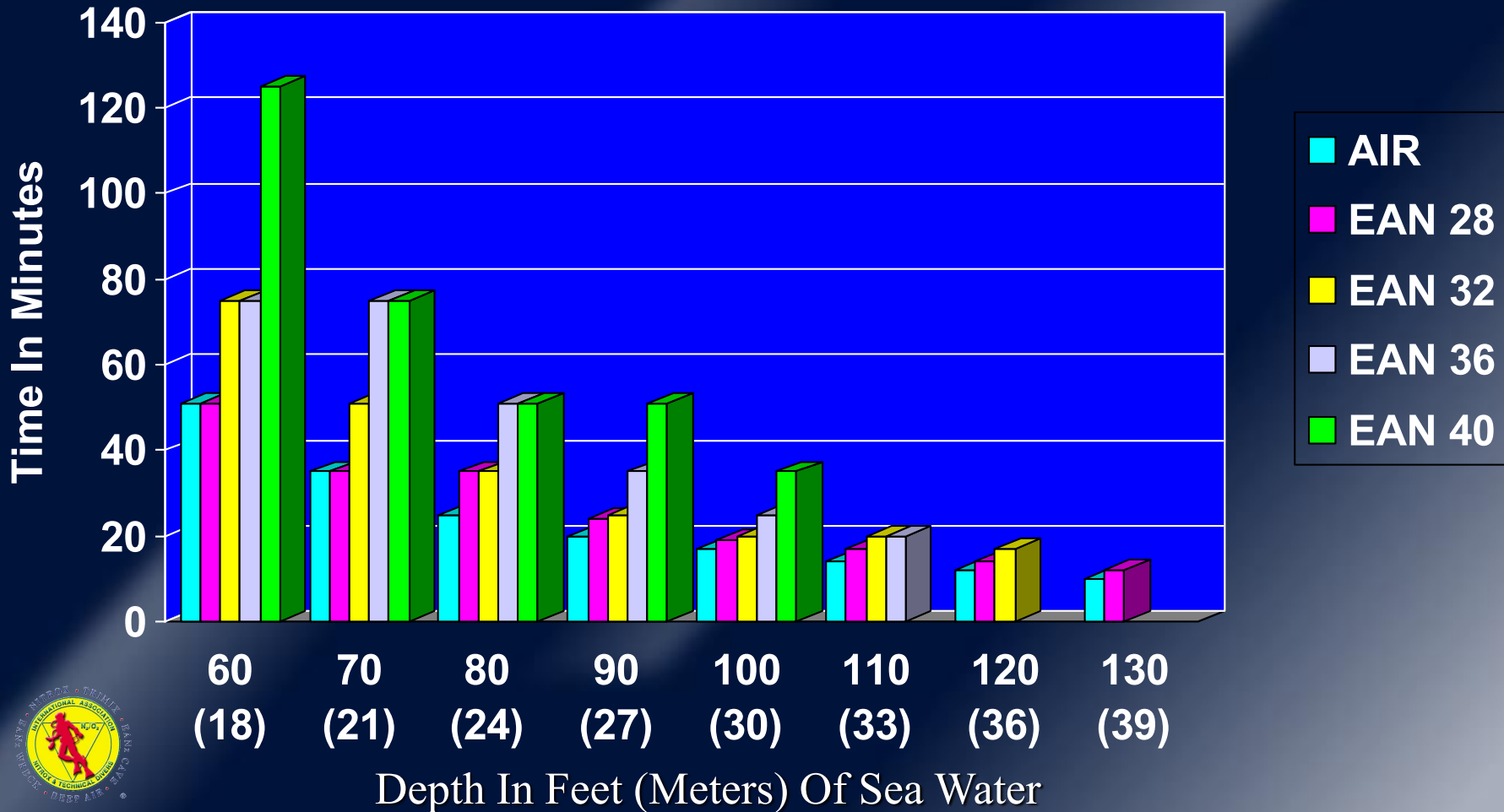
## *Comparison of Nitrox Mixtures*

Depth (fsw)	Depth (msw)	Air (minutes)	EAN 28 (minutes)	EAN 32 (minutes)	EAN 36 (minutes)	EAN 40 (minutes)
40	12	125	125	154	154	154
50	15	75	75	125	125	154
60	18	51	51	75	75	125
70	21	35	35	51	75	75
80	24	25	35	35	51	51
90	27	20	24	25	35	51
100	30	17	19	20	25	35
110	33	14	17	20	20	
120	36	12	14	17		
130	39	10	12			



# *Benefits of Nitrox*

## *Comparison of Nitrox Mixtures*



# *Concerns of Nitrox*

- ❑ **Oxygen toxicity (seizure & drowning)**
- ❑ **Decompression sickness**
- ❑ **Inaccurate gas analysis**
- ❑ **Explosion & fire during mixing**
- ❑ **Improper mixing**
- ❑ **Misuse by divers**

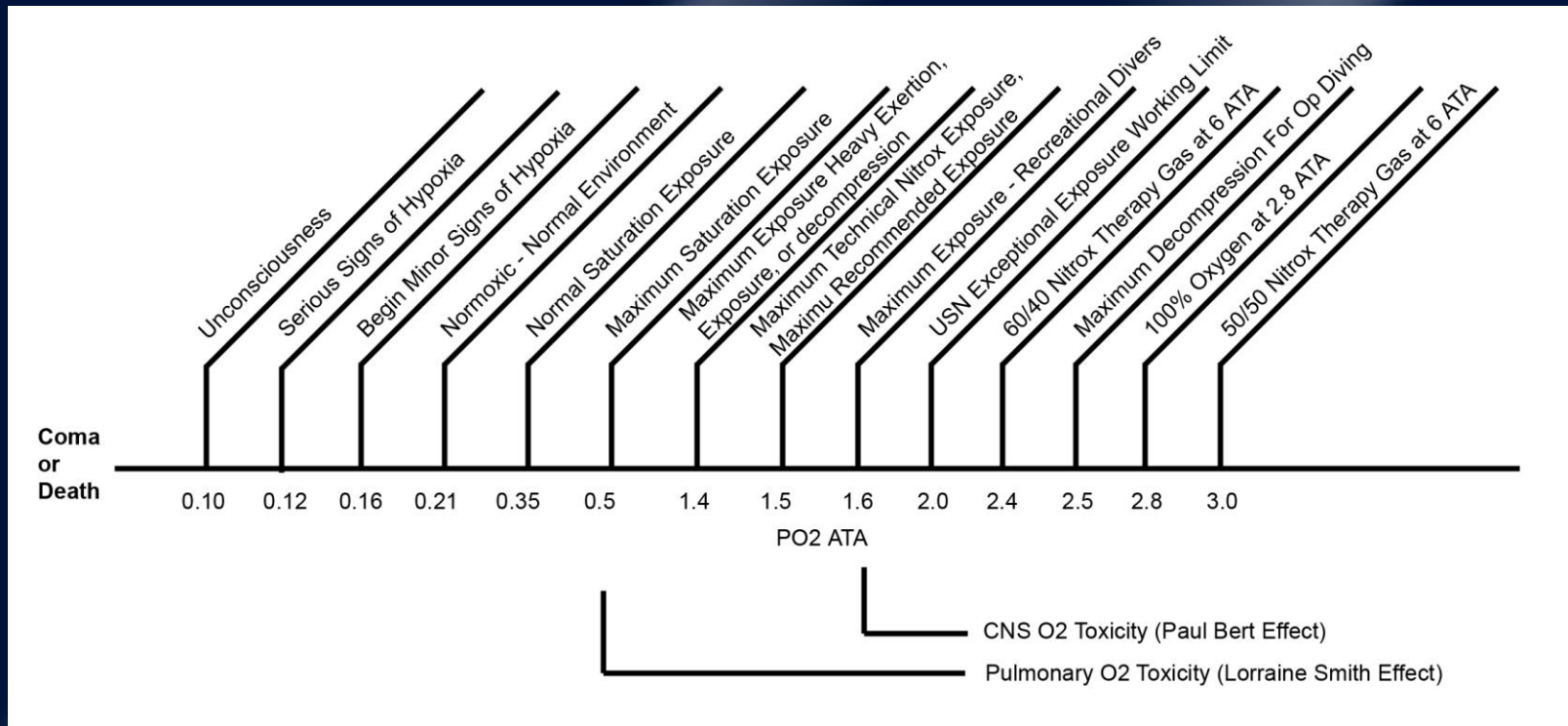


# *Concerns of Nitrox Oxygen Toxicity*

- Hypoxia – too little oxygen
- Hyperoxia – too much oxygen
  - Hyperoxic symptoms begin at about 1.6<sub>ATA</sub>
  - Therapy oxygen can be as high as 2.4<sub>ATA</sub> to 3.0<sub>ATA</sub>
  - Oxygen tolerance is reduced by exercise
  - Oxygen tolerance is reduced by stress
- Normal range for divers is 0.16<sub>ATA</sub> to 1.6<sub>ATA</sub>



# Concerns of Nitrox Oxygen Exposure Continuum



# *Concerns of Nitrox Oxygen Toxicity*

- ❑ **Pulmonary or Whole Body Toxicity**
- ❑ **Central Nervous System Toxicity**



# *Concerns of Nitrox Oxygen Toxicity*

- **Pulmonary or Whole Body Toxicity**
  - **Caused by extended exposures at PO<sub>2</sub> of 0.5 ATA**
  - **Symptoms include coughing, painful breathing, substernal irritation and reduced vital capacity**
  - **Generally not considered to be a problem for divers diving within the designated recreational nitrox parameters**



# *Concerns of Nitrox Oxygen Toxicity*

## □ Central Nervous System Toxicity

- Symptoms can be remembered using the acronym “CONVENTED”

<b>CON</b>	Convulsions
<b>V</b>	Visual disturbances
<b>E</b>	Ears, Hearing disturbances
<b>N</b>	Nausea Vomiting
<b>T</b>	Twitching Muscles
<b>D</b>	Dizziness



# *Concerns of Nitrox Oxygen Toxicity*

- **Factors contributing to or predisposing a diver to oxygen toxicity symptoms**
  - Physical exertion
  - Carbon dioxide retention
  - Cold stress
  - Heat stress
  - Individual physiology
  - drugs
- **Decrease maximum  $PO_2$  by  $0.05_{ATA}$  for each variable**



# *Concerns of Nitrox Oxygen Toxicity*

- **Effects are based on**
  - **Exposure time**
  - **Exposure amount or PO<sub>2</sub>**
- **NOAA developed exposure limits for individual dives and for a 24-hour period**



# Concerns of Nitrox Oxygen Toxicity – NOAA Limits

Oxygen PO <sub>2</sub> (ATA/BAR)	Single Exposure Limit (minutes)	24-Hour Limit (minutes)
1.6	45	150
1.5	120	180
1.4	150	180
1.3	180	210
1.2	210	240
1.1	240	270
1.0	300	300
0.9	360	360
0.8	450	450
0.7	570	570
0.6	720	720



# *Concerns of Nitrox Oxygen Toxicity*

- Accounting for oxygen toxicity is expressed in terms of an oxygen clock
- For CNS Oxygen Toxicity use the following formula:

$$\text{CNS\%} = \frac{\text{Time at depth}}{\text{NOAA Single Exposure Time at a specific PO}_2} \times 100$$



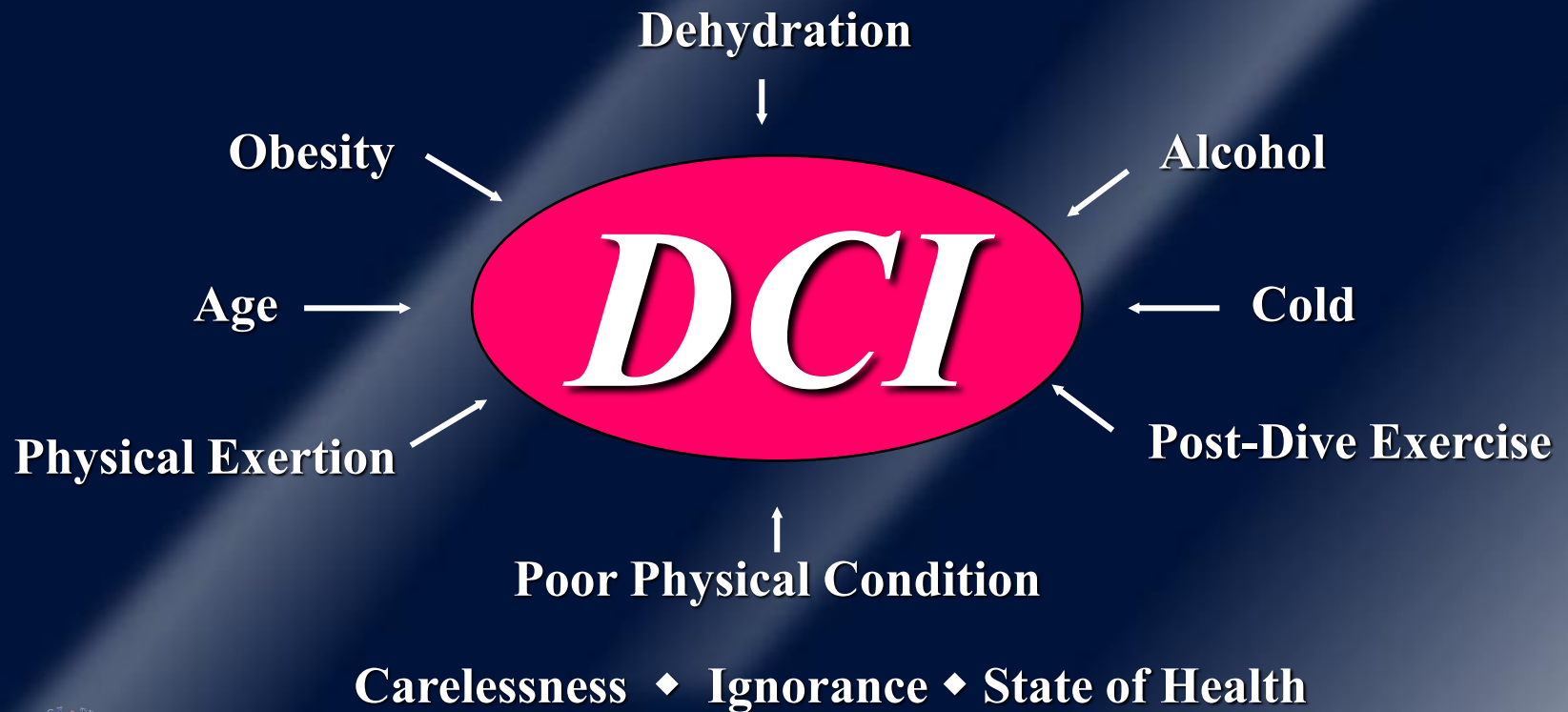
# *Concerns of Nitrox Decompression Illness*

- ❑ **Enriched Air Nitrox raises to oxygen in the mix and thereby lowers the nitrogen in the mix**
- ❑ **Nitrogen is not eliminated**
- ❑ **Decompression illness is still a concern**



# *Concerns of Nitrox*

## *Decompression Illness – Contributing Factors*



# *Concerns of Nitrox*

## *Decompression Illness – Reducing the Risk*

- ❑ **Plan your dive and dive your plan – be conservative.**
- ❑ **Do not dive if you are physiologically compromised.**
- ❑ **Do not exceed a rate of 30 fpm (10 mpm) during ascent.**
- ❑ **Make a 5 minute safety stop at 10 to 30 fsw (3 to 9 msw).**
- ❑ **Use nitrox to gain a conservative advantage.**
- ❑ **Do not push dive tables or computers to their limits.**
- ❑ **Drink plenty of water before and after you dive.**



# Concerns of Nitrox Oxygen Limits

< 0.16<sub>ATA</sub>

Hypoxia

1.4<sub>ATA</sub>

Cold-Working Dive



1.5<sub>ATA</sub>

Working of Stop Dive

1.6<sub>ATA</sub>

Maximum No-Stop



# *Planning Nitrox Dives*

## □ Practical Gas Physics



# *Planning Nitrox Dives*

## *Pressure Relationship*

- Most nitrox formulas use atmospheres absolute
- Depth and pressure relationship
  - $1 \text{ ATA} = 33 \text{ fsw} = 14.7 \text{ psi} = 760 \text{ mm hg}$
  - $1 \text{ ATA} = 10 \text{ msw} = 1 \text{ BAR}$
- Pressure formula:

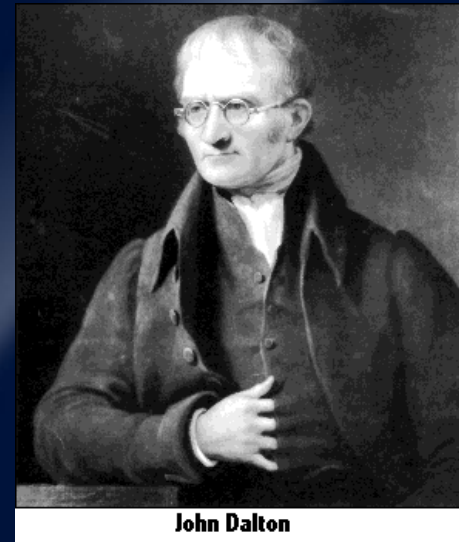
$$P_{\text{ATA}} = \left| \frac{\text{Depth}}{33 \text{ fsw}} \right| + 1 \quad \text{or} \quad P_{\text{ATA}} = \left| \frac{\text{Depth}}{10 \text{ msw}} \right| + 1$$



# *Planning Nitrox Dives*

## *Dalton's Law*

**“the total pressure exerted by a mixture of gasses is the sum of the pressures that would be exerted by each gas as if it were present and occupied the total volume”**



# *Planning Nitrox Dives*

## *Dalton's Law*

Dalton's Law can be expressed as:

$$P = P1 + P2 + P3 + \dots Pn$$

Where P1, P2, P3, Pn is the absolute pressure of that gas in the mixture



# *Planning Nitrox Dives*

## *Dalton's Law – O<sub>2</sub> Exposure*

Dalton's Law can also be expressed as:

$$\text{x} \frac{\text{Total Pressure (P}_{ATA}\text{)} \times \text{Fraction of the gas in the mixture (Fg)}}{\text{Pressure of a Gas (Pg)}}$$



# *Planning Nitrox Dives*

## *Dalton's Law – O<sub>2</sub> Exposure*

Thus the partial pressure of oxygen can be found using the following formula:

$$PO_2 = P_{ATA} \times FO_2$$



# Planning Nitrox Dives

## Dalton's Law – O<sub>2</sub> Exposure

Depth fsw	Depth msw	Pressure ATA	Air	EAN28	EAN32	EAN36	EAN40
0	0	1.0	0.21	0.28	0.32	0.36	0.40
10	3	1.3	0.27	0.36	0.42	0.47	0.52
20	6	1.6	0.34	0.45	0.51	0.58	0.64
30	9	1.9	0.40	0.43	0.61	0.69	0.76
40	12	2.2	0.46	0.62	0.71	0.80	0.88
50	15	2.5	0.53	0.70	0.80	0.91	1.00
60	18	2.8	0.59	0.79	0.90	1.01	1.13
70	21	3.1	0.66	0.84	1.00	1.12	1.25
80	24	3.4	0.72	0.96	1.10	1.23	1.37
90	27	3.7	0.78	1.04	1.19	1.34	1.49
100	30.5	4.0	0.85	1.13	1.29	1.45	1.61
110	33	4.3	0.91	1.21	1.39	1.56	1.73
114	34.7	4.4	0.94	1.25	1.43	1.60	1.78
120	36	4.6	0.97	1.30	1.48	1.67	1.86
130	39	4.9	1.04	1.38	1.58	1.78	1.98
132	40	5.0	1.05	1.40	1.60	1.80	2.00

Exceeds the  
Maximum PO<sub>2</sub>  
For  
Recreational  
Diving



# *Planning Nitrox Dives*

## *Dalton's Law – Best EANx Mixture*

Dalton's Law can also be used to determine the best EANx mixture for a dive using the formula:

$$\text{Best Mix (FO}_2\text{)} = \frac{\text{Desired O}_2 \text{ Level (PO}_2\text{)}}{\text{Depth in atmospheres (P}_{\text{ATA}}\text{)}}$$



# Planning Nitrox Dives

## Dalton's Law – Best EANx Mixture

Depth fsw	Depth msw	1.2 ATA	1.3 ATA	1.4 ATA	1.5 ATA	1.6 ATA
40	12	54	59	63	68	72
50	15	48	52	56	60	64
60	18	43	46	50	53	57
70	21	38	42	45	48	51
80	24	35	38	41	44	47
90	27	32	35	38	40	43
100	30.5	30	32	35	37	40
110	33	28	30	32	35	37
120	36	26	28	30	32	35
130	39	24	26	28	30	32

EANx Divers are limited to mixtures from EAN22 to EAN40



# *Planning Nitrox Dives*

## *Maximum Depth*

- Nitrox mixtures move the floor or maximum depth up as compared to air.
- We can compute this Maximum Operating Depth (MOD) with the formula:

$$\text{MOD}_{\text{fsw}} = \left| \frac{\text{Maximum Oxygen Exposure (PO}_2\text{)}}{\text{Oxygen Amount in EAN (FO}_2\text{)}} \right| - 1 \times 33_{\text{fsw}}$$



# *Planning Nitrox Dives*

## *Maximum Depth*

- Nitrox mixtures move the floor or maximum depth up as compared to air.
- We can compute this Maximum Operating Depth (MOD) with the formula:

$$\text{MOD}_{\text{msw}} = \left| \frac{\text{Maximum Oxygen Exposure (PO}_2\text{)}}{\text{Oxygen Amount in EAN (FO}_2\text{)}} \right| - 1 \times 10_{\text{msw}}$$



# *Planning Nitrox Dives*

## *Maximum Depth*

- The Maximum Operating Depth is computed using a maximum oxygen exposure of 1.6  $_{ATA}$ .
- The target or planned depth should be computed using a lower oxygen exposure such as 1.4  $_{ATA}$  to 1.2  $_{ATA}$  or lower.
- Remember be conservative.



# *Planning Nitrox Dives Equivalent Depth*

- In nitrox mixtures, the nitrogen is reduced as compared to air.
- Physiologically, you are on-gassing less nitrogen which equates to a shallower air exposure
- We term this shallower exposure the **Equivalent Nitrogen Depth**



# *Planning Nitrox Dives Equivalent Depth*

The Equivalent Nitrogen Depth (END) can be computed by:

$$\text{END}_{\text{fsw}} = \left| \frac{(\text{Nitrogen in mixture (FN}_2)) \times (\text{D}_{\text{fsw}} + 33_{\text{fsw}})}{\text{Nitrogen in Air (0.79)}} \right| - 33_{\text{fsw}}$$



# *Planning Nitrox Dives Equivalent Depth*

The Equivalent Nitrogen Depth (END) can be computed by:

$$\text{END}_{\text{msw}} = \left| \frac{(\text{Nitrogen in mixture (FN}_2)) \times (\text{D}_{\text{fsw}} + 10_{\text{msw}})}{\text{Nitrogen in Air (0.79)}} \right| - 10_{\text{msw}}$$



# Planning Nitrox Dives Equivalent Depth

- For various EAN<sub>x</sub> mixtures, IANTD has a table detailing the
  - END
  - MOD
  - CNS% per minute

**IANTD EAD / MOD TABLES**

The tables provide the following data for various nitrox mixtures:

- 10% O<sub>2</sub> Mixture:** EAD, PO<sub>2</sub>, OTU, and CNS% values for depths from 0 to 100 fsw.
- 14% O<sub>2</sub> Mixture:** EAD, PO<sub>2</sub>, OTU, and CNS% values for depths from 0 to 50 fsw.
- 45% O<sub>2</sub> Mixture:** EAD, PO<sub>2</sub>, OTU, and CNS% values for depths from 0 to 80 fsw.
- 50% O<sub>2</sub> Mixture:** EAD, PO<sub>2</sub>, OTU, and CNS% values for depths from 0 to 80 fsw.
- 55% O<sub>2</sub> Mixture:** EAD, PO<sub>2</sub>, OTU, and CNS% values for depths from 0 to 40 fsw.
- 15% O<sub>2</sub> Mixture:** EAD, PO<sub>2</sub>, OTU, and CNS% values for depths from 0 to 20 fsw.


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# Planning Nitrox Dives

## Dive Tables

- IANTD also prints dive tables for various EANx mixtures.



**IANTD AIR DIVING & DECOMPRESSION TABLES**

(A)	40	50	60	70	80	90	100	110	120	130	140	Depth (Feet)	Repetitive Group	No Decompression Limits (Minutes)							
	12	15	18	21	24	27	30	33	36	39	42	Depth (Meters)									
	125	75	51	35	25	20	17	14	12	10	9										
(B) BOTTOM TIMES	19	16	14	12	11	10	9	8	7	7	6		A	00:00-02:00 01:59							
	25	20	17	15	13	12	11	10	9	8	7		B	00:00-02:20 01:59							
	37	29	25	22	20	18	16	11	10	9	8		C	00:00-00:10 00:09-00:24 00:09-00:24 00:09-00:24							
	57	41	33	28	24	19	17	14	12	10	9		D	00:00-00:10 00:09-00:14 00:09-00:14 00:09-00:14							
	82	59	44	35	25	20							E	00:00-00:10 00:09-00:14 00:09-00:14 00:09-00:14							
	111	65	51										F	00:00-00:20 00:09-00:24 00:09-00:24 00:09-00:24							
	125	75											G	00:00-00:25 00:09-00:29 00:09-00:29 00:09-00:29							
													H	00:00-01:00 00:09-01:04 00:09-01:04 00:09-01:04							
													K	00:00-03:00 00:09-03:00 00:09-03:00 00:09-03:00							
													L	00:00-06:00 00:09-06:00 00:09-06:00 00:09-06:00							
(D) REPETITIVE GROUP AT END OF S.I.												G	F	E	D	C	B	A	DEPTH (ft) (m)		
												137	111	82	57	37	25	19	RNT	40	12
												115	88	59	41	29	20	16	RNT	50	15
												91	68	44	33	25	17	14	RNT	60	18
												72	53	37	28	22	15	12	RNT	70	21
												57	42	30	24	20	13	11	RNT	80	24
												47	35	26	21	18	12	10	RNT	90	27
												40	30	23	19	16	11	9	RNT	100	30
												35	27	21	17	14	10	8	RNT	110	33
												31	24	19	15	12	9	7	RNT	120	36
												27	21	17	14	11	8	7	RNT	130	39
												25	19	16	13	10	7	6	RNT	140	42
												23	17	14	11	9	7	6	RNT	150	45

**(E) REPETITIVE DIVE TABLES**

137	111	82	57	37	25	19	RNT	40	12
115	88	59	41	29	20	16	RNT	50	15
91	68	44	33	25	17	14	RNT	60	18
72	53	37	28	22	15	12	RNT	70	21
57	42	30	24	20	13	11	RNT	80	24
47	35	26	21	18	12	10	RNT	90	27
40	30	23	19	16	11	9	RNT	100	30
35	27	21	17	14	10	8	RNT	110	33
31	24	19	15	12	9	7	RNT	120	36
27	21	17	14	11	8	7	RNT	130	39
25	19	16	13	10	7	6	RNT	140	42
23	17	14	11	9	7	6	RNT	150	45

**RESIDUAL NITROGEN TIME**

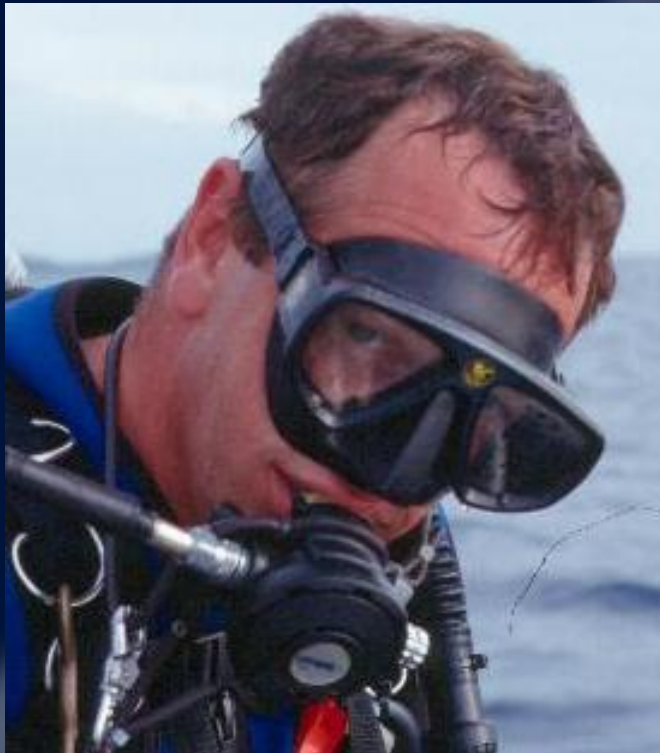
**Warning:** DO NOT attempt to use these tables unless you are fully trained & certified in the use of Gas Mixtures Other Than Air, or are under the supervision of a Gas Mixtures Other Than Air Instructor. Proper use of these tables will reduce the risk of decompression sickness & oxygen toxicity, but no table or computer can eliminate those risks. These Tables Are For Air With Air As Deco Gas Or Accelerated Deco Using EAN 50% Oxygen Or Greater At 20 And 15 Foot (4.5 and 6 m) Stops. The 15 Foot (4.5 m) Stops MUST Be Taken At 15 Feet (4.5m). These Tables Are Based On Bühlmann's ZHL-16 Algorithm For 0-1000 Feet (0-300m) Above Sea Level. They Were Produced Using Software Available from IAND, Inc. The Repetitive Dive Groups Are Not Transferable To ANY Other Tables. A Three Minute Safety Stop Is Required For All Dives. These Tables Do Not Take Into Consideration The Physical Condition Of Diver, Difficulty Of Dive, Water Temperature, Etc.

(A) Planned Depth  
 (B) Bottom Time In Depth Column  
 (C) Read Across To Find Surface Interval  
 (D) Locate RNT After S.I.  
 (E) Read Down To Planned Repetitive Dive Depth. Read RNT

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# *Planning Nitrox Dives*



**Time to go diving...**



# *Planning Nitrox Dives*

**You are planning a nitrox dive to 100<sub>fsw</sub>/30.5<sub>msw</sub>.**

- What is the best EANx mixture for this dive, if you wanted a maximum oxygen exposure of 1.4<sub>ATA</sub>?**
- What is the maximum operating depth?**
- What is the Equivalent Nitrogen Depth?**
- What is the maximum time you can spend without any required decompression stops?**
- How much of your oxygen clock will you use on this dive?**

# *Planning Nitrox Dives*

## *Best Mixture*

$$\text{Best Mix (FO}_2\text{)} = \frac{\text{Desired O}_2\text{ Level (PO}_2\text{)}}{\text{Depth in atmospheres (P}_{\text{ATA}}\text{)}}$$

$$\text{Best Mix (FO}_2\text{)} = \frac{1.4_{\text{ATA}}}{4_{\text{ATA}}} \quad \mathbf{0.35 \text{ or EAN 35}}$$

# *Planning Nitrox Dives*

## *Maximum Operating Depth*

$$\text{MOD}_{\text{fsw}} = \left| \frac{\text{Maximum Oxygen Exposure (PO}_2\text{)}}{\text{Oxygen Amount in EAN (FO}_2\text{)}} \right| - 1 \times 33_{\text{fsw}}$$

$$\text{MOD}_{\text{fsw}} = \left| \frac{\text{PO}_2 = 1.6_{\text{ATA}}}{\text{FO}_2 = 0.35} \right| - 1 \times 33_{\text{fsw}}$$

$$\text{MOD}_{\text{fsw}} = 117.81_{\text{fsw}} \text{ or } 117_{\text{fsw}}$$

# *Planning Nitrox Dives*

## *Maximum Operating Depth*

$$\text{MOD}_{\text{msw}} = \left| \frac{\text{Maximum Oxygen Exposure (PO}_2\text{)}}{\text{Oxygen Amount in EAN (FO}_2\text{)}} \right| - 1 \times 10_{\text{msw}}$$

$$\text{MOD}_{\text{msw}} = \left| \frac{\text{PO}_2 = 1.6_{\text{ATA}}}{\text{FO}_2 = 0.35} \right| - 1 \times 10_{\text{msw}}$$

$$\text{MOD}_{\text{msw}} = 35.7_{\text{msw}}$$

# Planning Nitrox Dives Equivalent Depth

$$\text{END}_{\text{fsw}} = \left| \frac{(\text{Nitrogen in mixture (FN}_2)) \times (\text{D}_{\text{fsw}} + 33_{\text{fsw}})}{\text{Nitrogen in Air (0.79)}} \right| - 33_{\text{fsw}}$$

$$\text{END}_{\text{fsw}} = \left| \frac{0.65 (\text{FN}_2) \times (100_{\text{fsw}} + 33_{\text{fsw}})}{\text{Nitrogen in Air (0.79)}} \right| - 33_{\text{fsw}}$$

$$\text{END}_{\text{fsw}} = 76_{\text{fsw}}$$



# Planning Nitrox Dives Equivalent Depth

$$\text{END}_{\text{fsw}} = \left| \frac{(\text{Nitrogen in mixture (FN}_2\text{)}) \times (\text{D}_{\text{msw}} + 10_{\text{msw}})}{\text{Nitrogen in Air (0.79)}} \right| - 10_{\text{msw}}$$

$$\text{END}_{\text{fsw}} = \left| \frac{0.65 (\text{FN}_2) \times (30.5_{\text{fsw}} + 10_{\text{msw}})}{\text{Nitrogen in Air (0.79)}} \right| - 10_{\text{msw}}$$

$$\text{END}_{\text{msw}} = 23.3_{\text{msw}}$$



# Planning Nitrox Dives Maximum No-Stop Time

Looking at the IANTD Air Decompression table we find that on a dive with an END of 76 fsw / 23.3 msw you can stay a maximum of 25 minutes.

(A)	40	50	60	70	80	90	100	110	120	130	140	Depth (Feet)	Repetitive Group ↓								
	12	15	18	21	24	27	30	33	36	39	42	Depth (Meters)									
	125	75	51	35	25	20	17	14	12	10	9	No Decompression Limits (Minutes)									
(B) BOTTOM TIMES	19	16	14	12	11	10	9	8	7	7	6		A	00:00 01:59	02:00						
	25	20	17	15	13	12	11	10	9	8	7		B	00:00 00:19	00:20 01:59						
	37	29	25	22	20	18	16	11	10	9	8		C	00:00 00:09	00:10 00:24	00:25 02:59	03:00				
	57	41	33	28	24	19	17	14	12	10	9		D	00:00 00:09	00:10 00:14	00:15 00:29	00:30 02:59	03:00			
	82	59	44	35	25	20							E	00:00 00:09	00:10 00:14	00:15 00:24	00:25 00:44	00:45 03:59	04:00		
	111	65	51										F	00:00 00:19	00:20 00:29	00:30 00:44	00:45 01:14	01:15 01:29	01:30 07:59	08:00	
	125	75											G	00:00 00:24	00:25 00:44	00:45 00:59	01:00 01:14	01:15 01:39	01:40 02:09	02:10 11:59	12:00
													H	00:50 01:04	01:05 01:34	01:35 02:09	02:10 02:59	03:00 03:59	04:00 05:39	05:40 23:59	24:00
													K	03:00 03:59	04:00 04:59	05:00 05:59	06:00 06:59	07:00 07:59	08:00 09:19	09:20 38:59	39:00
													L	06:00 06:59	07:00 08:29	08:30 09:59	10:00 11:59	12:00 13:59	14:00 16:29	16:30 47:59	48:00
(D) REPETITIVE GROUP AT END OF S.I.												G	F	E	D	C	B	A			



# *Planning Nitrox Dives Oxygen Clock*

$$\text{CNS\%} = \frac{\text{Time at depth}}{\text{NOAA Single Exposure Time at a specific PO}_2} \times 100$$

$$\text{CNS\%} = \frac{25 \text{ Minutes}}{150 \text{ minutes}} \times 100$$

$$\text{CNS\%} = 16.7\%$$



# *Planning Nitrox Dives Decompression Table Notes*

- You can change between the IANTD Air Table and the IANTD nitrox tables.
- The repetitive nitrogen table, the lower portion of the table, used **must be** that for the gas used on the repetitive dive!"
- You **cannot** change between IANTD tables and other dive tables.



# *Operational Aspects Scuba Equipment*

*"As long as the oxygen content of the  
breathing mixture entering the cylinder is*

***40% or less,***

*all scuba equipment can be used without oxygen cleaning!"*

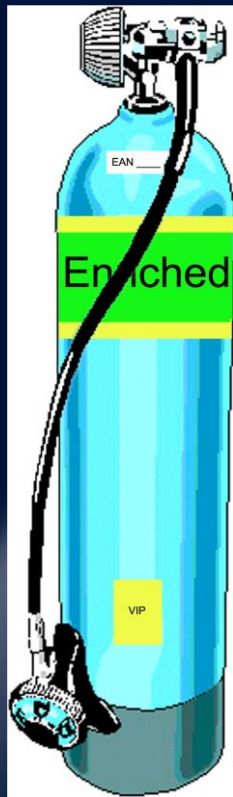
**However, the scuba cylinder should be dedicated to  
nitrox use and color coded.**

## **Caution!**

**Gas Mixtures Cannot Be Partial Pressure Blended Directly In Scuba Cylinders  
That Have Not Been Cleaned And Designated For Oxygen Service!  
Equipment Must Meet Manufacturer Specifications.**



# *Operational Aspects Cylinder Labeling Requirements*



**Content sticker**

**Enriched Air Nitrox  
Designation Sticker**

**Visual Inspection sticker**



# Operational Aspects Gas Analysis

- All nitrox cylinders must be analyzed for the oxygen content
- To build in safety, use the 1% rule



# Operational Aspects Gas Analysis

- Your IANTD facility will require you to record your gas analysis in a fill station log

OCEANIC VENTURES, INC.  
EANK BUNKO LOG

Customer	Customer Name	Customer Code	EANK No.	Pressure	Amount	Release Equipment	Date	Amount	Scale Pressure	Station	Date	Amount	User Signature	Date
N8	OLIT	367	367				1/10/01	37.4	0.8		1/10/01	37.4		1/10/01
N7	DELSON	367	367				1/10/01	37.4	0.8		1/10/01	37.4		1/10/01
N6	DELSON	367	367				1/10/01	37.4	0.8		1/10/01	37.4		1/10/01
N5	DELSON	367	367				1/10/01	37.4	0.8		1/10/01	37.4		1/10/01
N4	DELSON	367	367				1/10/01	37.4	0.8		1/10/01	37.4		1/10/01
N3	DELSON	367	367				1/10/01	37.4	0.8		1/10/01	37.4		1/10/01
N2	DELSON	367	367				1/10/01	37.4	0.8		1/10/01	37.4		1/10/01
N1	DELSON	367	367				1/10/01	37.4	0.8		1/10/01	37.4		1/10/01
N0	DELSON	367	367				1/10/01	37.4	0.8		1/10/01	37.4		1/10/01



# *An Additional Warning*

Remember

# *OXYGEN*

will not be as forgiving as nitrogen!

Convulsions can occur without warning,  
so **do not** push the limits.



# *A Final Thought*

**Congratulations on completing the  
IANTD Nitrox Diver course.**

**You have a whole underwater world awaiting  
you. Your IANTD Instructor & IANTD  
Professional Dive Facility are here to help you  
expand your horizons. As Mark Twain said:**

***Explore! Dream! Discover!***





*The leaders in diver education!*

