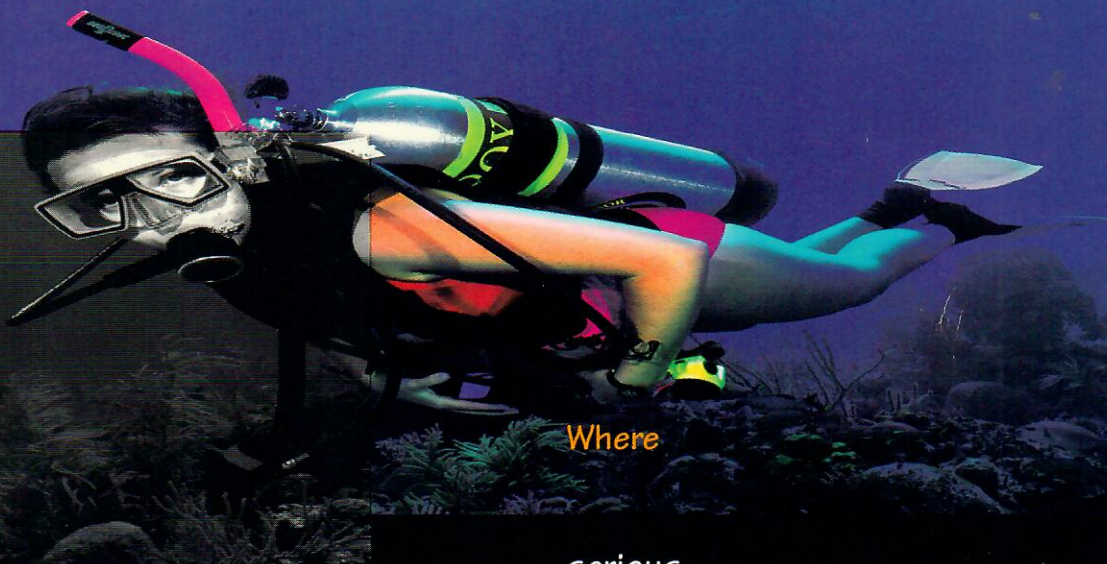


NAUI NITROX: A Guide to Diving with Oxygen Enriched Air

By R.W. Bill Hamilton, Ph.D., and Joel D. Silverstein




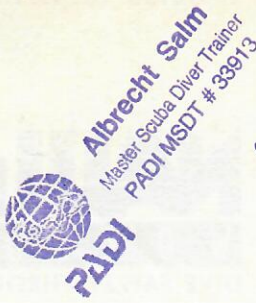
Where

serious

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NAUI 
WORLDWIDE
DIVE SAFETY THROUGH EDUCATION



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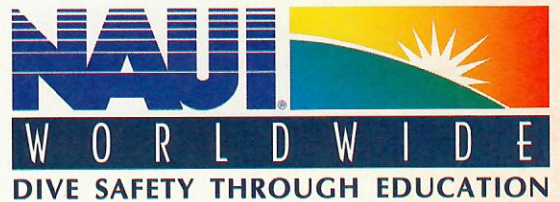


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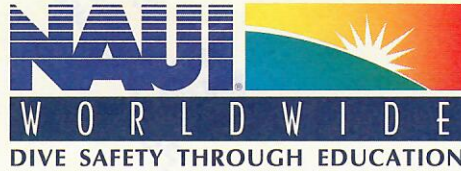
NAUI Nitrox:

A Guide to Diving with Oxygen Enriched Air

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National Association of Underwater Instructors

1st Edition

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R.W. Hamilton, Ph.D., and Joel D. Silverstein

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NAUI Nitrox: A Guide to Diving with Oxygen Enriched Air is a comprehensive text that focuses on the practical information a diver needs to know to use oxygen enriched air. The text is presented in 14 chapters. It reviews gases, explains the all-important concept of partial pressure, covers oxygen physiology as well as oxygen limits and tolerance techniques, tells how to select the right mix and to have the right amount of gas, includes both procedures and tables to manage no-stop dives, incorporates dive computers and dive planning software, reviews mixing and how to obtain a tank of enriched air, and provides an introduction to technical diving, as well as contingency procedures. An appendix includes several useful tables supporting the topics just mentioned, a glossary of terms, and a bibliography that also includes cited references. Specific learning goals are stated at the beginning of each chapter. Review these carefully before and after studying each chapter to make sure the educational goals are met.

When this text is used as part of a course of instruction your instructor may schedule the course in a sequence different from that presented here, for logistical purposes. However, the chapters are to be studied in the order presented since each new chapter builds on the previous one. In any event, we encourage you to use this text as your guide to diving with oxygen enriched air and to reference it often. The authors also encourage you to seek out the information that is available from the many fine texts in the reference section, and encourage you to learn all that you can about this subject. If you have a specific question, you are welcome to contact the authors by electronic mail.

This book is not intended to teach all the techniques and knowledge necessary for diving with oxygen enriched air without the guidance and supervision of a qualified NAUI instructor. Local knowledge, techniques, and regulations for all areas cannot possibly be incorporated into this one text. This publication provides only part of your education for diving with gas mixtures other than air. Much of what you will learn about oxygen enriched air will come from this text. However, your instructor will provide valuable demonstrations, present diving techniques, and share personal experiences that are not possible to present in a text.

Thus far in your diving education you have learned the fundamentals of diving. You know what should and should not be done and you understand some basic diving theory. You are qualified to dive in conditions similar or more favorable to those in which you have received training. The purpose of this book, when used as part of a course of instruction, is to increase your understanding of why certain things are or are not done in diving and to expand your skills and qualifications. Upon successful completion of this course you will be qualified to conduct dives using oxygen enriched air and engage in additional diving activities and programs.

About the NAUI Enriched Air Nitrox Diver Course

About the NAUI Enriched Air Nitrox Diver Course

The NAUI Enriched Air Nitrox Diver course is an intensive program consisting of approximately eight hours of academic sessions plus the application of the knowledge acquired through up to three open water dives. The knowledge you acquire will help make those experiences safer and more enjoyable. One dive is to be a repetitive dive. NAUI strongly recommends that the partial pressure of the oxygen enriched air used during training dives not exceed 1.4 atm.

Responsibilities

Both you and your instructor have certain responsibilities during the NAUI Nitrox Diver course. Your instructor must determine that you have the necessary background and experience to safely participate in the activities of this course, provide an academic session plus an on-site briefing for each activity, ensure that you are properly equipped for the training dive, and oversee your diving activities.

In a specialty diver course it is understood that you are already certified to dive with a buddy, and you will be responsible for your own safety. It is not the responsibility of your NAUI instructor to accompany you during all of the dives, although he or she must be present at the dive site, in control of the activities, and ready to lend assistance if needed. You will be instructed what to do, how to do it, and how to avoid potential hazards. It will then be your responsibility to follow the instructions given. You will learn by doing activities at dive sites selected by your instructor.

Getting the Most From the Course

1. Read and study the assigned section prior to the academic session on the subject matter.
2. Keep the learning objectives in mind as you study, then review them after completing the chapter to be sure you have acquired the knowledge.
3. As you study, keep notes on areas that are unclear to you, so you can obtain clarification from the instructor during the academic sessions.
4. Become familiar with the "New Terms" identified at the beginning of each chapter. When a term is presented a second time in normal text, refresh your memory of its meaning if it is unclear to you. The terms are defined in the glossary if you are unable to locate them quickly in one of the sections.
5. Obtain a notebook and take it with you to every session, including the open water dives. Note pages that fit into your NAUI Deluxe Log Book are an excellent choice. Save your notes for future reference. These notes will be especially useful should you decide to pursue leadership training, and in additional training programs you may participate in.

NAUI Nitrox: A Guide to Diving with Oxygen Enriched Air

6. Log your dives in detail. Your instructor will provide you with underwater activities and skills that you will perform during your training dives. Keep a detailed record of those activities as proof of your successful completion of that training.

We commend you on your decision to become a NAUI Enriched Air Nitrox Diver. You must do more and learn more to acquire this rating of an Enriched Air Nitrox Diver than you would with other training organizations, but we feel you will agree that it is worth it! A NAUI Enriched Air Nitrox Diver is knowledgeable, skilled, and respected. You will know more, be able to do more, and feel more comfortable and confident as a diver when you have successfully completed this program; you will have met one of the highest standards of diver education.

WARNING

Scuba diving is an adventure activity with inherent risks of serious personal injury or death. Good training and good equipment can help to minimize those risks, but there is no guarantee that these risks can be completely eliminated. The code of the responsible NAUI Enriched Air Nitrox diver states that:

You must accept responsibility for your own actions and safety during every dive.

You must dive within the limits of your ability and training.

Evaluate the conditions before every dive; assure that they fit your personal capabilities.

Be familiar with and check all equipment before and during every dive.

Personally analyze or directly observe the analysis of the breathing gas you will be using.

Always dive with an alternate air source.

Know your dive buddy's as well as your own ability level.

A note about Units

In most cases involving units we attempt to include both Imperial and S.I. (metric) units. The conversion between fsw and msw is for the pressure units, not the units of length, so is 3.2568 fsw/msw. Where ranges of depth, etc., are included the conversion is rounded and may not be exact. Gas partial pressures are given in atmospheres; the metric near-equivalent of an atmosphere, the bar, is not exactly one atmosphere, it is not a valid S.I. unit, nor is it equal to sea level pressure, therefore we use atmospheres.

You are about to embark on one of the most exciting and challenging areas in scuba diving—oxygen-enriched air. And I can't think of any experts better to guide you than my close friends Dr. Bill Hamilton and Joel Silverstein. I can honestly say that if not for Dr. Hamilton, the world of technical and mixed gas recreational diving wouldn't have proceeded as quickly and as safely as it has. You're learning from "the man." I've put my life in Dr. Bill's hands, in the form of his expertise and table creation, many times. He's the guy NOAA, the military, and the huge international diving concerns trust with the lives of their people. Follow his advice, and learn his lessons, and you'll be diving mixed gas with the best of them.

Joel Silverstein and I have been diving together for years. His experience in exploration, dive publishing, diver safety, operations, and training is an unbeatable combination. During the growth phases of technical diving, his Sub Aqua magazine was one of the best places to learn about key issues. This book is the result of years of communicating clearly to divers. Joel's work in hyperbarics and emergency diver treatment gives him an extra perspective on safety. As an instructor who's been teaching oxygen enriched air almost since its first recreational application, Joel has heard all the questions, and developed reliable and useful answers.

This is a book we've all been waiting for. I almost wish I had written it, but knowing how much work Dr. Bill and Joel have put in, I'm glad I can read my copy along with you, and get more diving time in. You are holding the book we would have paid many thousands of dollars for not too long ago.

Use it well.

Safe diving,

Captain Billy Deans

Credits

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figure 9-6

Diving Unlimited International
figure 12-7

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INTRODUCTION



INTRODUCTION

LEARNING GOALS

In this chapter you will:

- Be introduced to enriched air mixtures for recreational diving.
- Learn how enriched air nitrox can benefit you for no-stop diving.
- Learn about some of the myths that cause confusion in enriched air nitrox diving.
- Compare no-stop air dives to enriched air dive profiles.
- Learn about the history and development of enriched air nitrox.

