Diving & ROV specialists

Analysis of the document IOGP 411 "Recommended practices for diving operations"

January 2023

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Important Note

This study is written with the only aim of informing people interested in diving activities whether the document discussed is suitable for commercial diving operations.

Christian CADIEUX - main author

20/09/21	*First publication*
23/01/23	*Reinforced the texts pages 49 & 76 and added the internet link to the UK-HSE report #30 "Development of the Analox Hyper-gas diving bell monitor"*

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1 - What is IOGP?

1.1 - Description

IOGP stands for International Organization of oil and Gas Producers.

This organization presents itself as *"The voice of the global upstream oil and gas industry that serves industry regulators as a global partner for improving safety, environmental and social performance, and also acts as a uniquely upstream forum in which its members identify and share knowledge and good practices to achieve improvements in health, safety, the environment, security, and social responsibility".*
Note that this organization currently represents 77 companies producing 40% of the world's oil and gas. So we can consider it a potent organization that does represent only the interests of oil and gas producers.

1.2 - Structure

The elements below are those indicated on the website of the organization. Most texts are those of the organization

1.2.1 - Management Committee

IOGP's Management Committee is responsible for the association's overall strategy and direction. It provides guidance on policy, work plans, finance and communications.

1.2.2 - Committees

The organization is organized in a dynamic network of standing committees, subcommittees, and task forces (TF) that manage the exchange and dissemination of what they consider good practices through publications and events worldwide. This work is primarily done by a staff of members of the organization with support from the secretariat. They all report to the Management Committee and are organized as follows:

- Decommissioning committee:
  Many offshore structures are coming to the end of their operational lives. This committee focuses on benchmarking the decommissioning process, assessing any environmental implications.
  This is done by:
  - The identification and resolution of engineering and environmental issues.
  - The sharing of experiences, proven technologies, and cost-effective strategies.
  - The evaluation of regulatory developments that may have a direct or indirect bearing on decommissioning.
  - The liaison with other IOGP committees on safety and environmental aspects of decommissioning.

  Some of the Committee's work may be done through joint industry projects.
- Environment committee
  This committee is dedicated to identifying and addressing current and future environmental challenges and opportunities facing the industry. It focuses on the following areas:
  - The development and promotion of practices that improve environmental performance.
  - The scientific investigations, analyses, and researches to develop appropriate risk management approaches.
  - The development and advocation of the industry's position to inform regulatory changes with environmental implications and enhance the industry's license to operate.
  - The engagement with regulators and relevant stakeholders to identify/address concerns, raise awareness and encourage fact-based decisions.

  These activities include:
  - The access to new and known hydrocarbon sources.
  - The management of the environment.
  - The monitoring of the regulatory developments and the advocacy positions.

  The committee has the following subcommittees and task forces:
  - Bio diversity and ecosystem services working group
  - Environmental data
  - Environment regional seas
  - Sound and marine life
  - Carbon capture and storage (CCS) monitoring (jointly with the Geomatics and Metocean Committees)
  - Drill cuttings management
  - Energy efficiency indicator
  - Habitat retention (jointly with Decommissioning)
  - Mediterranean
  - Methane recommended practices
  - Micro-plastics
  - Risk-based assessment for produced water

    - Arctic Network

- European committee
  The European Committee’s key long-term strategic aims are to facilitate:
    - The safe, responsible, and profitable performance of members in Europe.
    - A favourable environment for members to bring to the European market oil and gas they have produced elsewhere in the world.
    - Open energy markets with sound environmental and social policies

  The committee does this by engaging in dialogue with the European institutions such as the commission, the parliament, and the council.
  The European Committee has several subcommittees and task forces dedicated to specific issues:
    - Carbon Capture & Storage (CCS) subcommittee
    - Corporate governance, transparency & reporting subcommittee
    - Energy & climate subcommittee
    - Energy market subcommittee
    - European Union marine & environment subcommittee
    - Upstream subcommittee
    - Financial regulation task force
    - Air quality & methane network
    - Emissions trading (ETS) network

- Geomatics
  Oil & Gas business decisions, personnel safety, assets, operational activities, and protection of the natural environment are often dependent on having complete, correct, consistent, and current information of the operating locations and areas of interest.
  Geomatics combines Survey & Positioning and Geospatial data management and provides accurate positioning and mapping support across the full O&G life cycle.
  The Geomatics Committee aims to help members by:
    - Developing and disseminating good practice.
    - Providing a forum for exchanging experiences and knowledge.
    - Influencing regulators and standards organisations.
    - Maintaining industry standard position exchange formats and a geodetic parameter database.

  The work of the Geomatics Committee is executed through its subcommittees and temporary task forces covering the following topics:
    - Practical geodesy, including Geodetic Parameter Dataset (EPSG), and geodetic guidance notes
    - Geo-Information, including Seabed Survey Data Model (SSDM), Land Survey Data Model (LSDM), data model and common operating picture for oil spill response.
    - Earth observation, including OGEO Portal
    - Geophysical operations, including P-Formats (position data exchange formats) and Guidelines for the conduct of offshore drilling hazard site surveys
    - Surveying and positioning, including guidelines for Global Satellite Navigation Systems (GNSS) positioning and well bore survey data exchange format
    - Geospatial Integrity of Geoscience Software – GIGS.
    - liaison with industry associations.

- Health committee
  The Health Committee develops guidance and recommendations on occupational, environmental, and public health issues such as:
    - The issue of fatigue.
    - The collection of data on leading health indicators.
    - The management of infectious diseases.
    - The company-contractor relationship in health and hygiene management.
    - The promotion and support of health integration into the everyday business of member companies and the communities in which they work.
    - The promotion of health leadership and supporting members and the wider industry in the most cost-effective manner

- Metocean committee
  Offshore facilities and infrastructure need to withstand the forces of winds, waves and ocean currents over the 30-40 year life span of a producing field. That is why offshore structures and infrastructure design, construction, operation, maintenance and decommissioning are critically dependent on a thorough understanding of all the forces that prevail in the marine environment.
  IOGP’s Metocean Committee encourages a better understanding of the value of applied oceanography and meteorology

both within and outside the industry. It promotes use of sound metocean techniques in offshore and onshore structure design and operations. Its activities include:
  - The critiques of existing and proposed rules and regulations of government agencies and certification societies.
  - The provision of a focal point for communicating industry requirements to relevant regional and global organizations.
  - The development of appropriate metocean standards in safety and engineering.
  - The analysis techniques for developing metocean design criteria. These include joint probability, hind casting, instrumentation, methods of observation, and remote sensing of data. In particular, the Committee highlights cost-effective techniques such as improved data collection methods and the use of numerical models.
  - The discussion of ongoing regional upstream metocean projects and helping to initiate metocean research.

- Safety committee
  IOGP says that this committee promotes the integration of safety into every aspect of exploration and production operations. It also provides the benchmarks against which to measure improving safety performance and aims to:
  - Promote the integration of safety into the everyday business of IOGP member companies and other E&P companies, contractors, and service companies.
  - Promote a level playing field for safety across the industry that is recognized by global regulatory authorities.
  - Position itself as a leader on safety issues of global significance.
  - Provide information that can be shared with regulators and other stakeholders to improve the industry's performance.

  The Safety Committee achieves this by:
  - Providing practical tools and guidelines to advance safety performance.
  - Promoting good practices and the sharing of lessons learned.
  - Dialogues with the intergovernmental authorities that regulate the industry.

  This committee works closely with other IOGP committees, national industry associations and industry trade associations, through the following subcommittees and task forces
  - Aviation subcommittee
  - Diving operations subcommittee
  - Geophysical subcommittee
  - Human factors subcommittee)
  - Land transportation subcommittee
  - Process safety subcommittee
  - Safety data subcommittee
  - Learning to prevent incidents task force
  - Life-saving rules task force
  - Managing HSE in a contract environment task force
  - Process safety fundamentals task force
  - Risk assessment data directory task force
  - Fabrication site – construction safety practices network
  - Process safety fundamentals task force
  - Risk assessment data directory task force
  - Fabrication site – construction safety practices network

- Security committee
  Security is defined as identifying, evaluating, and managing threats and risks arising from intentionally directed actions against people, assets, information, operations, and reputation regardless of the cause.
  The primary objective of this committee is to provide a safe and secure operating environment by mitigating security threats. This is achieved by implementing robust threat and risk assessment processes and minimizing the impact from security-related incidents, should they occur.

- Standards committee
  IOGP says that the Standards Committee promotes consistent, efficient, and effective upstream oil and gas industry standards worldwide. This is done through cooperation with national regulating bodies as well as the International Organization for Standardization (ISO) and the International Electrotechnical Committee (IEC), which are ultimately responsible for publishing the standards. It is also achieved by monitoring, coordinating, and influencing the development of international standards to meet the needs of IOGP members.
  IOGP also says that the primary aim of this committee is to provide the oil and gas industry with a series of added-value international standards that are globally recognized and used locally worldwide. It is composed of the following subcommittees and task forces:
  - Administration task force.
  - Test methodology task force.
  - Coatings subcommittee.

- Digitalisation & information subcommittee.
- Electrical subcommittee.
- Global equipment hub task force
- Supplementary specifications task force
- Industry digitalisation roadmap task force
- Instrumentation & automation subcommittee
- Global certification task force
- Material and corrosion subcommittee
- Non-metallics network
- Offshore cranes task force
- Offshore structures specifications task force
- Offshore structures subcommittee
- Operators' preferred standards task force
- Piping & valves subcommittee
- Product lifecycle management task force
- Requirements digitalisation task force
- Wave crest task force

- Subsea installation committee
  The purpose and vision of the subsea committee is to improve HSSE (Health, Security, Safety, Environment) performance, and contribute to value creation with a focus on two priority areas with two supporting themes:
  - HSSE: performance improvement through production efficiency & lifetime extension
  - SSI (Simplification, Standardization, Industrialization): Technology application through qualification alignment and supplier engagement

  This committee provides member companies with a forum for dialogue on the diverse challenges, issues and opportunities associated with the committee's objectives.
  The Subsea Committee includes SURF (subsea facilities from tubing hanger to boarding valve, umbilicals, risers, and flow lines) and underwater portion of export systems (pipelines, risers, isolation valves, etc.). The scope of work encompasses design, manufacture, installation, operation and decommissioning, including integrity, reliability, production efficiency and obsolescence of the facilities over their entire lifecycle.
- Wells committee
  IOGP says that this committee aims to be the global voice of well operators and a relevant and effective technical authority on the prevention and mitigation of high consequence well control events.
  The purpose of the Wells Expert Committee (WEC) is to improve well operators' effectiveness in the prevention and mitigation of high consequence well control events throughout the well life cycle, but particularly during well construction and well work, recognising that such events pose the highest global risk to safety, to the environment, and to the industry's license to operate.

1.2.3 - Secretariat

The Secretariat is split between IOGP's registered office in London and Brussels office. IOGP staff provides management, administrative and technical support to committees and task forces.

2 - Purpose of this study

IOGP 411 “Recommended diving practices 2021" replaces the initial diving guidelines published in June 2008 by the Diving operations subcommittee of the Safety Committee.
According to IOGP, its purpose is to ensure a consistent approach to training, management, and best practice worldwide. Thus, we can say that this document is planned to be used as a reference for the members of the association, their contractors, and also other organizations.
To be realistic, this document is imposed on diving contractors working for IOGP members. Due to this fact, it has become a reference most manual writers are obliged to indicate, except, of course, those who write manuals dedicated to companies working in other markets. However, does this publication really merit being considered a reference? It is a question manual writers and divers may ask.

Based on the question above, the purpose of our analysis is to ensure that this publication meets the targets its authors pretend to have reached. However, instead of being done by petroleum companies department managers, this analysis is done by a manual publisher who has collected and faithfully reported remarks of diving client representatives, diving supervisors, divers, and scientists, whose names are kept confidential to protect them against possible pressures from their employers and IOGP.
Thus, we can say that this analysis is made by people who have to implement this document whose opinion is too often not taken into account. The reason is that we can consider that it is not because a publication has been emitted by an organization representing several multinational companies that individuals have not the right to analyze it and highlight its weaknesses if there are some.
As a result, this study is a technical analysis that can be used by every person who desires to make a self-opinion of this IOGP publication.

Note that this study, which has been written sincerely, does not talk about the activities of this organization that are often sources of discussions from divers and company managers, such for example:

- The suitability of its management system, and whether its activities are really beneficial for its members?
- Whether the articles it publishes are written by people who are not under conflicts of interest? Note that employees of the organization or its members are by fact under conflicts of interest!
- Whether its influence on national and corporate organizations is really beneficial?
- Whether it is desirable to let only one or a few organizations lead our profession?
- Whether an organization that groups the interests of some of the richest multinationals is legal and desirable?
- Whether states are sufficiently powerful to impose the point of view of their citizens?

However, this analysis may be used by others to answer these questions.

3 - Study process

3.1 - Elements taken into account

Writing a manual is a complicated exercise that many people think easy, and only a few of us are able to perform it correctly. There are a lot of excellent divers and technicians who are not able to put their immense knowledge on paper. As a result, we can see that a lot of company manuals are poorly written. That must not be the case with an association such as IOGP representing some of the most potent petroleum companies in the world. For this reason, and considering what this organization pretends to be, we can assume that this document must be an example of excellence and should:

- Be easy to read and understand.
- Explains what are diving operations and the systems used for these operations
- Explains when manned diving operations are to be preferred to others
- Be based on the latest reliable standards and scientific researches.
- Give precise, safe, and useful guidelines and explains the reason for these guidelines.
- Be consistent.
- Promotes new equipment that may improve the safety of the divers. Note that promotion does not mean authoritative measures.
- Promotes working processes that simplify the methods of work and improve the safety of the divers.
- Be easy to find

3.1.1 - Ease of reading

There are two types of authors: Some write documents to prove that they are intelligent, and some others try to explain something to people with the hope that their explanations are comprehensive and what they write can be useful to others.
Of course, we prefer and promote the 2nd category of authors. However, to reach the goals indicated above, document writers must apply some basic rules:

- Documents that are designed to be internationally distributed must be understood by all readers. For this reason, the vocabulary and the grammar used must be simple. Also, because the education of people is different from one country to another, some words must be chosen with precaution or explained to avoid misinterpretation. Note that American and United Kingdom English have small differences with the writing of some words. However, we consider that these differences are not fundamental as long as grammar rules are respected and the sentences' understanding is correct. English is the international language used in the offshore diving industry, and there is no rule saying that one orthography is to be used to the detriment of the other. I use both of them in my documents with the consent of my proofreaders, who are American.
- It is also essential to suggest to which public a document is written.
- The fonts' size and the format of the publication must allow easy reading and printing.
- A technical document must be as pleasant to read as a novel. For this reason, a few rules that are promoted by grammar institutions must be followed:
    - The plan must provide a logical progression of the topics discussed and be easy to understand, so a reader who does not know what is discussed can acquire this knowledge step by step and become fully informed at the end of the document. This plan should be displayed in the table of contents except if only a few points are discussed.
    - It is sometimes necessary to refer to other documents. If it is the case, it is recommended to describe the topic discussed and provide sufficient information not to oblige the reader to interrupt his reading to collect the missing information on another document he may not have.
    - Acronyms are often used in technical documents. The purpose of using acronyms is to facilitate the writing and reading of names that are difficult or long to pronounce and are repeatedly used in the text. They are massively used by militaries who employ them to describe their equipment and operations; for example, SONAR that describes equipment used to detect the bottom's proximity, underwater vehicles, and fish, means "Sound Navigation and Ranging". Social media development has increased abbreviation usage by some people and institutionalised some bad habits, such as changing the orthographic form of some words. For example, "U" is used to replace "you". Such writing habits must be banished from official documents, and acronyms that describe equipment and procedures must be used according to the following rules that come from recognized grammar organization:
        - Abbreviations must be used only when they are useful for the ease of reading and the comprehension of a text. As an example, it is unnecessary to replace a well-known name easy to pronounce with an acronym. It is also unnecessary to create an abbreviation to replace a word of 4 - 5 letters.
        - When acronyms are used, the standard rule is to explain their meaning in brackets the first time they are used in the point or in the chapter, so the reader does not need to return to a glossary to understand what the text is speaking. That may have to be renewed several times in a document with the same acronym used for different topics. It is considered incorrect to display such abbreviations in a glossary at the beginning of the document and use them without displaying their meaning in the text to be read.
        - It is unnecessary to provide acronyms of names that are used only a few times in the text. In this case, it is better to use the names in full when they are employed.
        - Note that the use of a glossary of abbreviations is not a grammar obligation. Many book authors do not use

this practice and explain abbreviations in their texts as indicated above. It is what we do in our documents. Such a method has the advantage of being less stressful for the reader and avoid forgetting some definitions of acronyms.

- Technical explanations must be provided in publications written for all publics.
- Drawings, schemes, and tables should be used to reinforce the clarity of the explanations.

3.1.2 - Supporting scientific papers and norms

A technical document must be based on scientific facts, and it is necessary to prove it:

- It is usual to indicate some of the sources from which the paper is built at the end of the document and/or in the texts.
- It may happen that scientific papers taken as references open to discussion. In this case, it is essential to prove that their authors are not under the influence of pressure groups.
- The author of a document may modify an existing procedure. In this case, the modifications must be described and motivated so the reader can validate them. Note that it is uncommon to downgrade safety procedures. Also, methods based on believes or assumptions that cannot be scientifically proved must not be published.

3.1.3 - Promotion of new technologies and procedures and their implementation

It is vital that professional organizations push contractors to invest in new technologies and procedures that can be beneficial for the well-being of their personnel and increase their productivity. Two processes can be implemented for that:

- The authoritarian method consists of imposing rules. When such a procedure is implemented, the reason for the set rules must be justified and explained.
  The authoritarian method has the advantage of obliging workers to use equipment and procedures that have been certified beneficial for their safety and well-being when they are reluctant to do it. However, it has the inconvenience not to be well perceived by people who may feel constrained and favour big companies to the detriment of middle-sized and small contractors when costly investments have to be done. Thus, that may result in an inequality some clients may use to pre-select their contractors, but that can be perceived as unfair.
- The soft method consists of implementing new equipment and procedures by suggestion. That is usually done by demonstrating their advantages.
  New procedures and equipment implemented through such a process are usually more accepted by people who often have the feeling that these things come from them. It is also more equalitarian as small companies have more time to organize in case investments have to be done. However, persuading people is usually a long process that may not be successful. For this reason, a lot of organizations use the soft method first and then the authoritarian approach.

The following elements have been taken into account during the evaluation of the document:

- New technologies that improve the working conditions of the divers and their supporting teams are suggested in the document.
- The selected mandatory systems and procedures are justified and adequately explained so the reader can understand its advantages and the reasons for its implementation.

3.2 - Evaluation process used for this document

The structure of the document and its texts have been all checked.

For convenience, specific forms have been used where document's texts are displayed in the left column (see #1 below) and our comments in the right column (see #2).

The document's page number and its purpose are indicated at the top of each form (See #3). It happened that long comments were necessary. In this case, several records were used for the same page.

The comments indicate only things that are incorrect or need to be improved. However, a few comments provide additional explanations of correct texts. In this case, they are written in green colour.

Some pages and paragraphs needed several comments. In this case, reference numbers were used.

3 **Page # of the document IOGP 411 - January 2021**	
Purpose: ***This page provides ….***	
Text document IOGP	**Our comments**
Topic #1 1	2
Topic #2	

The document has been thoroughly checked when received. However, we know that comments that are done after a first reading must be reviewed: Several things we may not like at first can be then seen as good ideas, and the initial comments may need to be improved. When the first comments have been made, the forms have been transmitted to all checkers who were free to add their comments and give their advice on those already done.
A final revision has been then performed that has taken into account all the comments.
This process explains why this study is available only several months after the publication of the IOGP document it describes.

Hyperlink Table of contents

4 - Result of this study and comments

4.1 - Ease of downloading and presentation of the document

4.1.1 - Downloading

IOGP 411 can be downloaded using the following link. https://www.iogp.org/bookstore/product/recommended-practices-for-diving-operations/ . Also, this document is not difficult to find on the organization's website:
From the home page click on "Publications", when this page opens, click on "Publications library", in this new page , select "safety", then select "Recommended Practices for Diving Operations" (IOGP 411). Then a window opens where the person has to provide data such as names, company, employment, email address, and document usage. A link is then provided on the same page from which the document can be downloaded. Thus, we can say that finding this document is not difficult. Another good point is that it is available free of charge.

4.1.2 - Presentation

The document is published in A4 format. The font family is arial, and the size of the main texts is 11. As a result, the texts are visible enough to be read from a normal reading distance.

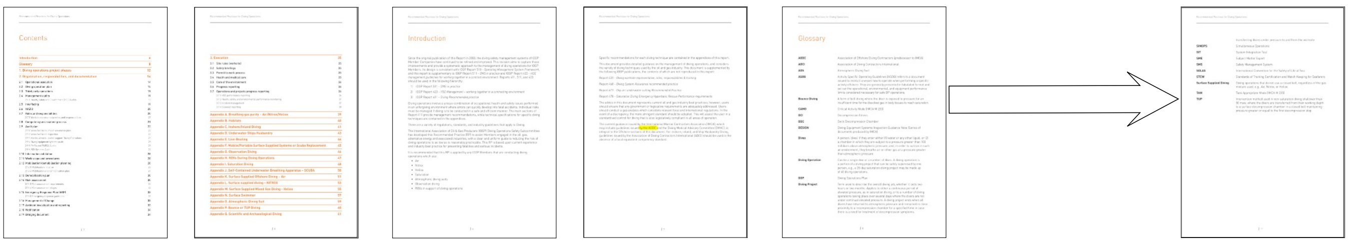
Page #1 is the cover. It is made of an assembly of underwater photos

Page 2 provides legal and usual points such as:

- Acknowledgements
- About (indicates the purpose of the documents)
- Feedback (in this point, it is said that feedbacks are welcome, and that this publication is made available for information purposes and solely for the private use of the user)
- Copyright notice, which is the legal text that indicates that this document can be reproduced in whole or in part provided that the copyright of IOGP and the sources are acknowledged.

Note that there are no drawings, photos, and schemes that could help the reader to understand the content of the texts and make them more attractive. Thus, we can say that these missing items has an influence on the comprehension of the texts but also make them not very attractive to the reader.

Page #3 displays the document's title, and pages #4 and #5 display the table of contents. These two pages are followed by two pages (#6 & #7) that describe the document and four pages (#8 to #11) that provide a glossary.

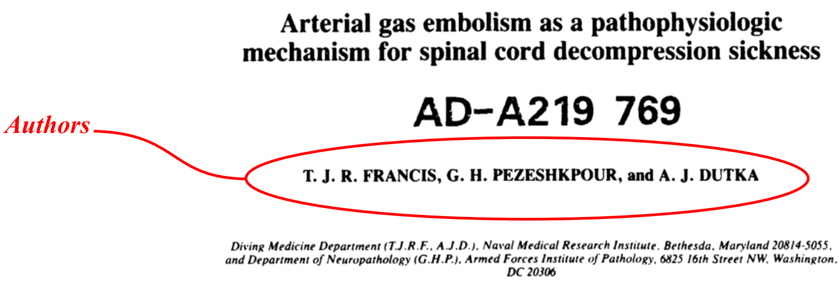


Pages #4 & #5: Contents *Pages #6 & #7: Introduction* *Pages #8 to #11: Glossary*

We will return to the content of these pages later, but what we can say regarding the presentation of this document is that the glossary should be displayed before the pages #4 & #5, because not explained terminologies and acronyms are used in the tables of contents and the two pages that describe this document. Another option is not to use a glossary.

Points 2.4, 2.7, and 2.15 of the table of contents discuss only one topic. For this reason, sub-points 2.4.1, 2.71, 2.15.1 should not exist as there is no sub-points 2.4.2, 2.7.2, and 2.15.2.
Other points in the table of contents that are not logically organised are the appendix that describe the types of diving operations that can be performed. This is linked to what seems to be a lack of knowledge or comprehension of diving operations, which impacts the general organization of the document. We will return to these problems in the next points.

IOGP says that this recommended practice guide was produced by the "IOGP Diving Operations Subcommittee", reporting to the "IOGP Safety Committee". The problem is that we do not know who are the real authors of this document.
Not disclosing the names of the persons who have generated guidelines becomes usual with some organizations. However, that is in opposition to the rule in force with most companies and imposed by many IOGP members that require that the authors of a publication are displayed. It is also in opposition with most scientific studies where the authors indicate their names, like the example below.



Arterial gas embolism as a pathophysiologic mechanism for spinal cord decompression sickness

AD-A219 769

T. J. R. FRANCIS, G. H. PEZESHKPOUR, and A. J. DUTKA

Diving Medicine Department (T.J.R.F., A.J.D.), Naval Medical Research Institute, Bethesda, Maryland 20814-5055, and Department of Neuropathology (G.H.P.), Armed Forces Institute of Pathology, 6825 16th Street NW, Washington, DC 20306

IOGP May have decided to protect the authors of this document from external pressures. If it is the reason, it should be indicated, and at least the name of the main authors should be displayed.

Regarding the audience of this document, it is said in point “About” that *“this report provides a framework for a systematic approach to the management of diving operations”*. So, we can consider that this document is designed first for managers involved in diving operations.

4.2 - Ease of reading

4.2.1 Texts comprehension and cultural compliance

The sentences do not require a very elevated level in English language to be understood.
However, some terminologies should be reviewed to make this document more neutral and not appearing pretentious to people who are not from western cultures:

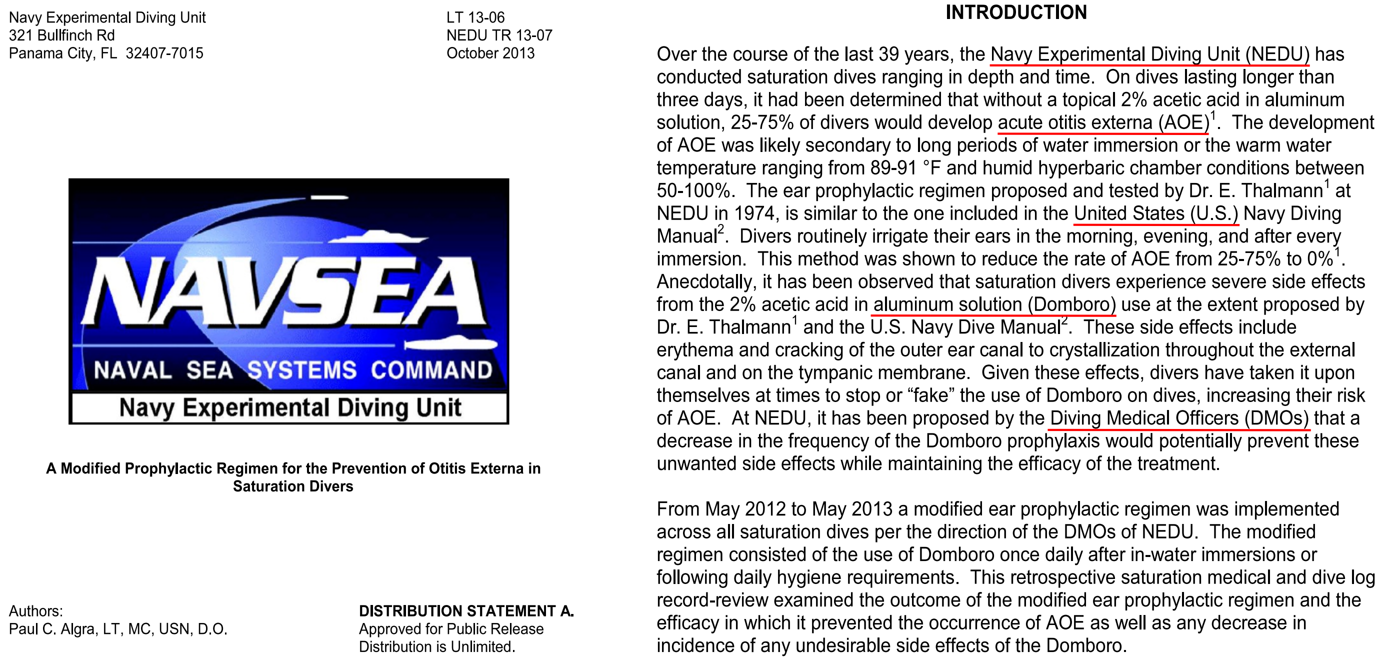
- Depending on cultures, the word “recommended” is diversely interpreted; Some people consider it a rule, and others that it is just advice. For this reason, it would be judicious to add definitions such as those from the Cambridge Dictionary, which are: “A suggestion that something is good or suitable for a particular purpose or job”, or “Advice telling someone what the best thing to do is”. These definitions could be displayed in point “About” with the text “This publication is made available for information purposes and solely for the private use of the user”, which would be in a better place here than in “Feedback”. By doing this, the reader is informed of the extents of the document.
- The word “shall” is massively used in this document. Merriam Webster dictionary says that this word is used to express a command or exhortation or used in laws, regulations, or directives to express what is mandatory. Thus, the usage of this word conflicts with the definition of “recommendation” and the sentence “This publication is made available for information purposes and solely for the private use of the user”. For this reason, “shall” should be replaced by “should”, which, according to Cambridge Dictionary, is used to say or ask what is the correct or best thing to do. Note that the massive use of this word by the authors indicates that they are more familiar with the writing of authoritarian documents. Opposite of that, writing guidelines is an exercise that requires some softness.
- In the introduction (page 6) the authors say: “*Diving operations involve a unique combination of occupational health and safety issues performed in an unforgiving environment where errors can quickly develop into fatal accidents”.* The word “unique” is unnecessary and should be removed from this sentence because the combination of occupational health and safety issues performed in an unforgiving environment where errors can quickly develop into fatal accidents are the conditions of many people who have to deal with dangers linked to their profession. It is, for example, the case of aircraft pilots, rope access workers, drillers, mine removers, and so many others.
- On the page above the authors say: *“This RP is based upon current experience and industry best practice for preventing fatalities and serious incidents”*. “Best practices” is a common English expression I always fight about with some of my proofreaders. The reason is how to be sure that the practices selected are the best?
  I understand that a reseller uses such an expression as it is his job to attract the attention of potential clients. However, regarding the organization of diving operations, we have to admit that someone can find something better than what we have selected. Thus, instead of saying “best practices”, I think it more appropriate and less pretentious to say “appropriate practices”, “adequate practices”, or merely “good practices”.

4.2.2 - Use of acronyms

This point is a disaster as none of the rules indicated previously is respected!

- Acronyms are not explained in the text, which obliges the reader to return to pages 8 to 11 of this document. That is highly uncomfortable and considered incorrect.
- The authors also create new and unnecessary acronyms. It is the case with SDC that means “Submersible Decompression Chamber” that replaces “diving bell’ that uses three letters when the word “bell” uses four. That obliges the divers to learn a new term. In contrast, we use “wet bell” for an opened bell and “closed bell” for those employed in saturation and transfer under pressure procedures since the beginning of this industry. This ridiculous behaviour can be considered a disease we can call “acronym abuse” or “acronym mania”.
- Acronyms are explained in a glossary that is not precisely at the very beginning of the document which is not adequate because some are used in presentation texts published before it and are not described in these texts
- The reason for this glossary is unclear as it displays acronyms that are not used in the texts, it is the case with Dive Support Vessel (DSV), Exploration and Production Industry (E & P Industry), Hyperbaric Evacuation Plan (HEP), and many others, and it does not record acronyms that are in the texts such as MOPO (Matrix Of Permitted Operations), Volatile organic compound (VOC), and others.
- Another problem is that some acronyms in the glossary are incorrectly listed. For example, FMEA (Failure Mode Effect Analysis) should be indicated before FMECA (Failure Mode Effect Critically Analysis) because FMECA is a variation of the FMEA, which is not the case here. This point is further explained in the form that records problems.
- Having a glossary is not a bad idea if it displays the names used in the document. It can also be used as a reminder of the main terminologies used in the offshore industry, and in this case, it is better to organize it at the end of the document.

As an example that demonstrate that what we say is applied by recognized scientists and organizations, the following US Navy document that can be downloaded on our website has been written by doctor Algra in 2013. There is no Glossary at the beginning of this document, and the author explains the meaning of the acronyms in the text.



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LT 13-06
NEDU TR 13-07
October 2013

NAVSEA
NAVAL SEA SYSTEMS COMMAND
Navy Experimental Diving Unit

A Modified Prophylactic Regimen for the Prevention of Otitis Externa in Saturation Divers

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INTRODUCTION

Over the course of the last 39 years, the Navy Experimental Diving Unit (NEDU) has conducted saturation dives ranging in depth and time. On dives lasting longer than three days, it had been determined that without a topical 2% acetic acid in aluminum solution, 25-75% of divers would develop acute otitis externa (AOE)[1]. The development of AOE was likely secondary to long periods of water immersion or the warm water temperature ranging from 89-91 °F and humid hyperbaric chamber conditions between 50-100%. The ear prophylactic regimen proposed and tested by Dr. E. Thalmann[1] at NEDU in 1974, is similar to the one included in the United States (U.S.) Navy Diving Manual[2]. Divers routinely irrigate their ears in the morning, evening, and after every immersion. This method was shown to reduce the rate of AOE from 25-75% to 0%[1]. Anecdotally, it has been observed that saturation divers experience severe side effects from the 2% acetic acid in aluminum solution (Domboro) use at the extent proposed by Dr. E. Thalmann[1] and the U.S. Navy Dive Manual[2]. These side effects include erythema and cracking of the outer ear canal to crystallization throughout the external canal and on the tympanic membrane. Given these effects, divers have taken it upon themselves at times to stop or "fake" the use of Domboro on dives, increasing their risk of AOE. At NEDU, it has been proposed by the Diving Medical Officers (DMOs) that a decrease in the frequency of the Domboro prophylaxis would potentially prevent these unwanted side effects while maintaining the efficacy of the treatment.

From May 2012 to May 2013 a modified ear prophylactic regimen was implemented across all saturation dives per the direction of the DMOs of NEDU. The modified regimen consisted of the use of Domboro once daily after in-water immersions or following daily hygiene requirements. This retrospective saturation medical and dive log record-review examined the outcome of the modified ear prophylactic regimen and the efficacy in which it prevented the occurrence of AOE as well as any decrease in incidence of any undesirable side effects of the Domboro.

4.2.3 - Technical explanations

Technical explanations are provided. However, the organization of the book obliged the authors to publish similar explanations at the beginning of the document and in the appendixes that are used to describe the diving procedures they have selected. Due to this configuration, the authors wrote short texts that are insufficient to describe the various operations and are unclear. So, the reader has not a precise idea of the types of procedures that can be employed and the reason for selecting one instead of another. The fact that drawings, schemes, photos, and tables are not used to reinforce the texts' clarity can be considered among the reasons that make the explanations provided confusing and sometimes not exact.

4.2.4 - Links to other documents

The authors often send the reader to another book. As an example, on page 21, in point 2.7.1 "worksite representative roles and responsibilities" they say: *"This role is integral to operational control at the worksite. Detailed requirements and expectations are given in IOGP Report 431"*
This information is too limited: There is no sufficient provided information to allow the reader to continue his reading without being obliged to open another document to understand what the author is speaking about. A summary of the essential elements of a document indicated as reference should have been provided.

The document links to sources that could not be found, and the downloading links are not indicated.
As an example, despite researches, we have not seen the "Operational guidance for Ships Husbandry" from the Association of Diving Contractors International (ADCI). Note that IMCA M 210 "Guidance for the selection of diving contractors to undertake underwater ship husbandry" could have been indicated as another reference regarding such operations.
In the same point, the authors also say: *"Oxygen, Carbon monoxide and carbon dioxide contents in any gas storage receptacles will be verified as meeting the requirements of Appendix 1"*. The problem is that Appendix 1 does not exists.

4.3 - Compliance to scientific facts and norms

There are many things to say regarding this point as the authors want to impose practices that are not based on scientific facts. Also, as indicated in the previous point, confusing explanations contribute to making the texts unclear, so a reader with limited knowledge will not be able to select and implement the relevant procedure.

4.3.1 - Confusing or imprecise texts

There are many confusing texts in this document which purpose should be to clarify the procedures in use in the petroleum diving industry. Thus, we can say we obtain the opposite of the planned target regarding the clarity of texts.

- On page 6 of the document the authors say: *"It is recommended that this RP is applied by any IOGP Members that are conducting diving operations which use: Air; Nitrox; Heliox; Saturation; Atmospheric diving suits; Observation diving; ROVs in support of diving operation"*.
  This presentation's problem is that Air, Nitrox (Nitrogen + oxygen), and Heliox (Helium + Oxygen) are gasses that must not be confused with the methods of decompression of the divers in use, such as saturation diving or surface orientated diving using a wet bell, a basket, or a ladder. Also, observation diving can be performed with every method of deployment. Reading the document, I have understood that what the authors call "observation diving" should be called "normobaric observation bell deployment": It is a method where a person is deployed in a not pressurized closed bell provided with viewports allowing 360 degrees observation, which is lowered above the bottom using a winch. It must be noted that this procedure is not commonly used since Remotely Operated Vehicles (ROVs) have become usual.
  This description fails to explain that several gasses can be used with a means of deployment depending on the depth to

reach and the physiological problems the team has to control. As an example, Heliox is used to replace air to fight narcosis, a reversible alteration in consciousness that occurs while diving at depth (> 30 m) with air or mixes using nitrogen or other narcotic gasses. Nitrox, which in divers' language means mixtures nitrogen-oxygen with a percentage of oxygen more elevated than air, are used to reduce the decompression time that is linked to the elimination of the nitrogen dissolved in the body. Even though heliox is currently the preferred gas for saturation diving for technical and operational reasons, air can be used for such operations at shallow depths. Also, heliox can be used with a diver deployed from a ladder or a basket. This description problem is further discussed in the next points as it is linked to other issues and impacts the whole publication. However, we can already say that it is related to the structure of this IOGP document. It should be preferable to start it by describing what diving operations are, the gasses used and their limitations, and the means of deployment used to avoid this confusion.

- On page #9 in point "diving project," the authors say: "*A diving project ends when all divers have returned to atmospheric pressure and remained in close proximity to a recompression chamber for a specified time in case there is a need for treatment of decompression symptoms*".
  This point is not well explained: For the contractor, a diving project ends when the divers have sufficiently decompressed to leave the surface support safely and can be returned to their home by plane or be assigned to another task without the need to be in direct proximity of a chamber. Thus when the legal period of observation time is elapsed.
  Note that the observation period should be based at the minimum on the document DMAC 7 (DMAC = Diving Advisory Committee), which is available for free on this organization's website. However, the decompression procedures used or the coastal country's laws where the operations are undertaken should be prioritised if they are more stringent. It is, for example, the case of NORMAM-15 (Brazil) or US Navy rules.
  For the client, the end of a diving project may depend on what is specified in the contract with the contractor. It often happens that the diving project ends when the surface support is outside the limits of the field and thus no more under the responsibility of the Offshore Installation Manager (OIM) in charge of the oilfield.
- When describing a technique or a physical state, it is preferable to use other words than the one that is to be explained: As an example, the authors say the following to explain "saturation Diving" on page #9: *"The diving technique used during diving operations <u>where the diver has reached the full saturation state</u> for the pressure and breathing mixture used. When this state has been reached, the time required for decompression is not further increased in relation to the duration of the dive"*.
  Divers know what a "saturation state" is so that they can partially understand the idea. Nevertheless, people not familiar with diving operations reading the document may be lost. For this reason, it is more advisable to describe this technic as follows:
  The principle of saturation is based on the fact that if a diver stays for a sufficiently long time at a given depth, the breathing gas which is absorbed by the diver's body will gradually reach the ambient pressure at this depth. When this state is reached, the diver is said to be in a state of saturation. As a result, the decompression will be the same regardless of the time spent at this depth, and the diver can work at the depth he is stored without the need to perform decompression stops as long as he is maintained at this pressure. Thus, the divers live in chambers kept at the bottom's pressure and are transferred to the bottom using a pressurized closed bell. The decompression is done at the very end of the project. This diving method allows to dive a long time and at depths that are unreachable using incursion dive techniques from the surface. One danger with this technique is that the divers cannot be exposed to the surface pressure even for a short time as such exposure would result in explosive decompression and immediate death.

Some official texts are also partially reported and used in a very authoritative manner which results in practices that are not precisely those recommended by the emitting body.
As an example, in point "Equipment" of Appendix L. Surface supplied diving – NITROX that is displayed on page 53 of the document, the authors say: *"Gas composition of the diver's bailout cylinder shall be the same as the primary breathing supply"*.
That is not precisely the words of the recommendation of the Diving Medical Advisory Committee (DMAC), which says: *"The committee recommends that the <u>maximum</u> pO_2 supplied to the diver from the bail-out bottle should be 1.4 bar. The committee recommends that the <u>minimum</u> pO_2 supplied to the diver from the bailout bottle should be the same as the pO2 in the diver's primary breathing gas mixture, with an absolute minimum of 0.4 bar."*.
Thus, nothing forbids having a "richer mix" than the one used at work in the bailout as long as it is not above the maximum value stated by the legal organization (depending on the organization and the country, from 1.4 to 1.6 bar maximum).

Other not appropriate texts are indicated in the form used to check the document. Again, the lack of drawings does not help in the comprehension of the processes described.

4.3.2 - Missing essential explanations

Essential elements for the comprehension of the procedures are missing: There is no description of the possible accidents linked to diving activities such as hypothermia, cold shocks, hyperthermia, barotraumas, oxygen poisoning, narcosis, high pressure nervous syndrome, hypoxia & anoxia, hypercapnia, drowning, decompression accidents, isobaric inert gas counter-diffusion, compression arthralgia, and many others.
Other elements missing are where diving operations are organized, and the problems posed by each type of location. The elements from the International Maritime Organization regarding the "law of the sea" and what are "territorial sea", "contiguous zone". "Exclusive economic zone", "Continental shelf", and the rights and duties of petroleum companies and coastal states in these zones. The rules regarding the pollution at sea (MARPOL). The organizations that emit laws and guidelines and those that represent diving contractors. The surface supports that can be used.
Without such explanations, it is impossible for the reader to understand the reason for some procedures and why it is advantageous to use a process in place of another one.

The authors do not explain the difference between the procedures of decompression such as "in-water decompression", "surface decompression". and "transfer under pressure". The difference between these procedures should be precisely explained as they are essential for the organization of diving operations and to explain the reason dives with scuba replacement are usually not decompression dives.

4.3.3 - Document sources and scientific references

The authors tend to refer to only a few sources.
For example, on page 39, they say: *"Any divers' breathing gas should be compliant with BS EN 12021:2014 or equivalent prior to being connected online"*.
They indeed say " Equivalent" in the text. However, this document is the European Norm EN 12021:2014. Because IOGP 411 is written for people who do not live in the United Kingdom, only the European Norm reference should be indicated to let the reader the possibility to buy it in the country of his choice and not push him to British Standard. Also, there is often a substantial difference in prices between countries.
European Norms are decided and sold by countries who are members of the European Community or associated countries whose names are displayed in the form used to check the texts. The fact that the authors push the readers to only one provider of standards proves that they have not considered others. Despite my high respect for the United Kingdom Health and Safety Executive I often refer to, it is essential to consider every organization.

The authors also impose rules which scientific references are not indicated:

- It is the case in *"Table 1: Proximity to a Recompression Chamber" of* Appendix C. Inshore/Inland Diving, where it is said: "f*or dives between 0 and 10 m Diving contractor should identify the nearest suitable operational two-person, two-compartment chamber. Under no circumstances, should this be more than 2 hours*".
  This text seems based on section 115 / page 26 of the UK HSE document *"Commercial diving projects inland/inshore Diving at Work Regulations 1997" that says: "For dives that are shallower than 10 metres with planned in-water decompression not exceeding 20 minutes, the diving contractor should identify the nearest suitable operational two-person, two-compartment chamber. Under no circumstances should this be more than 6 hours travelling distance from the dive site"*.
  However, although this text is from an official body, it cannot be considered a scientific reference.
  Another problem is that this limitation of 10 m (33 ft) considers only decompression accidents and forgets potential barotraumas. What is said regarding the maximum elasticity limit of pulmonary alveoli should be considered. As an example, in their book "diving medicine" Bove & Davis say: *"Under experimental conditions, it has been demonstrated that a transpulmonic pressure (the difference between the intra-tracheal and the intra-pleural pressure) of 95 to 110 cm H2O is sufficient to disrupt the pulmonary parenchyma and allow gas into the interstitium"*. Because a diver using a breathing apparatus at 10 m has an air pressure of 2 bar in his lungs, pulmonary barotrauma is possible in case of an ascent without exhaling.
  It is recognized that compression to a depth of relief is a beneficial treatment of mediastinal and subcutaneous emphysema, in addition to decompression accidents. For this reason, the ideal scenario is to have a chamber on the worksite or close to it, like in appendix F of this IOGP document, where the travel time to the mother vessel (where the chamber is) is limited to less than 15 minutes.
  It must be taken into account that when they emit laws, states are often confronted with situations they must manage by compromise not to destruct the employments of the citizens to protect. As a result, national rules sometimes do not follow in full scientific considerations for practical reasons. It is the case of this rule from UK HSE that arbitrarily selects a maximum depth and distance from the decompression chamber, even though this minimum is not ideal (6 hrs is very long for the treatment of DCI), and that the legislator is conscious that the best is to have the chamber onsite.
  It must be considered that the likelihood and consequences of pulmonary barotraumas and decompression accidents are similar for shallow dives at sea and inland/onshore. For this reason, apply weaker rules for onshore projects than for offshore ones is not suitable. Opposite of that, there must be consistent rules applicable by all contractors because they must be on an equal status. Thus, if IOGP considers that pulmonary barotraumas are sufficiently under control to allow for a chamber at more than 15 minutes distance from the job site, that must be justified by a risk assessment that demonstrates that the likelihood of such accident is scarce and that they are under control due to suitable precautions. Then the limits for diving without a chamber on the job site can be established and justified.
  To conclude, this rule, already mentioned in the previous revision of this IOGP report, is not scientifically proven and poses a consistency problem with other ones.
- In appendix L. Surface supplied diving – NITROX, the authors say the following in point "operational factors": *"The Diving Contractor shall ensure the use of NITROX for any in-water decompression cannot result in NITROX of PPO2 of greater than 1.4 bar being supplied to any diver or subsequent diver's using the equipment"*.
  Reading this sentence, it seems that the authors have not understood that the effects of the high partial pressures of oxygen at work and at rest are two different problems.
  Please, remember that there are no specific nitrox tables. Instead, the air table to use is calculated by the Equivalent Air Depth (EAD) formula. So, if the PPO_2 of the mix is 1.4 bar at the working depth, its partial pressures will be less than 1.4 bar at shallower depths. Note that a lot of published tables provide pre-calculated equivalent depths for selected mixes.
  Also, there is currently no commercial diving table with in-water oxygen stops at less than 1.6 bar because decompression with O_2 at 1.3 bar is not as efficient as 1.6 bar. All these tables have been tested by recognized competent bodies and provide safe decompressions! For example, USN proposes decompressions in the water at 1.6 atm, DCIEM proposes 1.9 bar and 1.6 bar (or atm), and COMEX MT92/2019 offers 1.6 bar in the water and 2.2 bar in a wet bell. Thus, a PPO2 of 1.6 bar at rest is recognized safe and must not be confused with such a value when the diver produces efforts at work. So, there is no

reason for changing these values which recognized specialists have tested.
The snapshots of DCIEM and COMEX MT 92 /2019 tables below and on the next page show that 6 msw (20 fsw) is the depth commonly selected for in-water oxygen decompression stop by decompression tables designers.

Tables DCIEM - O2 at 6 m

Depth (msw)	Bottom Time (min)	Stop Times (min) at Different Depths (msw)							Decom. Time (min)	Repet. Group
		Air						O_2		
		24	21	18	15	12	9	6		
	75	-	-	-	-	-	-	-	1	G
	120	-	-	-	-	-	-	5	6	J
	130	-	-	-	-	-	-	10	11	J
15	140	-	-	-	-	-	-	14	15	K

Depth 12 metres

Comex MT92 tables

Minimum depth time	Ascent to stop min :sec	Air 21 m	Air 18 m	Air 15 m	Air 12 m	Air 9 m	Oxy 6 m	Total decompression min :sec	Repetitive dive
180	0 :30	-	-	-	-	-	3	3 :30	Possible
210	0 :30	-	-	-	-	-	5	5 :30	No

For the control of the daily oxygen dose, the tables provided in the diving manual of the US National Oceanic and Atmospheric Administration (NOAA) can be used. These tables are also provided and described in our documents with the explanation of the Unit Pulmonary Toxicity Dose (UPTD) concept, which is not the acute oxygen crisis (Paul Bert Effect) the limitation to 1.4 bar at work aims to prevent.

- The authors introduce Appendix M. Surface Supplied Mixed Gas Diving - Heliox with the following description: *Surface supplied diving using a properly equipped Wet Bell Surface Supplied Mixed Gas Diving can lead to a Serious injury or fatality should the diver not complete the prescribed in-water decompression due to an emergency such as: Manta Ray entanglement of umbilical, extreme current (Solitons), equipment failure or loss of station etc. Safer alternatives are available and before accepting this technique these should be carefully considered.*
  This text demonstrates that the authors are against the use of heliox in a wet bell, are afraid of manta rays, focus on an exceptional event, and consider incidents that may happen with any diving procedure is susceptible to occur with only heliox diving:
  - As already said, the authors do not explain the reason for employing heliox, the advantages of this family of gasses, and their inconveniences. Thus, they limit the use of heliox to only wet bells, which is a lack of knowledge.
  - Considering that manta rays can be a major cause of umbilical entanglement when using such mixes sounds like a joke! Even though that may have happened, such an incident must be classified among exceptional occurrences. Thus the risk of accident with marine life is more elevated with sharks, jellyfish, stone fish, and many more aggressive animals. Also, note that the cause of entanglement of the umbilical is more usually the diver himself. Thus, umbilical entanglement can happen and leads to problems with any type of surface-supplied diving operations. It can also occur with saturation diving, but it is true that this procedure allows for more time to free the diver.
  - Instead of these not documented explanations, it should have been more inspired to say that the advantage of a wet bell compared to an open basket is that it provides a dome, which is a refuge where the divers can remove their helmets if necessary. That a wet bell allows to be less disturbed by the underwater currents when the divers umbilicals are terminated in it as the lengths deployed are much more reduced than with divers' umbilicals tended from the surface. Thus, that a wet bell is a good tool usually limited to 75 m instead of 50 m for a basket, but that it has also inconveniences and that a means of rescue must be planned.
    Also, that the reason for using heliox is to fight the problems arising from Narcosis, which is a reversible alteration in consciousness that occurs while diving at depth (> 30 m) with air or mixes using nitrogen or other narcotic gasses that can be used with several means of deployment (Basket, wet bell, closed bell…), and that the inconvenience of heliox is that helium diffuses quickly and deeply into the tissues which result in longer decompressions than nitrogen based mixes, which can be observed by comparing the two extracts below.

1) Air diving with oxygen decompression at 6 m

Depth 39 metres

Minimum depth time	Ascent to stop min :sec	Air 21 m	Air 18 m	Air 15 m	Air 12 m	Air 9 m	Oxy 6 m	Total decompression min :sec	Repetitive dive
10	2 :45	-	-	-	-	-	3	5 :45	Possible
15	2 :45	-	-	-	-	-	3	5 :45	Possible
20	2 :45	-	-	-	-	-	7	9 :45	Possible
25	2 :45	-	-	-	-	-	10	12 :45	Possible
30	2 :30	-	-	-	-	3	15	20 :30	Possible
35	2 :30	-	-	-	-	5	20	27 :30	Possible

2) Heliox diving with oxygen decompression at 6 m

Depth : 39 metres — Heliox 22-24 % oxygen

Depth time (min)		10	20	30	40	50	60	70	80	90
Ascent to stop		3	3	2	2	2	2	2	2	2
	21 m	-	-	-	-	-	-	-	3	3
Heliox	18 m	-	-	-	3	3	5	5	10	10
	15 m	-	-	3	5	5	10	10	10	15
22-24%	12 m	-	3	5	5	10	10	15	15	20
	9 m	3	5	10	10	15	20	20	25	30
Oxygen	6 m	5	10	20	25	30	40	45	55	60
Total decompression		0h11	0h21	0h40	0h50	1h05	1h27	1h37	2h00	2h20

It should have also been judicious to indicate that these long decompression times limit heliox's use to only small interventions because it is impossible to organize continuous diving operations where the diver at work is replaced by another one when he has completed his bottom time, which is possible with air & nitrox. Also, that organizations such as IMCA limit the maximum bottom time between 50 and 75 m to 30 minutes, and the in-water stops of interventions above 50 m to 100 minutes, which results that contractors often use this technique to perform spot operations where the implementation of a saturation diving system would be too expensive such as for closing or opening a valve at depth, or the inspection of a few specific items.

4.4 - Promotion of new technologies and procedures

The document indicates elements that can be used to control people, but does not explain the reason, and does not make any suggestion of equipment that can improve their working conditions. As an example, in point equipment of Appendix I. "Saturation Diving " they say: *"Saturation systems should be capable of electronically recording and storing pressure variations in chambers, SPHL(s), SDC(s), transfer locks and medical/equipment locks. Life support parameters: temperature, humidity, oxygen and carbon dioxide levels should also be electronically recorded and stored".*
The Diver Monitoring Systems (DMS), mandatory with NORSOK standards, is an equipment primary designed to help the supervisor to refine the diving parameters and avoid incidents. It displays and records at least the following elements and provides relevant alarms:

- Divers' depth (Diver 1 & 2 and bellman).
- Bell internal depth.
- Bell external depth.
- Bell internal temperature.
- Divers' breathing gas PO2 and ppm CO2.
- Sampled bell internal gas PO2 and ppm CO2.
- Hot water temperature supply to the bell measured at the surface
- Hot water supply flow rate supply to the bell measured at the surface
- Hot water temperature supply to each diver measured at the bell
- Duration of each bell-run.
- Duration of the "in-water time" of each diver.
- Depth of each chamber lock in the saturation system.
- For each chamber in the system: PO2; ppm CO2; Temperature; Humidity

These parameters are grouped in a video combo in direct view of the supervisor, and classical instruments can also be used in parallel, so the supervisor has two references. Note that more parameters can be provided.
It seems that authors of the IOGP report 411 focus only on elements that can be used to control divers and supervisors and then blame them instead of promoting the essential aspect of comfort and ease of work of the diving team. So it looks like they promote a world similar to the one presented in the famous novel "1984" written by George Orwell.

Another similar example of imposed procedures that forget to promote efficient systems can be found in Appendix A Breathing Gas Purity – Air/Nitrox/Heliox, where the authors promote the UK HSE document EH75/2 'Occupational exposure limits for hyperbaric conditions'. Implementing this procedure is a good point, although the publisher of this study says that it is based on theoretical calculations only. For this reason, we suggest using the values from the US Navy manual in parallel. Nevertheless, the authors forget to say that the design of the saturation systems can reduce the exposure of the living chamber to contaminants (For example, a transfer through the transfer lock and the entry lock before accessing the living chamber). Also, systems such as the "Gaspure Divex" are incredibly efficient in removing most chemical and bacterial contaminations and should be promoted more.

Tools that are today essential are not indicated:

- The document does not promote ROVs, which are essential tools to investigate the worksite before deploying bells and baskets without exposing the divers to dangers. ROVs also allow to monitor the descent and the recovery of bells and baskets, to observe the divers and provide them additional lighting, and transfer tools to the worksite.
- The document also does not speak of the use of survey systems, which are essential tools to locate divers, ROVs, working targets, wet stored equipment, and dangers on a screen.

Ethical practices are insufficiently promoted in this document.:

- There is nothing regarding rehydration and nutrition breaks for divers during their lockout. although it is mentioned in the Norwegian and Brazilian procedures.

- There is nothing regarding the maximum time an ROV pilot operates the machine.
- Rebreathers (such as the Divex COBRA system) should be promoted to replace classical bailouts for dives below 60 m.
- There is no limitation of the excursions during saturation diving even though scientists have proved that the maximum excursions of the US Navy may create bubbling (*As an example refer to the book from Brubakk, Ross, and Thom - "Saturation diving; Physiology and pathophysiology")*.
- Saturation diving profiles such as those recommended by NORSOK and MT 92 that are based on square profiles are not promoted, and there is no guideline regarding the limitation of repeated ascent and descents during the saturation (W profiles).
- The authors limit the use of some technics (See heliox diving), but not in a scientific manner and without explanations regarding the reason for these rules. It is probably linked to the fact that these people are not used to express any idea in another manner than the authoritative one.
- The assigning of doctors or nurses with diving accidents knowledge to diving support vessels should be promoted. Also, actions should be undertaken to push IMCA to change the terminology "Diver medic" to "Advanced first aid diver" to avoid confusion, as a nurse's formation takes 5 years, instead of 15 days for an IMCA "diver medic".

Another significant missing in the document is that it is never indicated the importance of the personnel's involvement in the procedures to be implemented. It is again because it seems written by people educated to give orders but not used to discussions with "basic" workers. The problem is that it is these people who implement procedures and make them successful.

4.5 - Document consistency

This IOGP document is not consistent as it mixes some procedures that are in opposition with those imposed on commercial divers that are initially based on IMCA or ADCI procedures.
It is the case of the two following methods that are usually forbidden in the offshore industry, and should not be in the middle of recommended practices and be explained in another point with the reasons they are banished.

- Appendix J. Self-Contained Underwater Breathing Apparatus – SCUBA: It is the diving systems used by sport and military divers that consist of gas reserves carried by the diver who breathes through a mouthpiece or a full face mask linked to a regulator. Wireless communications can be provided. This system was used for small interventions at the early period of this industry. However, it is now banished as it offers limited gas reserves, no physical link that allows the diver not to be lost and to return to his deployment device in case of strong current or loss of visibility. Also, there is no camera enabling the supervisor to manage him properly.
- Appendix E. "Live-Boating", which refers to practices used during the early times of this industry and that are abandoned since vessel positioning systems have been implemented and SCUBA (Self-Contained Underwater Breathing Apparatus) has been forbidden. It consists of deploying divers from a not anchored boat maintained in a static position by manually controlling her propellers and rudder. Even though it is possible to deploy a basket or a bell with this practice, there is no computer and positioning system to help the operator, so the vessel is never static as with a real dynamic positioning system, and a loss of position is highly probable. For this reason, this practice is considered dangerous.
  "Live Boating" also consists of jumping to the sea from a ship underway, such as practiced by some military scuba divers. Jumping from a vessel underway is impossible with umbilicals, except if you want to kill the divers.

It is also the case of three procedures in the appendix that should not be in this document:

- Appendix N. Surface Swimmer should not be in a book discussing diving operations as this working procedure does not correspond to the definition of diving operations (where workers are called to operate at a pressure greater than local atmospheric pressure), and can be implemented by no-diver personnel. For these reasons, these operations should be described in another document. Also, the authors list safety items they think necessary but do not indicate the reason for their choices, and do not provide guidelines for selecting and implementing them.
- Appendix Q. Scientific and Archaeological Diving promotes the use of SCUBA, which is banished from underwater operations in the offshore industry, and allows sportive divers to dive on oilfields. Of course, this is confusing to regular workers because a company cannot organize commercial diving with a safety level for some activities and another level for some other activities. In other words, it cannot impose a level of security for some operations and open the gate to other ones where its representatives authorize a weaker level of safety to people under their responsibility!
  To summarize, such operations are exceptional and outside the operational procedures commonly applied for diving operations on oilfields. For this reason, a specific document that lists the methods of diving used and the relevant techniques to disengage the responsibility of the operator of the oilfield and its representatives should be issued separately.
  Appendix D. Underwater Ships Husbandry refers to operations that are commonly performed outside oilfields by companies applying weaker standards than those in force on the areas under the petroleum operator's responsibility. For this reason, the organization of such operations should be detailed in a separate document. IMCA did it in the guideline IMCA M 210 "Guidance for the selection of diving contractors to undertake underwater ship husbandry". In case that such operations are performed on an oilfield, the same diving procedures as those in force for every offshore commercial dive should be implemented.

Inconsistencies are also found in some rules:

- As already demonstrated, the requirements for chambers when performing inland diving operations, which are explained in Appendix c. "Inshore/Inland Diving", and those for Underwater Ships Husbandry, are not based on a document that

can be considered a scientific reference. In addition, they conflict with those of Appendix F "Mobile/Portable Surface Supplied Systems or Scuba Replacement" that are based on those explained in IMCA D 015 revision 0.
As previously explained for scientific and archeological diving, a company cannot organize commercial diving with a safety level for some activities and another level for some other activities. Thus, the guidelines from Appendix F should be in force for all scuba replacement diving operations, regardless of whether they are inland or at sea. However, as discussed in point 4.3.3, an amendment authorizing diving without a chamber on-site for very shallow operations where there is no possibility for the diver to fall deeper than the maximum depth authorized (so, this depth is the bottom) could be in force as long as the authors of this IOGP document prove that the risk of pulmonary barotraumas is under full control, as explained in point 4.3.3. Enforcing such a guideline would not weaken the initial procedure from appendix F and would provide a more logical rule than those currently proposed.

- Another type of inconstancy is that the authors implement a rule for one type of diving procedure and not for others where it should be in force. For example, the document says that there must be two diving supervisors for each shift for multiple air & nitrox diving operations, where one supervisor only is in control and can hand over for operational or refreshment breaks, which is good. However, for saturation diving, they say that an additional supervisor "should be" considered", so as an option. And, they say nothing about what they inaccurately name "wet bell diving" which we can name "wet-bell diving"
- Note that the authors insist on using risk assessments for the organization of diving operations but do not provide the elements that could help the reader perform these risk assessments. This problem is, of course, the result of the imprecise information provided. As an example, in Appendix M. Surface Supplied Mixed Gas Diving - Heliox, the authors say that a risk assessment should be performed. However, there is insufficient data to complete it if we consider what we say previously in point 4.3.2. Also, the authors classify the risk assessments into two categories: "high-level risk assessment" and "Formal risk assessment". That is illogical as, regardless of the apparent simplicity or complexity of the task, the process which consists in identifying the hazards and in assessing the risks should be the same.

4.6 - Positive elements

Despite the numerous problems highlighted this IOGP document provides some useful information for the several phases of a diving project.

- Regarding the project preparation phase, the document insists on:
  - The selection of the people in charge and the roles and responsibilities of the persons involved in the project.
  - The importance of "hazard Identification" and "risk assessment" processes, and also of the management of change procedures.
  - The process for vessel and equipment audits
  - The purpose and the importance of the implementation of Failure Mode Effect Analysis (FMEA) systems,
  - The importance of the information regarding the worksite
  - The process of scope of work
  - The bridging documents, and the creation of procedures, despite we consider that this essential point is insufficiently explained.
  - The importance of the mobilization and demobilization plans
  - The fact that an Emergency Response Plan (ERP) must be in place

- Regarding the project execution phase, the document insists on:
  - The Site rules (worksite)
  - Safety briefings
  - Permit to work process
  - Health and medical care
  - Care of the environment
  - Progress reporting
  - Operations and projects progress reporting

The authors demonstrate some knowledge regarding these points. However it must be noticed that what is said in the document is purely theoretical and not above what known safety organizations and safety schools say.

4.7 - To summarize

None of the objectives the authors pretended to have targeted is reached.
They are too much vagueness and elements based on beliefs instead of real scientific facts to consider this document a reference to take into account for the organization of diving operations.

In addition, the document is unpleasant to read as none of the recipes we have indicated and in force in recognized organizations publishing technical papers such, as an example the US Navy, are in place: The plan is confusing, the use of abbreviations a nightmare, and the reader is sometimes obliged to interrupt his reading to collect essential information in another document.

It seems that the authors of this document want to demonstrate that they are above other people, which results in this very authoritarian style. However, we can see that they cannot link the theoretical project organization course displayed at the beginning of the book to the topics they publish in the appendices. Moreover, through these appendices, they prove to have a limited knowledge regarding diving, which is a problem when you pretend to write guidelines regarding these operations.

The problem of many contractors and divers is that this document's guidelines are imposed on them through the powerful channels at the disposition of IOGP that claims to have legitimacy regarding the publication of diving rules and does not hide the fact that its ultimate aim is to impose its documents to states and other professional organizations.

Another problem is that there is the risk that this incorrect document will be taught to honest people and, in this way, will become a reference. For these reasons, something has to be done to prevent this from happening and ensure that this publication is withdrawn. Members of the organization should launch such action.
A revision of the document should also be asked by the organizations that defend the interests of contractors. However, it is not sure that these organizations are sufficiently powerful to succeed.
Writing this, we are obliged to admit that no international organization defends the interests of workers in the offshore industry. Hence, except in some countries, they remain a category of people to whom things are imposed, without the possibility of discussion.

4.8 - How to improve this IOGP document?

First of all, this document should not be written in an authoritarian style. It should only be a publication providing advice the reader is free to agree or not (which is unclear with the present publication). The document should solely concentrate on the potential accidents and published procedures from recognized national and professional organizations to control them.
To illustrate it, we describe below two types of books that can be written. It is obvious that the ideas listed below can be merged with others and so that many options are possible.

The 1st type of publication could be a document that indicates procedures to select diving & ROV contractors and the procedures to prepare a diving project. Such a document could provide the following information:

- A clear definition of what is diving with the main physiological problems and accidents arising from these activities, and the solutions commonly implemented to solve them.
- The areas where diving operations are organized (at sea, in lakes, rivers, ponds, and other industrial facilities), and the problems posed by each type of location.
- Elements from the International Maritime Organization regarding the “law of the sea” and the rights and duties of petroleum companies and coastal states in “territorial sea”, “contiguous zone”, “exclusive economic zone”, “continental shelf”. Also rules regarding the pollution at sea (MARPOL).
- The organizations that emit laws and guidelines and those that represent diving contractors. Also, how these guidelines can be downloaded.
- The surface supports that can be used (jetties, pontoons, the edge of the facilities, small boats, anchored vessels, barges, dynamically positioned vessels) with explanations of the relevant procedures to inspect them and the certificates that must be kept on board.
- The diving systems that can used for each type of operation, and their certification process.
- The process for selecting project managers and client representatives who will be in charge of the project.
- The process for selecting the operational procedures for a project and the equipment to be used.
- The process for the selection of contractors.
- The process for preparing the working procedures and the emergency response plan.
- Permit to work and to dive systems.
- The project documents that should be communicated to all involved parties prior to launch the operations.
- The mobilization process.
- Means of communication and reporting process.
- Demobilization process.
- Final report and elements to keep for the next projects.

This kind of publication provides elements to strictly stay within the legal limits of clients. Thus, it does not emit any guideline regarding diving procedures that remain a domain of specialists appointed by states, the International Maritime Organization, and some diving contractors’ organizations, provided that these professional organizations respect the requirements of IMO and coastal states.

The 2nd type of publication could be a document that indicates the processes above with in addition some suggested reinforcement of procedures. In this case, the following elements which most of them are already mentioned in this study should be in place.

- The reinforcements are only suggestions and are based on scientific facts.
- Explanations are provided to prove that the proposed reinforcements contribute to increasing the safety and the comfort of the workers and do not downgrade their working conditions.
- The reinforcements must be logical so the document is consistent. There should not be rules asking for a level of safety and other ones asking for another level of protection in the same publication.
- It must be proved that people who write or approve guidelines have no conflict of interest. Note that conflict of interest can be people working for a company who emit policies that favour their employers to the detriment of other members of the association, etc.

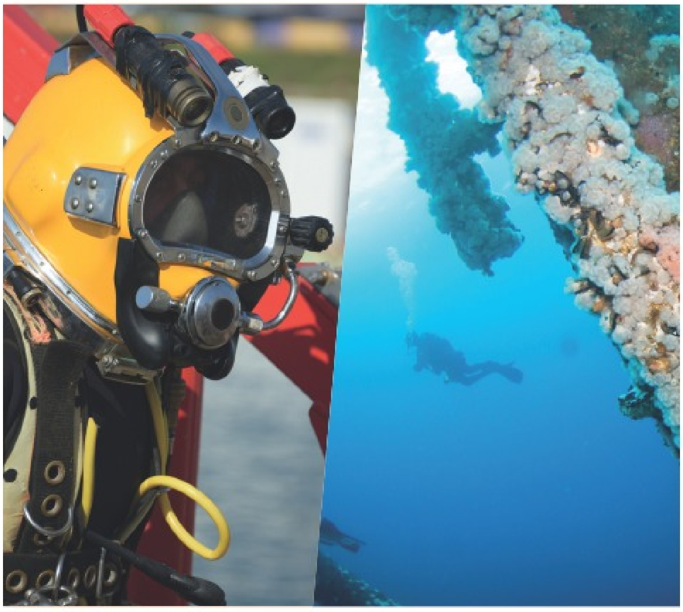
Hyperlink Table of contents

5 - Document evaluation and comment sheets

These sheets are those described in point 3.2 “Evaluation process used for this document”.

Page 1 of the document IOGP 411 - January 2021

Purpose:
This page is the cover of the document

Text document IOGP	Our comments
IOGP International Association of Oil & Gas Producers REPORT 411 | JANUARY 2021 Recommended Practices for Diving Operations 	

Page 2 of the document IOGP 411 - January 2021

Purpose:
This page provides a presentation of the document and its aim.

Text document IOGP	Our comments
Acknowledgements This recommended practice guide was produced by the IOGP Diving Operations Subcommittee, reporting to the IOGP Safety Committee. Front cover photography used with permission courtesy of ©Erik Ihlenfeld/Shutterstock and ©beusbeus/iStockphoto	The authors do not indicate the names of the members of the safety committee. There has been a meeting where diving managers of members have discussed this document. However, it has been previously written by people we do not know the names of. Not disclosing the names of the persons who have generated a document becomes usual with some organizations. That is in opposition to the requirement that the authors, checkers, and approvers' names of a publication should be displayed, which is a rule in force with most companies. That is also in opposition with most scientific studies that are signed by their authors.
About This Report provides a framework for a systematic approach to the management of diving operations. This guidance has been designed to accommodate the widely different techniques of diving used in the operations of the oil and gas and alternative energy industries.	The authors indicate that this document is designed for managing diving operations. It should have been better to be more explicit regarding this point. It should have been more judicious to write that these procedures are those proposed to IOGP members. However, this text shows that IOGP's dream is to impose its guidelines on the entire offshore industry. Even though every idea that can increase the well being of people is good to read, analyse, and implement if relevant, I would like to remind the authors of this document that the final decision regarding the minimum standards applied in a country is from its government, and also, the International Maritime Organization (IMO), which is a branch of the United Nations.
Feedback IOGP welcomes feedback on our reports: publications@iogp.org Disclaimer Whilst every effort has been made to ensure the accuracy of the information contained in this publication, neither IOGP nor any of its Members past present or future warrants its accuracy or will, regardless of its or their negligence, assume liability for any foreseeable or unforeseeable use made thereof, which liability is hereby excluded. Consequently, such use is at the recipient’s own risk on the basis that any use by the recipient constitutes agreement to the terms of this disclaimer. The recipient is obliged to inform any subsequent recipient of such terms. This publication is made available for information purposes and solely for the private use of the user. IOGP will not directly or indirectly endorse, approve or accredit the content of any course, event or otherwise where this publication will be reproduced. **Copyright notice** The contents of these pages are © International Association of Oil & Gas Producers. Permission is given to reproduce this report in whole or in part provided (i) that the copyright of IOGP and (ii) the sources are acknowledged. All other rights are reserved. Any other use requires the prior written permission of IOGP. These Terms and Conditions shall be governed by and construed in accordance with the laws of England and Wales. Disputes arising here from shall be exclusively subject to the jurisdiction of the courts of England and Wales.	These texts are legal texts to protect the companies and people who emitted this document, which is standard practice. Note that this document can be downloaded free of charge, which is a good point.

Page 3 of the document IOGP 411 - January 2021	
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Text document IOGP	**Our comments**

Page 4 of the document IOGP 411 - January 2021	
Purpose: This page displays the table of Contents	
Text document IOGP	**Our comments**
	Points 2.4, 2.7, and 2.15 discuss of only one topic. For this reason, under-points 2.4.1, 2.71, 2.15.1 should not exist.

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Purpose: This page displays continuation of the table of Contents	
Text document IOGP	**Our comments**
	Appendix E. Live-Boating, Appendix J. Self-Contained Underwater Breathing Apparatus – SCUBA, Appendix N. Surface Swimmer, Appendix Q. Scientific and Archaeological Diving are not adequately classified and should not be part of the procedures described. The presentation of the diving procedures is also not logically explained as it does not provide a logical view of the diving procedures that can be used. Also, the document promotes procedures that are today obsolete such as what the authors call “observation diving”.

Pages 6 & 7 of the document IOGP 411 - January 2021

Purpose:
These pages introduce the document.

Text document IOGP	Our comments
Since the original publication of this Report in 2008, the diving safety management systems of IOGP Member Companies have continued to be refined and improved. This revision aims to capture those improvements and provide a systematic approach to the management of diving operations for IOGP Members. Its design is consistent with IOGP Report 510 - *Operating Management System Framework*, and this report is supplementary to IOGP Report 511 - *OMS in practice* and IOGP Report 423 - *HSE management guidelines for working together in a contract environment*. Reports 411, 511, and 423 should be used in the following hierarchy: 1) IOGP Report 511 - *OMS in practice* 2) IOGP Report 423 - *HSE Management – working together in a contracting environment* 3) IOGP Report 411 - *Diving Recommended practice* Diving operations involve a unique ***(see #1)*** combination of occupational health and safety issues performed in an unforgiving environment where errors can quickly develop into fatal accidents. Individual risks must be managed if diving is to be conducted in a safe and efficient manner. The main sections of Report 411 provide management recommendations, while technical specifications for specific diving techniques are contained in the appendices. There are a variety of regulations, standards, and industry guidelines that apply to Diving. The International Association of Oil & Gas Producers (IOGP) Diving Operations Safety Subcommittee has developed this Recommended Practice (RP) to assist Members engaged in the oil, gas, alternative energy and associated industries, with a clear and uniform guide to reducing the risk of diving operations to as low as is reasonably practicable. This RP is based upon current experience and industry best practice **(See #2)** for preventing fatalities and serious incidents.	***#1:*** Why unique? Combination of occupational health and safety issues performed in an unforgiving environment where errors can quickly develop into fatal accidents are the conditions of every activity where environmental factors have to be taken into accounts, such as piloting an aircraft, working suspended on ropes, drilling petroleum wells, research and the deactivation of mines, and so many other activities. So the use of the word "unique" can be considered pretentious and a lack of open mind. What should be highlighted is that these activities require specific training and precautions to be undertaken safely. ***# 2:*** "Best practices" is a common English expression I always fight about with some of my proofreaders. The reason is how to be sure that the practices selected are the best? I understand that a reseller uses such an expression as it is his job to attract the attention of potential clients. However, regarding the organization of diving operations, we have to admit that someone can find something better than what we have selected. Thus, instead of saying "best practices", I think it more appropriate and less pretentious to say "appropriate practices", "adequate practices", "good practices", or merely "state of the art".
There are a variety of regulations, standards, and industry guidelines that apply to Diving. The International Association of Oil & Gas Producers (IOGP) Diving Operations Safety Subcommittee has developed this Recommended Practice (RP) to assist Members engaged in the oil, gas, alternative energy and associated industries, with a clear and uniform guide to reducing the risk of diving operations to as low as is reasonably practicable. This RP is based upon current experience and industry best practice for preventing fatalities and serious incidents. It is recommended that this RP is applied by any IOGP Members that are conducting diving operations which use: • Air • Nitrox • Heliox • Saturation • Atmospheric diving suits • Observation diving • ROVs in support of diving operation **(See #3)**	***# 3:*** This description is incorrect: Compressed air, nitrox, and heliox are breathing gas, and,"saturation diving" and "use of atmospheric diving suits" are diving methods. Also, observation diving can be performed with every method of deployment. Reading the document, I have understood that what the authors call "observation diving" should be called "normobaric observation bell deployment": It is a method where a person is deployed in a not pressurized closed bell provided with viewports allowing 360 degrees observation, which is lowered above the bottom using a winch. It must be noted that this procedure is not commonly used since Remotely Operated Vehicles (ROVs) have become usual. This description fails to explain that several gasses can be used with a means of deployment depending on the depth to reach and the physiological problems the team has to control. As an example, Heliox is used to replace air to fight narcosis, a reversible alteration in consciousness that occurs while diving at depth (> 30 m) with air or mixes using nitrogen or other narcotic gasses. Nitrox, which in divers' language means mixtures nitrogen-oxygen with a percentage of oxygen more elevated than

Pages 6 & 7 of the document IOGP 411 - January 2021 - Continuation -

Purpose:
These pages introduce the document.

Text document IOGP	Our comments
Continuation of comments on ***(#2)***: It is recommended that this RP is applied by any IOGP Members that are conducting diving operations which use: • Air • Nitrox • Heliox • Saturation • Atmospheric diving suits • Observation diving • ROVs in support of diving operation	air, are used to reduce the decompression time that is linked to the elimination of the nitrogen dissolved in the body. Even though heliox is currently the preferred gas for saturation diving for technical and operational reasons, air can be used for such operations at shallow depths. Also, heliox can be used with a diver deployed from a ladder or a basket. This description problem is further discussed in the next points as it is linked to other issues and impacts the whole publication. However, we can already say that it is related to the structure of the document. It should be preferable to start it by describing what diving operations are, the gasses used and their limitations, and the means of deployment used to avoid this confusion.
Specific recommendations for each diving technique are contained in the appendices of this report. This document provides detailed guidance on the management of diving operations, and considers the variety of diving techniques used by the oil and gas industry. This document is supplemented by the following IOGP publications, the contents of which are not reproduced in this report: Report 431 - *Diving worksite representative, roles, responsibilities & training* Report 468 - *Diving System Assurance recommended practice* Report 471 - *Oxy-arc underwater cutting Recommended Practice* Report 478 - *Saturation Diving Emergency Hyperbaric Rescue Performance requirements* The advice in this document represents current oil and gas industry best practices; however, users should ensure that any government or legislative requirements are adequately addressed. Users should conduct a gap analysis which considers relevant local and international regulations. In the event of a discrepancy, the more stringent standard should be adopted. This will assist the user in a standardised control for diving that is also legislatively compliant in all areas of operation. The current guidance issued by the International Marine Contractors Association (IMCA), which may include guidelines issued by the AODC ***(see #4)*** and the Diving Medical Advisory Committee (DMAC), is integral to the Offshore sections of this document. For inshore, inland, and Ship Husbandry Diving, guidelines issued by the Association of Diving Contractors International (ADCI) should be used in the absence of a local equivalent competency standard.	***#4:*** AODC= Association of diving contractors (it should be indicated in the text)

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Purpose:
This page provides a glossary

Text document IOGP	Our comments
AODC Association of Offshore Diving Contractors (predecessor to IMCA) **ADCI** Association of Diving Contractors International **ADS** Atmospheric Diving Suit **ASOG** Activity Specific Operating Guidelines (ASOG) refers to a document issued to instruct a vessel how to operate when performing a specific activity offshore. They are generally presented in tabulated format and set out the operational, environmental, and equipment performance limits considered necessary for safe DP operations. **Bounce Diving** A form of bell diving where the diver is exposed to pressure for an insufficient time for the dissolved gas in body tissues to reach saturation. **CAMO** Critical Activity Mode [IMCA M 220] **DCI** Decompression Illness **DDC** Deck Decompression Chamber **DESIGN** Diving Equipment Systems Inspection Guidance Note (Series of documents produced by IMCA) **Dives** A person 'dives' if they enter either (1) water or any other liquid, or (2) a chamber in which they are subject to a pressure greater than 100 millibars above atmospheric pressure; and, in order to survive in such an environment, they breathe air or other gas at a pressure greater than atmospheric pressure. **Diving Operation** Can be a single dive or a number of dives. A diving operation is a portion of a diving project that can be safely supervised by one person, e.g., a 28-day saturation diving project may be made up of 40 diving operations. **DOP** Diving Operations Plan **Diving Project** Term used to describe the overall diving job, whether it lasts two hours or two months. Applies to either a continuous period of elevated pressure, as in saturation diving, or to a number of diving operations taking place over several days where the divers are not under continual elevated pressure. A diving project ends when all divers have returned to atmospheric pressure and remained in close proximity to a recompression chamber for a specified time in case there is a need for treatment of decompression symptoms. ***(See #1)***	I have checked the abbreviations indicated in this point and how often they have been used in the texts to ensure the need to display them there: I found that many abbreviations indicated in this glossary are not used in the texts, or used one or two times only. However, it may be a glossary of acronyms found in the offshore industry. If it is the case, note that it should be better to call it "Glossary of terminologies used in the offshore industry", and to reinforce the definitions of most abbreviations that should be more explicit. ***#1:*** This point is not well explained: for the contractor, a diving project ends when the divers have sufficiently decompressed to leave the surface support safely and can be returned to their home by plane or be assigned to another task without the need to be in direct proximity of a chamber. Thus when the legal period of observation time is elapsed. Note that the observation period should be based at the minimum on the document DMAC 7 (DMAC = Diving Advisory Committee), which is available for free on this organization's website. However, the guidelines of the decompression procedures used or the coastal country's laws where the operations are undertaken should be prioritized if they are more stringent. It is, for example, the case of NORMAM-15 (Brazil) rules. For the client, the end of a diving project may depend on what is specified in the contract with the contractor. It often happens that the diving project ends when the surface support is outside the limits of the field and thus no more under the responsibility of the Offshore Installation Manager (OIM) in charge of the oilfield.
DMAC Diving Medical Advisory Committee **DP** Dynamic positioning **DSV** Dive Support Vessel **DSMS** A client or contractor diving safety management system **E & P Industry** Exploration and Production Industry, including oil, gas, energy, and construction activities **ER / ERP** Emergency Response/Emergency Response Plan **FAT** Factory Acceptance Text **FMECA** Failure Modes Effects Criticality Analysis **FMEA** Failure mode and effect analysis (FMEA) is a structured technique for assessing the mode of failure of a piece of plant, system, equipment or component, together with the possible causes, likelihoods, and consequences. ***(See #2)*** **HAZID** Hazard Identification **HELIOX** A breathing mixture of helium and oxygen **HEP** Hyperbaric Evacuation Plan	***#2:*** FMEA should be indicated before FMECA. FMECA is a variation of FMEA: There are many types of Failure Mode Effect Analysis that companies adapt to cover their industrial activities and differ with their risk evaluation methods. Three main approaches are commonly used, which are classified into two categories: The FMEA (Failure Mode Effect Analysis), and the FMECA (Failure Mode Effect Critically Analysis). - Risk Priority Numbers (RPN) is a system of analysis used with Failure Mode Effect Analysis (FMEA) process that is based on the product of three criteria: Severity, likelihood, and detection. - The quantitative criticality analysis is a method of evaluation used with Failure Mode Effect Critically Analysis (FMECA) - The qualitative criticality analysis is another method

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Purpose: These pages provide a glossary	
Text document IOGP	**Our comments**
HIRA Hazard Identification and Risk Analysis **HRS** Hyperbaric Rescue System **HRC** Hyperbaric Rescue Craft ***(See #3)*** **HSE** Health, Safety, and Environment **HSSE** Health, Safety, Security, and Environment **IACS** International Association of Classification Societies **ICOP** International Code of Practice **IMCA** International Marine Contractors Association **IMO** International Maritime Organization **ISM** International Safety Management Code – Marine safety standard **IT** Information Technology	used with Failure Mode Effect Critically Analysis (FMECA) that consists in evaluating risks and prioritising corrective actions **#3:** HRC commonly means "Hyperbaric Rescue Chamber". It is a rescue chamber that can be disconnected from a saturation diving system but is not self-propelled as the opposite of SPHL (Self Propelled Hyperbaric Lifeboats).
JSA Job Safety Analysis **KPI** Key Performance Indicator **Live-boating** Diving from a vessel under-way not using Dynamic Positioning (DP). Note: diving from a DP vessel on auto track would also be live-boating **LOTO** Lock Out, Tag Out **LSS** Life Support Supervisor **LST** Life Support Technician **MARPOL** International Convention for the Prevention of Pollution from Ships **MOC** Management of Change **NITROX** A breathing mixture of nitrogen and oxygen **Observation Dives** Using a diving bell, or similar, as an observation chamber when the internal pressure is at atmospheric pressure and external pressure ambient. **OCIMF** Oil Companies International Marine Forum **OIM** Offshore Installation Manager **OMS** Operating Management System **OVID** Offshore Vessel Inspection Database **IOGP** International Association of Oil & Gas Producers **POB** Personnel on Board **PPE** Personal Protective Equipment **PMS** Planned Maintenance System **RMV** Remotely Manned Vehicle **ROV** Remotely Operated Vehicle **RP** Recommended Practice **Saturation Diving** The diving technique used during diving operations where the diver has reached the full saturation state for the pressure and breathing mixture used. When this state has been reached, the time required for decompression is not further increased in relation to the duration of the dive. ***(See #4)*** **SBM** Single Buoy Mooring **SCUBA** Self-Contained Underwater Breathing Apparatus **SDC** Submersible Decompression Chamber (Diving Bell) used for transferring divers under pressure to and from the work site. ***(See #5)***	**#4:** When describing a technique or a physical state, it is preferable to use other words than the one that is to be explained. Thus avoid the use of the word "saturation" to explain what is the state of "saturation". Also, explain the advantage and inconveniences of this procedure: The principle of saturation is based on the fact that if a diver stays for a sufficiently long time at a given depth, the gas pressure absorbed by his body will gradually be at the pressure at this depth. When this state is reached, the diver is said to be in a state of saturation. As a result, the decompression will be the same regardless of the time at this depth, and the diver can work at the depth he is stored without the need to perform decompression stops as long as he is maintained at this pressure. Thus, the divers live in chambers kept at the bottom's pressure and are transferred to the bottom using a pressurized closed bell. The decompression is done at the very end of the project. This diving method allows to dive a long time and at depths that are unreachable using incursion dive techniques from the surface. One danger with this technique is that the divers cannot be exposed to the surface atmospheric pressure even for a short time as such exposure would result in explosive decompression and immediate death. **#5:** It seems that overusing acronyms can trigger an illness similar to drug and alcohol abuse we may call "acronyms abuse". As a result, these people cannot stop inventing new ones even when they are unnecessary! There is no reason to replace a well-known word such as "bell", which is composed of four letters by SDC, which is not commonly known as diving bell, as that gives more inconvenience than advantages as it obliges people to learn it without saving space in the text or facilitating a complex pronunciation. According to most grammar institutions, acronyms can be used only to replace names that are complicated to pronounce. Also, there is no need to provide a glossary if they are explained in the text. As a treatment against this disease, may I suggest these people writing a study 60 pages minimum where they expose the advantages there are to replace well-known words that are easy to memorize by such an abbreviation!

Pages 10 (continuation) &11 of the document IOGP 411 - January 2021

Purpose:
These pages provide a glossary

Text document IOGP	Our comments
SIMOPS Simultaneous Operations **SIT** System Integration Test **SME** Subject Matter Expert **SMS** Safety Management System **SOLAS** International Convention for the Safety of Life at Sea **STCW** Standards of Training Certification and Watch Keeping for Seafarers **Surface Supplied Diving** Diving operations that do not use a closed bell, regardless of the gas mixture used, e.g., Air, Nitrox, or Heliox. ***(See #6)*** **TAM** Task Appropriate Mode [IMCA M 220] **TUP** Intervention method used in non-saturation diving shallower than 50 msw, where the divers are transferred from their working depth to a surface decompression chamber in a closed bell maintaining pressure greater or equal to the first decompression stop ***(See #7)***	***#6:*** Incorrect definition: Surface supplied diving is also called "Surface orientated diving" by organizations such as IMCA. This procedure consists of leaving the surface of the sea and return to it during the same dive. Opposite of Saturation diving, the diver is not yet saturated at the pressure he reached so that he can return to the surface after a reasonable decompression time. So, the diver dive like a sportive SCUBA diver (Scuba means: Self-Contained Underwater Breathing Apparatus), except he is supplied by an umbilical which is connected to compressors or/and large gas banks, which allows him not to be limited regarding the gas reserves, which is not the case of a SCUBA diver who has gas reserves limited to the bottles he can carry. The deployment of the diver is usually done using baskets, open wet bells, or ladders, depending on the organization he works for and the laws of the country. ***#7:*** The authors confuse a method of decompression with the document published by the UK HSE regarding maximum exposure limits for surface orientated diving: • TUP means Transfer Under Pressure. This diving procedure consists of transferring the divers to the working depths using a closed bell, which is then connected to a chamber where they perform their decompression... Opposite of saturation procedures, the divers have not had sufficient time at depth to be saturated. Thus, they can be decompressed within a reasonable time at the end of the dive. The difference with other methods of surface-orientated diving operations is that there is no decompression phase in the water, so the divers are isolated from the external conditions, which is an advantage in rough seas. This procedure can be used for depths up to 90 metres and sometimes below using heliox or trimix, and can also be used up to 50 m with air. • The UK HSE exposure limits for surface-orientated diving, which are based on studies from doctors Shields and Lee, are published on page 16 of the document "Commercial diving projects offshore - diving at work regulations - approved code of practice". These procedures have resulted of a significant diminution of decompression accidents in UK waters. The depths of the displayed table are limited to 50 m, as they are the normal limitation when diving using a basket. Note that this document says that closed bell diving techniques should be used when diving deeper than 50 metres and that TUP is a closed bell technique. However, saturation procedures are usually preferred for deep dives because they allow for longer working times. Also, new strategies to solve high-pressure nervous syndrome (HPNS), which may happen at the depths reached with this technic, require stabilization periods at depth before launching the divers, which limits the available bottom time.

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Purpose:
This page discusses of "Diving operations project phases"

Text document IOGP		Our comments
1 - Planning pre award		***#1:*** The writers should have added the following guideline: To determine the scope and requirements, the client must write a procedure that clarifies the planned phases in detail. This procedure will be used to perform a 1st risk assessment. Note that particular technical studies should be performed. They should be done internally or by a 3rd party consulting engineering office. Also we do not understand what the authors mean by "high level risk assessment"? Do they mean that they are reduced level risk assessments? This is unclear… ***#2:*** "Industry practices" or "industry standards" are an imprecise wording opening to correct or incorrect procedures. Instead, the writers should have indicated "recognized standards". ***#3:*** Health, Safety, Security, and Environment. The name is used for the 1st time on this page, so it should be indicated with the acronym in bracket… ***#4:*** HSE= Health safety and environment ER= Emergency response Acronyms used the 1st time on this page or topic. Refer to " Develop Diving Operation Plan (DOP)" which is correct *(so the writers can do it!)*
Client	***Contractor***	
Determine scope and requirements of the proposed diving operation,utilising high level risk assessments ***(see #1)***		
Ensure diving standards and requirements are specified in the contract.	Identify all diving requirements, including 3rd party intervention for contractor vessels, verification of manning levels, legislative requirements, and company policies. Also consider industry practice ***(see #2)*** and IOGP recommendations.	
Invite bids from contractors after establishing Diving HSSE Capability. ***(see #3)***	Facilitate client capability assessment and audits.	
Conduct technical evaluations of contractor submissions, including use of subcontractors, vessel capability/marine assurance, diving resources, equipment, and emergency and contingency arrangements.	Submit technical and commercial proposals and respond to clarifications	
Develop project schedule, including bridging documents, HSE plan ER Plan ***(see #4)***, Diving Operation Plan, and verification audits. Seabed soil verification/sampling for hazardous contaminants. Chemical handling/ contamination at work site and equipment evaluation.	Develop Diving Operation Plan (DOP), establish timeframe and access for audits	
2 - Planning Post Award		***#5:*** Risk assessments must be part of the operation plan and must be developed at the same time as the operation plans are written. As a result, the operational plans may have to be modified or abandoned according to the risks identified. Remember that threats that have not been seen when writing the initial procedure can become evident later on. So, the mission of the contractor is not only carrying out risk assessments but also modify his procedures in functions of these risk assessments and remarks of his client and 3rd party auditors. There is nothing regarding this crucial point in the IOGP text. One thing a lot of people who have no technical formation in construction forget is that this phase is the most important one, as the operating task plans will be based on the procedures elaborated during this phase.
Client	***Contractor***	
Organise technical diving support for onshore and offshore project phases. Includes review of operational procedures, risk assessments and conduct operational verification	Carry out risk assessments ***(see #5)***	

<table>
<tr><td colspan="3">Pages 12 continuation & 13 of the document IOGP 411 - January 2021</td></tr>
<tr><td colspan="3">Purpose:
This page discusses of “Diving operations project phases”</td></tr>
<tr><th colspan="2">Text document IOGP</th><th>Our comments</th></tr>
<tr><td colspan="2">2 - Planning Post Award - continuation -</td><td rowspan="3"></td></tr>
<tr><td>Client</td><td>Contractor</td></tr>
<tr><td>Review plans, participate in familiarisation and mobilisation Meetings.

Verification of equipment, personnel, and resources Mobilisation

Oversight on diving mobilisation

Ensure mobilisation is carried out to current plan.</td><td>Develop mobilisation plan and personnel familiarisation plan. Familiarisation plans should reflect a harmonisation of the contractor’s diving management system and the client’s requirements.</td></tr>
<tr><td colspan="2">3 - Execution phase</td><td rowspan="3"><u>#6:</u>
ERP= Emergency Response Plan
The acronym is used the 1st time on this page or topic.</td></tr>
<tr><td>Client</td><td>Contractor</td></tr>
<tr><td>Operational verification, risk management, management of change, incident reporting, and investigation. Support contractor in ERP if initiated <u>(see #6)</u></td><td>Conduct activities following the approved DOP.
Supervise project reporting, follow management of change, and report and investigate incidents.
Implement ERP, if necessary.</td></tr>
<tr><td colspan="2">4 - Demobilization</td><td rowspan="3"></td></tr>
<tr><td>Client</td><td>Contractor</td></tr>
<tr><td>Oversight on diving demobilisation</td><td>Ensure all demobilisation plans, diving decompression, bend watch, and flight restrictions are followed.</td></tr>
<tr><td colspan="2">5 - Project review and close out</td><td rowspan="3"></td></tr>
<tr><td>Client</td><td>Contractor</td></tr>
<tr><td>Finalise project lessons learned. Communicate results and metrics to contractor.</td><td>Attend project closeout meeting and evaluate lessons learned</td></tr>
</table>

Page 14 of the document IOGP 411 - January 2021	
Purpose: This page displays point #2. Organisation, responsibilities, and documentation	
Text document IOGP	**Our comments**
Successfully managing diving operations requires the following key organisational components: • Established and enforced diving practices • The provision of technical expertise to clients, either as subject matter experts or technical authorities • Verifying compliance during planning and worksite operations • Usage of approved contractors with demonstrated capabilities • Production of a client approved Diving Operations Plan that details the controls, standards, processes, and emergency planning for the operation' The actions and activities of various parties, even those who are not part of the diving team, can affect the safety of diving operations. Examples of these parties, their responsibilities, and potential ability to affect diving operations include: • Clients who have arranged for diving work should appoint qualified and experienced on-site representatives to ensure procedures are followed. It is the client's responsibility to ensure that activities are safely managed. • The principal contractor should likewise have qualified and experienced representatives onsite. • A worksite, Asset, or Offshore Manager will have general responsibility for the area in and around the diving project. • The Master of the vessel (or floating structure) from which diving operations are to be conducted has the overall responsibility for the safety of the vessel and all those aboard. • Any other person whose acts or omissions could adversely affect the health and safety of persons engaged in a diving project, e.g., port and harbour authorities, other projects operating in the vicinity, crane operators and maintenance personnel, etc., could all affect a diving operation and procedures to protect the safety of the dive team from potential issues caused by these outside parties should be in place. **(See #1)**	**#1:** This point is not well written. Instead, the authors should have written that "diving operations involve different parties which actions may result in a dangerous situation for the divers in the absence of appropriate controlled processes where every party has to organize according to his duties" - Clients: It is their responsibility to ensure that the activities are safely organized and managed. - Diving representatives: They are appointed by the client to ensure that relevant procedures are selected and followed during the preparation of the project and its execution on-site. - Main contractor: It is the company in charge of the project. It is its responsibility to appoint qualified and experienced technicians and managers during the preparation and execution of the project. - Offshore manager: They are appointed by the contractor for the preparation and the implementation of the project - Subcontractors: They are often selected because they have specific skills the main contractor may not have. They have similar duties as the main contractor. - Most diving operations are to be conducted from diving support vessels or different types of floating structures: Their masters have the overall responsibility for the safety of the ship and all those aboard. - Worksite & asset Managers: They have responsibility for the area where the diving project takes place. - Port and harbor authorities: They are in charge of the circulation, mooring of the vessel, and access to it during the mobilization. - Other projects operating at direct proximity may be the source of conflicting activities - Maintenance personnel: They are not only people working for the project but those involved in the maintenance of the facilities on a routine basis
2.1 Operational execution A diving operation plan contains the controls that are recommended to be applied during the diving operation. The following list provides example components that should be selected by the client and contained in the diving operation plan	

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Purpose:
This page discusses the point #2.2 Diving operation plan

Text document IOGP

Diving operation plan – contents/sections	*Details – Sections should address the following*
Diving project summary	• Basic scope of work • Location of the diving worksite(s) • Location of shore bases • Location of applicable facilities • Type of vessel or diving platform
Compliance	• Applicable diving regulations • Diving standards and practices • State and/or regional legislation • Marine and environmental legislation • Gap analysis between contractor standards and client requirements
Diving method	• Diving technique/modes • Breathing mixtures • Gas volumes • Decompression Tables • Diving depth, profiles, and decompression plans • Minimum personnel requirements and personnel rotation plan
Environmental and metocean management	• Method of environmental /weather forecasting • Weather/environmental limiting criteria for marine and worksite activities • Current and significant wave height criteria on diving • Temperature limitations on diving and topside operations • Weather/environmental ASOG for diving tasks ***(See #1)***.
Third party support	• List of third-party support providers • Services, equipment, and products • Personnel • Audit, approval, and management of third parties
SIMOPS (Simultaneous Operations) plan	• SIMOPS Matrix/MOPO ***(#2)*** • Communication ***(See #3)***. • List of known or possible SIMOPS • DP/Diving/ROV • Production platform operations • Drilling • Wireline/downhole • Geophysical survey and sonar • Flight operations • Multiple vessel operations and movement

Our comments

#1:
ASOG = Activity Specific Operating Guidelines
Acronym used the 1st time on the page and for the topic.
It should be explained so the reader can remember it.

#2:
Acronym not in the list:
MOPO (Matrix Of Permitted Operations) is not in the list of acronyms and not explained.

#3:
Inappropriate text and use of words: In SIMOPS (Simultaneous Operations) Plan, IOGP says: *List of known or possible SIMOPS*
This list should be the result of the evaluation of the elements listed in this point. The authors should have written:
"List the known or possible SIMOPS:
- Other manned diving or ROV operations
- Production facilities operations
- etc.

Please note that the following words are not operations:
- "Communication" refers to the means of contact and transmissions of messages. They may be affected by SIMOPS operations.
- "DP (Dynamic Positioning)" refers to a system for maintaining a vessel in position during the operations.
- SONAR (Sound Navigation Ranging) is a tool used for survey and other operations.

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Purpose:
This page discusses the point #2.2 Diving operation plan

Text document IOGP		Our comments
Diving operation plan – contents/sections	***Details – Sections should address the following***	
Worksite HSE Plan	• Basic Safety Management System (SMS) description • Bridging method and document to other relevant SMS • Stop Work and Ultimate Work Authority [ISSOW Work Authority] • HAZID/risk assessment • Job safety analysis • Toolbox talks • Permit to Work • Energy/Hazard Isolation • Management of Change (MOC) method • Relevant Life-Saving Rules • Emergency/Incident management and reporting • Medical support and intervention measures • Incident investigation • Site safety inspections and audits • Safety performance measurements (KPIs) • Emergency Response Plan • Project familiarisation plan • Mobilisation plan • Security plan	
Quality Plan	• Quality bridging plans • Quality audit • Onsite FAT/SIT • Test results and acceptance • Completion of work	
Communication Plan	• Communication organisational chart between Company project team and contractor management • Communication organisational chart between Contractor's project/functional support and diving worksite • Communication organisational chart for diving project worksite • IT and communication system support plan • Methods of communications • Identified language(s) • Reporting flow charts • Daily progress reporting • Written report deliverables • Register and minutes of meetings • Document/Information transfer • Relevant contact lists	

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Purpose:
This page discusses the point #2.2 Diving operation plan

Text document IOGP		**Our comments**
Diving operation plan – contents/sections	***Details – Sections should address the following***	
Marine/Dive Platform Operations	• Vessel specifications • Vessel GA drawings • Vessel audits (OVID) • Marine Warranty Survey (MWS) (if applicable) • Classification society certificates • DP capability report (if Applicable) • DP FMEA (If applicable) • DP Marine Assurance • ASOG • Vessel anchor plot drawing (if applicable) • Crane specification and inspection reports (if applicable) • Lifting and load charts • Subsea Lifting plans and rigging arrangements • Personnel transfer • Equipment transfer • Client asset information [flare, seawater/fire pump intakes, overhangs, etc.]	
Diving Plant and Equipment	• Specific dive system specifications • Classification society certificates • IMCA DESIGN audit • FMEA • Preventive and corrective maintenance plan • Equipment testing/examination certificates • Dive equipment register	
ROV Equipment	• ROV system specifications • Tooling specifications • Tether Management System (TMS) • Auxiliary equipment specifications • IMCA R 006 audit • Testing and calibration certificates • Preventative and corrective maintenance plan • Engineered seafastening design and calculations with dynamic ROV system load • Calculations for launch and recovery	
Survey Equipment	• Vessel location and position • Subsea tooling position	

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Purpose:
This page discusses the point #2.2 Diving operation plan

Text document IOGP		Our comments
Diving operation plan – contents/sections	***Details – Sections should address the following***	
Survey Equipment (continuation)	• Subsea systems location • Monitoring locations • Equipment specifications • Testing and calibration certs	
Diving Project Equipment	• Tools and Equipment specifications • Equipment register • Lifting and rigging register • Lifting appliance testing certificates • Deck layout arrangements • Seafastening arrangements	
Diver Entry and Egress	• Location • Air gap distance ***(See #4).*** • Primary method • Secondary method • Emergency recovery	**#4:** In Diver Entry and Egress IOGP list: *"Air gap distance"* The authors must explain this point more precisely.
Diver Umbilical Management Procedure	• Surface diving • Saturation diving • Active/Passive tending method • Golden Gate/ intermediate tending point instructions • Maximum excursion distances calculations and chart • Measurement and restraint method details • Location measurement verification of tending datum point • Maximum bailout endurance/distance calculated according to contractor defined RMV	
Detailed Diving SOW Procedures	• Master Document and drawing register • Engineering drawings and prints • Construction/Installation procedures (If applicable) • Repair instructions (If applicable) • Inspection instructions (If applicable) • Testing instructions (If applicable) • Lifting plans and instructions • Rigging instructions • Step by Step diving task instructions • Contingency plans	
Diving HIRA	• Level 1 - Hazard ID and Risk Assessment • Level 2 - Site Specific Risk Assessment	

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Purpose:
This page discusses the points #2.3 “Third party operations”, #2.4 “Management audits”, #2.5 “Interfacing”

Text document IOGP	Our comments
2.3 Third party operations Third parties working on behalf of IOGP Members, or in areas where a Member has a duty of care, have an impact on their operations and reputations. It is essential that work is conducted in a manner that is consistent and compatible with an IOGP Member’s policies and business objectives. Third parties include but are not limited to: • Other IOGP Members • Contractors and their subcontractors • Government organisations • Militaries • Environmental bodies • Authorities of ports, harbours, canals, rivers, etc. • Local community organisations	
2.4 Management audits **2.4.1 Health, Safety and Environment (HSE) Audits** The purpose of this section is to define the expectations pertaining to auditing client or contractors Diving Safety Management Systems (DSMSs) and interfacing with IOGP Members. IOGP Members should conduct their own internal governance audits to provide assurance that the Member’s controls are properly operating throughout their businesses. These internal governance audits should include: • Internal project reviews or audits for the business to evaluate compliance with its standards • Contractor DSMS audit To ensure that they have the capability to deliver all functions safely and are aligned with company HSE standards, third parties should undergo a technical capability audit of their DSMS. Holders of contracts should ensure that their SMS aligns with the IOGP Member’s Health, Safety and Environment (HSE) policies. Site audits should be conducted to ensure compliance with stated HSE objectives; the site audit requirements should be incorporated in the project execution plan.	
2.5 Interfacing Holders of contracts will define the interfaces between the contractor’s SMS and the IOGP Member. This may be via a specific interface or bridging document to demonstrate SMS alignment. A gap analysis of contractors’ DSMS and this RP should be performed to demonstrate compliance with the DSMS.	

Pages 20 & 21 of the document IOGP 411 - January 2021

Purpose:
This page This page discusses the points #2.6 HAZID, #2.7 Roles and responsibilities,

Text document IOGP	Our comments
2.6 HAZID A HAZID or Preliminary Hazard Analysis should be performed shortly after the work requirements and vessel have been identified. The format of which could include the operator or the contractor or both. This is an additional process not intended to replace any of the standard process risk assessments. A small group that possess the range of experiences capable of understanding all aspects associated with the upcoming work scope should perform the HAZID. The objectives of the HAZID are separate from the normal risk assessment processes in order to provide a very high-level overview of the upcoming work scope and its associated management, interfaces, procedures, and hardware. It is also recommended to conduct a high level assessment of health, safety, environment and commercial hazards, carried out early to identify significant hazards relating to overall project HSEQ, including, but not limited to: asset selection, engineering design, installation methodology, fabrication methodology, security, logistics, and supply chain management. Other goals of the HAZID assessment include: • Providing an open forum where any areas of concern can be highlighted, candidly discussed, and nominated for further detailed attention, if necessary • Specifically define requirements for specialist personnel (e.g., vessel master, diving, • DP, marine, lifting specialists, etc.) • Local area constraints • Identifying possible risks relating to new equipment or techniques, or vessels or equipment with outstanding restrictions, such as class notations or non-conformances • Adverse weather conditions - specific local conditions must be considered in design, engineering, and operational activities, and contingency plans must be developed in order to provide the best opportunity of completing the work safely and effectively	HAZID means "Hazard Identification (Haz + Id)".
2.7 Roles and responsibilities The roles and responsibilities of all key personnel involved in the management and control of a diving operation should be clearly defined. Key personnel include the following. These key personnel and their responsibilities should be declared in the project bridging document. Contractor Personnel • Contractor project manager • Construction manager/superintendent • Contractor project worksite representative • Vessel Master • Contractor supervisors • Contractor responsible diving doctor	

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Purpose:
This page This page discusses the points #2.7 Roles and responsibilities, & #2.8 Competency assessment process

Text document IOGP	Our comments
2.7.1 Worksite representative roles and responsibilities This role is integral to operational control at the worksite. Detailed requirements and expectations are given in IOGP Report 431***(see #1)***. It is recommended that the IOGP Member develops worksite competency and control for all areas where diving is being conducted. Roles and responsibilities are not written to establish demarcation lines between individuals, or to detract from the collective responsibility of: • The onshore/worksite management teams • Teamwork within Member companies • Teamwork within contractors A competency assessment process must have been completed on all personnel who are allocated responsibilities and duties related to diving. The IOGP Member or its representatives will maintain training and competency records for personnel that are used as diving representatives. There are a number of assurance activities at a diving operation worksite that may be allocated to IOGP Member-approved competent persons, depending on IOGP Member assessment of the need based on risk and added value. The client project manager should nominate individuals to perform one or more duties, dependent on the individual's competency. Responsibilities and duties may be transferred during a project. Competency must be assured when transferring responsibilities.	***#1:*** It could have been interesting to summarize this point here: In a written document, there must be sufficient provided information to allow the reader to continue his reading without being obliged to open another document to understand what the author is speaking about. A summary should be used when the information to provide is too big. It is an essential international rule for people writing documents…
2.8 Competency assessment process During execution of the work, the IOGP Member must monitor the continued competence of the contractor. This refers to any associated training commitment undertaken. Where necessary, the company should also determine if any additional competence assurance is needed as a result of local circumstances. Monitoring should include a verification that the contractor complies with his management system that may include: • Competence and close monitoring of the replacement of personnel • Provision of the necessary induction courses • Training of contractor personnel in job related activities and procedures • Completion of all agreed upon HSE training, including any specified statutory training requirements • Availability of HSE documents, instruction, and information leaflets with special attention to use of local language reinforced with simple visual messages	

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Purpose:
This page discusses of point # 2.9 Audit plan

Text document IOGP	Our comments
2.9.1 Vessel/worksite project assurance plan Before diving operations commence, companies should conduct an audit or inspection process that, at a minimum, applies IOGP Member and industry standards. The assurance plan may include, but not be limited to, the following: • OVID (Offshore Vessel Inspection Database) ***(See #1)*** • Vessel/worksite HSE audit • Diving equipment systems audit • Project equipment FMEA/FMECA audits • IT/communication services capability • Remotely Operated Vehicle (ROV) systems audit • Survey systems audit • Environmental audit • IOGP Member policies, standards, or procedures • Lifting appurtenance inspection and wire assurance • Structural and mechanical integrity of all lifting equipment • PTW and isolations ***(See #2)*** • Working at height • Rotating machinery • Chemical and other substances hazardous to health	***#1:*** When an organization is promoted or unavoidable it is a good practice to indicate its address: Add the internet link; https://www.ocimf.org/OVID **#2** PTW = Permit to work is not in the glossary and not explained in the text Refer to the previous comments regarding the pathology the authors are suffering from…
2.9.2 Vessel/worksite inspection The vessel/worksite inspection should address items such as: • Project equipment, product and associated component sea-fastenings • Final deck/worksite equipment layout • Ergonomic factors involved in carrying out the work scope ***(See #3)*** • Trip and other hazards • Access and egress routes for executing the work and for emergencies • Sea fastening and vessel stability assurance • Emergency and contingency planning • The provision of access to emergency equipment • Environmental contingency spill kit provision In cases where the mobilisation has been successfully completed in accordance with a well-developed and risk-assessed plan, there is often little to do for the final inspection. In other circumstances, the inspection provides an important final hold point for approving the readiness to commence work	***#3:*** This point should have been more detailed. I suppose that the authors want to describe factors that may contribute to or result in an increased risk of strain and injury, such as those listed below: Awkward postures Bending Compression or contact stress Forceful exertions Insufficient rest breaks Lifting Lighting Noise Pushing, pulling Reaching Repetitive motions Static or sustained postures Temperature extremes Vibration etc.

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Purpose:
This page and the following one discuss of point #2.9.3 Marine Vessels used to support Diving Operations

Text document IOGP	Our comments
Vessels used to support diving operations should be thoroughly assessed by diving and marine SME ***(See #1)*** personnel for fitness of purpose. The anticipated scope of work and diving method intended must be considered for proper vessel selection.	***#1:*** SME = Subject Matter Expert - It should be displayed in the text
Dynamically Positioned vessels Vessels which use Dynamic Positioning (DP) systems must be thoroughly assessed by specialist personnel who have training and experience in DP systems and diving from DP vessels. The International Maritime Organisation (IMO), several flag states, IMCA, IACS (International Association of Classification Societies), and the Marine Technology Society (MTS) DP committee have requirements and guidance on the design, setup, and operation of DP vessels used during diving. DP Equipment Class 2 or 3 is required for vessels undertaking manned diving operations. The vessel should also meet the requirements of and be operated in accordance with: • IMO MSC/Circ.645 “Guidelines for vessels with dynamic positioning systems” and IMO MSC/Circ.1580 “Guidelines for Vessels and Units with Dynamic Positioning (DP) Systems” • Oil Companies International Marine Forum (OCIMF) – “Dynamic Positioning Assurance Framework”, First Edition 2016 • IMCA M 117 “The training and experience of key DP personnel” • IMCA D 010 “Diving Operations from Vessels Operating in Dynamically Positioned Mode” • DNVGL RP-E306 “Dynamic Positioning Vessel Design Philosophy Guidelines” and RP-E307 “Dynamic Positioning Systems Operations Guidance”, (published by MTS DP Committee as “DP Vessel Design Philosophy Guidelines” and “DP Operations Guidance”). A company’s Marine and Diving Specialist personnel should have access to and review the vessels, referencing the following guides: • DP Operations Manual • DP/Diving SIMOPS procedures • DP FMECA/DP FMEA • Annual DP Trials and FMEA Proving Trials report • DP Capability Plots • CAMO, TAM, and ASOG ***(See #2)*** (Diving Operations) Additional details which should be considered when determining DP vessel suitability are: • Position of propulsion system components and thrusters in relationship to where the diver’s launch and recovery system is located • Type of diving mode intended (Surface supplied or closed bell) • Whether operations in open water or near structures and subsea obstructions • Type of position referencing systems outfitted on the vessel IMCA D 010 “Diving Operations from Vessels Operating in Dynamically Positioned Mode” can provide further considerations for planning diving from DP vessels. The IOGP Member and vessel operator should jointly perform a scope of work-specific risk assessment to determine if the vessel DP system equipment, configuration, and operating parameters are acceptable for the planned diving operation. See also IMCA D 035 “The Selection of Vessels of Opportunity for Diving Operations	***#2:*** CAMO = Critical Activity Mode of Operation TAM = Task Appropriate mode ASOG = Activity Specific Operating Guidelines These definitions should be displayed in the text as it is the 1st time they are used on this page and for this topic

Page 24 of the document IOGP 411 - January 2021	
Purpose: This page displays the continuation of point #2.9.3 Marine Vessels used to support Diving Operations	
Text document IOGP	**Our comments**
Audit and Assurance The Offshore Vessel Inspection Database (OVID) produced by the (OCIMF) checklist aims to reduce the number of client audits of contracted vessels. Once an audit is performed in accordance with the guidelines, copies should be made available to clients, along with statements of any corrective action taken, ongoing work or outstanding issues. The audit document should contain an extensive set of definitions and abbreviations, an explanation of the inspection process, and a report summary and distribution list. It should also include a selection of generic inspection sheets and a section dedicated to specialist vessel inspection, each with the following subsections, as below: • Generic section – Previous inspections – Vessel particulars – Certification, documentation – Crew management – Bridge, navigation, and communications equipment – Safety management – Pollution prevention – Structural condition – Life-saving appliances – Fire fighting – Mooring – Machinery spaces and plant (including ballast systems) – General appearance and condition (including accommodation, public rooms, galley) – Hazards – slips, trips and falls • Specialist Vessel Sections – Dynamic Positioning (DP) vessel supplement – Diving vessel supplement – Remotely Operated Vehicle (ROV) vessel supplement – Helicopter supplement It is the responsibility of individual IOGP Members to ensure that, where their individual requirements are greater, provision is made for additional auditing with a contractual obligation for rectification included in the contract.	

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Purpose:
This page discusses of points # 2.9.4 Diving equipment systems audit & #2.9.5 FMEA and FMECA Audits

Text document IOGP	Our comments
2.9.4 Diving equipment systems audit Any equipment that is to be used on an IOGP member's worksite should be inspected and verified as 'fit for purpose' prior to being used. Guidance for this inspection can be found in IOGP Report 468 - Diving System Assurance Recommended Practice and the applicable IMCA DESIGN Audit. IMCA's Diving Equipment Systems Inspection Guidance Note (DESIGN) documents should be used; this can be done by Member employees or by a third party. Five DESIGN documents are currently available: IMCA D 023 – DESIGN for surface orientated (air) diving systems IMCA D 024 – DESIGN for saturation (bell) diving systems IMCA D 037 - DESIGN for surface supplied mixed gas diving systems IMCA D 040 - DESIGN for mobile/portable surface supplied systems IMCA D 053 – DESIGN for the hyperbaric reception facility (HRF) forming part of a hyperbaric evacuation system (HES) IMCA D 063 - DESIGN for Hyperbaric Rescue Unit Life Support Packages. The IOGP Member should verify the accuracy and completeness of any submitted DESIGN document. Additionally, operators may undertake spot, theme, or full audits at any time. All diving systems shall be designed, fabricated, and maintained in class.	*All diving systems shall be designed, fabricated, and maintained in class:* This text results that old systems in perfect condition cannot be used, so small companies with limited resources but making efforts to keep their equipment in excellent condition cannot work for IOGP members or must buy new classified equipment to have the possibility to bid contracts they are not sure to obtain. It must be said that the classification processes include regular inspection and are expensive. Opposite to saturation systems that present a certain complexity, surface-supplied diving systems are simple enough to be inspected by a competent third party using the IMCA DESIGN documents or similar. Thus, contrary to what IOGP pretends, this text favors rich companies and classification societies and penalizes the small entrepreneurs. Of course, the authors of this text demonize those who say that this measure is unnecessary for small systems.
2.9.5 FMEA and FMECA Audits **Failure Modes, Effects and Criticality Analysis** The analysis is sometimes characterised as consisting of two subanalyses: the failure modes and effects analysis (FMEA), and a second analysis which includes criticality analysis (FMECA), where a risk matrix is used to estimate and rank the criticality of the failure from its probability and severity. Criticality analysis is useful when carrying out evaluation of non-redundant systems or systems with an excessive number of dependencies. The FMEA is a tool used to postulate the effects of component or system failure modes and identify the resultant local and end effects on equipment. The effects could, in turn, have operational impacts. Successful development of an FMEA requires that the analyst include all significant failure modes for each element of the system that is considered to fail. FMEAs can be performed at the system, subsystem, assembly, subassembly, or part level. The worst-case failure design intent should be clearly identified for both redundant and non-redundant systems. Criticality analysis can be used to determine that if a high probability failure does occur, its effects will not exceed the severity of the worst-case failure design intent. A comprehensive analysis should be able to unambiguously identify the above and incorporate a comprehensive set of proving trials to demonstrate the validity of the analysis. A FMEA should be carried out on all diving systems used in this report, whether Surface Supplied, Saturation, or Subsea Habitats. It should remain with the system as a living document, periodically reviewed and validated to ensure relevance and accuracy from design phase through to operational deployment and throughout its lifecycle.	The way these elements are explained should be simplified: The problems with many FMEA are that they are not readily exploitable. So the manufacturers should be encouraged to produce documents easy to understand and exploit. Remember that these documents are to be used on worksites in an emergency if needed. Regarding this point, those provided by manufacturers such as an example, Parkburn *(winches and Launch and Recovery Systems manufacturer)* are simple and excellent. Also, such demand may oblige small companies to invest in such a process when a risk assessment was considered sufficient before with simple systems such as air diving systems or scuba replacements. Should I believe that the authors of this document ignore what are the difficulties in creating a company from scratch and do not care about that? Also, if IOGP members continue to ask more and more from small companies, they must not be surprised if one day they will have to deal only with multinationals that will arrange to impose upon them their price!

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Purpose:
This page discusses of the continuation of point #2.9.5 FMEA and FMECA Audits

Text document IOGP	Our comments
Additionally, a comprehensive FMEA should be able to: • Identify single point failures with potential effects of a severity exceeding that of the worst-case failure design intent • Record the configuration(s) in which the failure effects have been analysed and the potential for configuration errors • Identify external interfaces and influences on the system being analysed (diving systems) which have potential effects exceeding the severity of the worst-case failure • Identify potential internal and external common cause failures • Identify hidden failures with the potential to defeat the redundancy design intent if it is an FMEA on a redundant system • Identify the elements of performance protection and detection upon which the predicted failure effects depend for their validity • Identify potential single acts of maloperation with the potential to create failure effects of a severity exceeding that of the worst-case failure design intent • Identify critical components for provision as operational spares • Be a resource for crew familiarisation and training including identification of emergency response training and drills to enhance awareness and preparedness Major benefits derived from a competently executed FMECA include: • Provision of a documented method for evaluating design(s) to validate achieving predictable outcomes. (i.e., achieving a higher probability of successful operation and safety). • Early identification of single failure points (SFP) and system interface problems, which may be critical to operational success and/or safety and potential remediation, if executed at the concept phase • FMEAs provide a method of identifying common cause failures that could impact more than one redundant equipment group. • An effective method for evaluating the effect of proposed changes to the design and/or operational procedures for success and safety. A basis for developing troubleshooting procedures and for locating focus areas for performance monitoring and fault-detection devices. It is a useful tool to identify and develop control of work processes to aid delivery of predictable incident free operations and performance. The key benefits are: • Improved operational awareness through identification of the most failure critical aspects of the work programme • Accurate identification of programme contingency options and enhanced contingency planning	
The FMECA Process The FMECA process can be carried out at system, subsystem, or component level. Generally, for diving project activities, due to potential outcomes and project impacts, it is essential that the analysis is conducted at a sufficient level of detail to establish a high degree of confidence that the worst case failure effects, and their causes, have been unambiguously identified. FMECAs should be carried out as a structured and documented process. An outline of this process is as follows: • Establish and align upon the worst-case failure design intent • Identify the systems or subsystems involved • Identify the failure modes • Identify the possible failure causes (this may involve a review at component level)	

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Purpose: This page discusses of the continuation of point #2.9.5 FMEA and FMECA Audits - Continuation	
Text document IOGP	**Our comments**
• Identify the local and end effect of failures modes • Carry out probability and severity reviews for criticality analysis (this needs to be documented) • Use the identified probability and severity ratings to produce a criticality rating • Develop compensating provisions/mitigations as appropriate • Carry out the mitigation recommendations • Prove the analysis and effectiveness of the compensating provisions / mitigations using suitable verification and validation methods including testing. • Utilise the results to ensure team competency and operational system resilience The FMECA is a critical document it should be expected that audits will focus on this document. The results of the FMECA should be documented in a transparent and intuitive manner to facilitate an effective audit process.	
2.9.6 ROV Systems Audit This recommends the use of IMCA R 006 - Standard ROV Audit Document. The audit covers: • ROVs • Tooling • Interfacing • All the support systems and the relevant procedural documentation The audit proforma is typically passed to the contractor to complete in the first instance. The IOGP Member auditor should review the contractor’s findings and focus on any areas requiring further attention.	

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Purpose:
This page displays points #2.10 Information validation, #2.11 Work scope and procedures, #2.12 Mobilisation/demobilisation planning

Text document IOGP	Our comments
2.10 Information validation A system shall be in place to ensure that all information on the worksite is current and valid. Key documents with the latest revisions should be listed in the bridging document or a referenced document register.	
2.11 Work scope and procedures A work scope must be clearly defined to facilitate timely preparation and issue of procedures. Procedures should be written in compliance with the IOGP Member, the contractors and legislative expectations, policies and practices, and incorporate industry best practice. Hold points should be included in procedures where there is a requirement for specific, signed authorisation for work to continue (e.g., completion of conference toolbox talk, identification of subsea equipment, valves, flanges etc and receipt of key documentation such as permits and isolation certificates, etc.). The responsibility for the development and issue of competent procedures lies with the contractor. Lessons learned from previous projects of both IOGP Member and contractors should be incorporated into the project planning at an early stage. The schedule for procedure production shall allow for: • Review and comment on draft prior to Stage 1 risk assessment • Final review, approval, and issue for construction before work can commence • Development of lift plans and their review by an IOGP Member's mechanical handling and/or marine engineering contractors before work can commence	
2.12 Mobilisation/demobilisation planning **2.12.1 Mobilisation initiative** A high proportion of incidents occur during mobilisation and demobilisation. The following recommendations are made: • Vessel/Worksite assurance plans should be drawn up at an early stage to provide clear guidance on requirements. • Safety awareness should be increased among personnel by ensuring that subcontractor companies receive the client's safety expectations at an early stage. • Increase efficiency of the mobilisation by assisting the provision of adequate and realistic information to Contractor personnel, subcontractors, marine and worksite personnel as early as practicable. • Provide personnel joining the vessel/worksite with a positive message by producing plans that have no surprises and that demonstrate that management has researched the project thoroughly. This will give personnel a positive frame of mind in which to work that will naturally follow through to the offshore phase and to demob and will, through time, improve the culture and behaviour of the personnel. • Improve vessel/worksite access control and management. This is key to both security and, more importantly, provide a means of managing and tracking personnel in case of emergency. • Improve subcontractor alignment and participation in mobilisation initiatives, pre planning meetings and safety expectations. • Implement a robust 'lessons learned' process within each contractor organisation.	

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Purpose: This page displays the continuation of point #2.12 Mobilisation/demobilisation planning	
Text document IOGP	**Our comments**
2.12.1 Mobilisation initiative - continuation • Treat mobilisations and demobilisations separately from the main project activity with regard to safety performance and safety focus. • All contractor companies should emphasise their safety expectations to all parties (i.e., their workforce, clients, and subcontractors). • Complete induction and familiarisation of project, scope, specialised tooling or equipment, dive system, etc.	
2.12.2 Mobilisation and demobilisation plan The contractor's process for managing mobilisations should be in place and open to audit. The plan should ensure that the mobilisation is carried out in a safe, efficient, and timely manner. This maybe contained as part of the contractors project execution plan. It involves a review of the work scope objectives followed by detailed engineering and logistics preplanning, complete with the accompanying risk assessments and assurance processes. The mobilisation plan should address the following: • The project work scope • Pre-mobilisation meetings • Third-party contractor audits • Site safety planning and auditing • Project HSE plan review • Designation of responsibilities • Third-party contractor integration and management during the mobilisation • Vessel/Worksite deck plans: proposed and final • Detailed mobilisation schedule including the equipment mobilisation sequence and the supporting logistical requirements • Management of change during the mobilisation • Communications during the mobilisation • Project and vessel/worksite inductions • The onboard management of non-vessel personnel • Emergency and contingency plans • Availability of all required documentation There may be a requirement for a documented acceptance and sign-off process by the main contractor, client, and some of the third-party companies in the mobilisation.	

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Purpose:
This page displays points #2.13 Demobilisation plan, & #2.14 Risk assessment

Text document IOGP	Our comments
2.13 Demobilisation plan The contractor's process for managing demobilisations should be in place and open to audit. The plan should ensure that the demobilisation is carried out in a safe, efficient, and timely manner. It involves engineering and logistics pre-planning, complete with the accompanying risk assessments. The demobilisation plan will address such items as: • Demobilisation meetings • Management and timing of final decompression and bend watch. Including demobilisation of plant and equipment (HRF, NRV, LSP, Gas) as well as the cessation of services and plans. ERP arrangements and medical contingency support arrangements • Third-party contractor audits • Site safety planning • Project HSE plan review • Designation of responsibilities • Third-party contractor integration and management during the demobilisation • Vessel/Worksite deck plans: current and final • Detailed demobilisation schedule including the equipment demobilisation sequence and the supporting logistical requirements • Management of change during the demobilisation • Communications during the demobilisation • Vessel/worksite inductions • The onboard management of non-vessel personnel • Emergency and contingency plans • Capturing of as-built and other key project deliverables • Performance data There may be a requirement for a documented acceptance and sign off process by the main contractor, client, and some of the third-party companies during the demobilisation.	
2.14 Risk assessment **2.14.1 Risk assessment requirements** **Responsibility** The diving contractor accountable for the work has the responsibility for the risk assessment. If, after the initial risk assessment, the contractor is changed for any reason, then the new contractor must conduct the risk assessment again.	
Personnel involved The risk assessment should be attended by any party whose acts or omissions could adversely affect the: • Health and safety of persons engaged in the project • Environment • Contractor and/or company assets • Operational/execution performance It is essential that the necessary, qualified personnel are available for all phases of the risk assessment. These personnel should include: • Operations, installation, worksite, area managers with detailed local knowledge of the management and control systems which are to be utilised during the work • Subcontractors (e.g., commissioning, pumping, rock dumping, grouting, survey, dredging, crane, haulage, security, etc.) • Specialists (e.g., marine, aviation, diving, lifting, etc.) • Third-party operators (including drill rigs, accommodation, other operators)	

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Purpose:
This page displays the continuation of point #2.14 Risk assessment

Text document IOGP	Our comments
Personnel involved - Continuation Risk assessments should not be conducted until all personnel are present, and all present must contribute to the process	
Content of risk assessment All aspects of the work must be risk assessed, including the mobilisation, demobilisation, onshore trials and transit to site, scope of work, diving operational tasks, ERP, diving system and equipment operation, ROV, and SIMOPS. Some areas of the work may be covered by so-called ‘generic procedures’ (e.g., laying concrete mats, water blasting, etc.). These procedures must be examined as part of the overall risk assessment unless it can be shown that they have been independently risk assessed. If this is the case, the generic procedure and its associated independent risk assessment must be available for review during the job-specific risk assessment. The risk assessment team must ensure that the generic procedure is applicable to the work in hand and any variations are identified and included as part of the overall risk assessment. Where the same activities have been carried out previously it is permissible to use previous risk assessments as guidance only.	
Timing of risk assessment Risk assessments should be carried out in a timely manner. For normal planned operations, the Stage 1 risk assessment should be completed prior to the scheduled work. This allows time for the control/mitigating measures to be implemented. For more urgent work, the timescale for the planning phase may be much shorter. However, the risk assessment process must still proceed even if this means delaying implementation. All procedures must be at least at the ‘final draft’ stage including internal and external checks prior to the Stage 1 risk assessment.	

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Purpose: This page displays point # 2.14.2 Risk assessment stages	
Text document IOGP	**Our comments**
2.14.2 Risk assessment stages In the subsea sector, the preliminary hazard risk assessment process comprises three phases or levels:	
Stage 1 – Onshore risk assessment (also known as a Hazard Identification and Risk Assessment, HIRA) All activities covered by work scopes and generic and specific procedures must be subject to a formal risk assessment process during the onshore planning phase. The process will identify any requirement to change the work scope and procedures and/ or any mitigating measures to be applied. The process shall be as defined in the diving contractor's SMS and will include active involvement from all parties whose acts or omissions could adversely affect the health and safety of persons engaged in the project or could affect plant, equipment, or the environment.	
Stage 2 – Onsite risk assessment At a minimum, those conducting the onsite risk assessment should review the onshore stage 1 risk assessment, generic risk assessments, and job safety analyses using these as a starting point for the stage 2 risk assessment. A stage 2 risk assessment must be conducted for all elements of the project including routine maintenance activities.	
Stage 3 – Toolbox talk This is a review and discussion immediately prior to the work taking place. It will include a final review of the risks involved by all participants. A record of the toolbox talk, its outcomes, and attendees should be made.	
Conference toolbox talk Where the work involves a connected action between remote sites, e.g., an installation and a vessel, joint 'conference' toolbox talks involving key personnel at both locations shall be arranged before the commencement of each section of work. Key personnel shall comprise those with responsibilities under the local Permit to Work System (PTW) (e.g., Installation Area Authority and Vessel Performing Authority) and those with direct responsibility for the work, e.g., Installation OIM, Installation Technical Representative, Vessel Shift Supervisor, contractor Project Engineer, and technical specialist.	OIM = Offshore Installation Manager

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Purpose:
This page displays points # 2.15 Emergency Response Plan (ERP), #2.16 Management of Change, #2.17 Accident investigation and reporting

Text document IOGP	Our comments
2.15 Emergency Response Plan (ERP) 2.15.1 Emergency response guidelines ***(see #1)*** Site specific contingency plans supported by risk assessments must be in place, for all foreseeable emergencies, to provide reference to personnel that have responsibility or involvement in a diving project in the event of an emergency. For detailed guidance on preparing a diving-specific emergency rescue plan, please see IOGP Report 478 - Saturation Diving Emergency Hyperbaric Rescue Performance requirements. ERPs should address scenarios including, but not limited to: • Recovery of an incapacitated diver from working depth to a safe place for treatment • Treatment of Decompression illness or dysbaric injury • Hyperbaric Evacuation to a safe refuge including medical support and decompression to surface • Emergency procedures for the locating, support, and recovery of a lost Diving Bell • Emergency procedures for the support and recovery of occupants in a subsea habitat • Diving at a contaminated worksite • Recompression contingency arrangements where the primary site is compromised in an emergency during surface supplied diving operations • Medical treatment facilities identified in remote areas Contingency and response plans, together with callout procedures, should be exercised regularly by IOGP Members, the diving contractor, other operators, and key parties.	***#1:*** Where is point 2.15.2?
2.16 Management of Change There should be a formal, documented Management of Change (MOC) Process which is acceptable to the IOGP Member. The MOC process will define how change is implemented, who is authorised to approve levels of change, and how any appropriate risk-reducing measures are applied. The approval levels for MOC shall be defined in the Project Bridging Document that form part of the DOP. ***(see #2)***	***#2:*** DOP = Diving Operating plan
2.17 Accident investigation and reporting An agreed system of accident, incident, and near miss reporting must be implemented to ensure that legislative, IOGP Member, and contractor reporting requirements are met. All health, safety, technical integrity, and environmental incidents, including near misses, shall be openly reported, investigated, and documented in order to analyse and learn from the incident. The objective of such reporting is to ascertain root causes and not to assign blame. Major incidents are to be investigated by a multi-functional team with independent participation and leadership. An agreed suitable root cause investigation methodology should be utilised. Furthermore, investigation updates, reports and action closeouts should be carried out in a timely fashion.	

<table>
<tr><td colspan="2">Page 34 of the document IOGP 411 - January 2021</td></tr>
<tr><td colspan="2">Purpose:
This page displays points # 2.18 Notification & #2.19 Bridging document</td></tr>
<tr><th>Text document IOGP</th><th>Our comments</th></tr>
<tr><td>2.18 Notification
Good communications are key to conducting safe diving operations. Key parties must be notified and updated regularly as situations change. Notifications may be in relation to safety, performance, progress, or engineering issues. Key parties include, but are not limited to:
• Those identified as key in the Project Strategy or Bridging Document
• Single point accountability, i.e., project and single point authorities
• Worksite, OIM and/or control rooms of Installations and other vessel offshore managers
• Emergency response centres
• External authorities, federations and other regulatory bodies
• Onshore terminal control rooms</td><td></td></tr>
<tr><td>2.19 Bridging document
No diving operation should commence until an approved bridging document has been issued. The object of the Bridging Document is to link or bridge the management control processes of the IOGP Member, Worksite, third parties where appropriate and the contractors' safety management systems (SMSs) to clarify the procedures and processes that will be adhered to at that worksite. It is the responsibility of the contractor to produce the project bridging document.
A bridging document will be required to cover the whole of the work. It is recommended that this follows the format in Table 1, "Bridging Document Template", found in IOGP Report 423-02 - Guide to preparing HSE plans and Bridging documents. Key personnel and response organisations should receive controlled copies. The contents of a bridging document should include, or reference, but are not limited to the following:
• Project title and revision status
• Circulation list and authorisation signatures
• Project overview including dates and contract arrangements
• Identification of the relevant work scopes and procedures
• Identification and allocation of key personnel roles and responsibilities
• Communication contact numbers for key personnel and worksites
• Management of change process, and identification of approval levels
• Emergency and contingency procedures including clarification of primacy
• List of referenced documentation including revision status
• Example of a work control system
• Applicable permit to work systems
• Procedures for combined marine operations
• Procedures for field logistics and support
• Procedures for helicopter operations</td><td></td></tr>
</table>

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Purpose:
This page displays point #3. Execution

Text document IOGP	Our comments
3. Execution **3.1 Site rules (worksite)** Site rules that define the specific arrangements to manage and control diving operations safely shall be in place for all worksites. Note 1: Site rules should not be confused with the contractors' worksite 'Site Rules'. Note 2: Site rules may extend 500 m from some worksites, e.g., exclusion zones.	
3.2 Safety briefings Briefings on IOGP Member expectations, policies, and practices are to be given to all personnel involved in the project, including marine crew, and third parties. A system of general safety briefings, safety meetings, and toolbox talks must be carried out and recorded. Appropriate site orientation, induction and project-specific training including site rules and emergency procedures shall be undertaken to clarify roles, responsibilities, and actions. All personnel should attend the briefings and training, and a register should be maintained.	
3.3 Permit to work process A formal permit to work system must be in place to manage diving operations, for example a permit-to-work system between the diving team, the Worksite/Installation Manager and/or the master. Where isolations are required, these should follow the approved isolation plan and managed as an integral part of the PTW process	
3.4 Health and medical care The contractor will comply with occupational health arrangements as required by legislation, IOGP Member and the contractor's standards. The diving contractor Medic/Nurse/Doctor will provide first aid and emergency treatment onsite. IOGP Member will assist with evacuation from the site, as necessary. The contractor will take responsibility for their injured/ill or medically incapacitated personnel on arrival at the heliport, port or medical centre, as appropriate. Contractors and their medical providers should co-operate with IOGP Member regarding case management and return to work.	

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Purpose:
This page displays the continuation of point #3 Execution

Text document IOGP	Our comments
3.5 Care of the environment IOGP Members and contractor personnel must comply with standards of the country of operation, IOGP and contractor corporate policies, and site rules. Each contractor or project shall establish a strategy and management plan to ensure that there is no damage to the environment from their operation. The accountabilities for delivering management plans should be clearly defined for all areas of operation	
3.6 Progress reporting It is essential that progress is reported regularly and consistently throughout the life of the project, thus ensuring that all those involved, or with an interest in the project, are kept up-to-date and informed of current issues or changes. This applies equally to long term projects and service call-offs, and to short duration operations. Progress reporting can be achieved through meetings, telephone conversations, and written reports. The frequency and timing of these will depend on the nature of the project, service or operation. All meetings and teleconferences should have standard agendas and be documented. Additional ad hoc meetings and reporting will also be required to address one-off issues or specific areas of interest, e.g., management of change, engineering, response to incident, serious integrity issues, etc. The following paragraphs suggest a progress reporting systems and expectations for diving operations. It is expected that these will be modified to meet individual project or operation requirements.	
3.7 Operations and projects progress reporting A process of regular communication between key IOGP client and contractor personnel shall be in place to report project progress including safety, operational, technical, commercial and contractual issues. Meetings will be attended by IOGP Member and Contractor Project Manager supported by others as required. Meetings shall have agendas and outcomes documented	
3.7.1 HSE performance reporting During operations, a process for communicating safety performance in terms of 'inputs' and 'outputs' shall exist. The process shall enable reporting on a weekly basis as a minimum. The reporting shall be suitable to enable the identification of trends for analysis and initiation of appropriate interventions. The 'inputs' shall record areas of workforce and management participation in safety alongside the recording of observed unsafe or safe conditions/acts. The 'outputs' shall cover the range of incidents ranging from high, medium, and low potential near misses, days away from work cases, recordable injuries, first aid cases, and others as required by project requirements.	

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Purpose: This page displays the continuation of point #3 Execution	
Text document IOGP	**Our comments**
3.7.2 Health, safety, and environmental performance monitoring This section suggests expectations on monitoring, reporting and reviewing of health, safety and environmental measures associated with contractor companies and their associated operations. IOGP Members have an interest in the safety performance of vessels and contractors that are used (or likely to be used) on their contracts both whilst they are engaged in work or while performing work for other operators. Measures are described as ‘input measures’ (also known as ‘leading indicators’) when actions are proactive in nature in an effort to prevent incidents. Measures are also described as ‘output measures’ (or also known as ‘lagging indicators’) when they are used to report incidents that have occurred. The process of monitoring and reporting should meet the following key objectives: • Provide timely focus on measures in order to enable rapid and direct influence on the activities concerned • Identify trends in order to determine whether any intervention or changes should be introduced by the contractor or by IOGP Members • Provide records of HSE performance which may assist in establishing goals for future performance • IOGP Members must have a system to notify, investigate, record, and report incidents to IOGP	
3.7.3 Incident management This section suggests a process for the management of incidents involving diving contractors whether they occur on contractor or IOGP Member managed sites. The process and expectations also apply to contractors contracted by third parties when they are working on equipment and in areas controlled by an IOGP Member. Additionally, and in the interests of shared learning and continuous improvement, contractors are expected to advise IOGP Members of any significant incidents that occur on any of their operations and to follow this up with safety flashes, investigation reports, and lessons learned, as they become available. The objective for the incident management process is to ensure the following: • Care and treatment of any injured parties • Timely reporting of the incident to all interested parties, including relevant authorities if necessary • Clear definition of accountability for incident investigation and reporting • Timely investigation of the incident to establish root causes and evaluate • actions to prevent recurrence • Timely restart of work • Evaluation and distribution of lessons learned • Consistent recording and tracking of incident details and action	

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Purpose: This page displays the continuation of point #3 Execution	
Text document IOGP	**Our comments**
3.7.4 Closeout reporting **Closeout meeting** A closeout meeting should take place as soon as possible (preferably within two weeks) after demobilisation, or for extended operations, at regular intervals (not greater than three months). The agenda should include but not be limited to: • Review of events • Review and discussion of any accidents, incidents and near misses • Recommendations for corrective actions • Confirmation of project final status • Confirmation of the provision of as-built and closeout documentation • Lessons Learned	
	Missing in the elements for the preparation of the project: There is nothing indicated regarding drug abuse policy. People under the effects of psychotropic substances are dangerous to themselves and the people working with them, and a system should be in place to detect them (it is easy to implement with the help of the company doctor). The purpose of such policies is not to substitute for the legal authorities, but implement a management system and procedures that allow the personnel at work to deal with cases that may be encountered, and organize an efficient system of prevention to be sure that such undesirable events never happen *(extract of "Implement a drug and alcohol abuse policy" published by CCO Ltd.)*

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Purpose:
This page displays Appendix A Breathing Gas Purity – Air/Nitrox/Heliox

Text document IOGP	Our comments
Title: Diver breathing Gas Purity: Air, Artificial Air, NITROX, and HELIOX	
Definition: Breathing Gas component parameters and maximum contaminant levels.	
Scope: Compressed breathing gas for divers. The identification and control of potential contaminants and their effects	
Personnel: The competence of all personnel shall be demonstrated according to their roles and responsibilities.	
Requirements Any divers' breathing gas should be compliant with BS EN 12021:2014 ***(See #1)*** or equivalent prior to being connected online. The oxygen content of all umbilical supplied breathing gas shall be constantly monitored for that diver regardless of gas composition	***#1:*** This document is the European Norm EN 12021:2014. Because IOGP 411 is written for people who do not live in the United Kingdom, only the European Norm reference should be indicated to let the reader the possibility to buy it in the country of his choice. Also, there are often substantial difference of prices between countries. European Norms are decided and sold by the following countries who are member of the European Community or associated countries: - Austria : ON (Österreichisches Normungsinstitut) - Belgium : NBN (Bureau de normalisation/Bureau voor Normalisatie - Bulgaria : BDS (Bulgarian Institute for Standardisation) - Cyprus : CYS (Cyprus Organisation for Standardisation) - Denmark : DS (Dansk Standard/Danish Standards) - Estonia : EVS (Estonian Centre for Standardisation) - Finland : SFS (Suomen Standardisoimisliitto r.y.) - France : AFNOR (Association française de normalisation) - Germany : DIN (Deutsches Institut für Normung e.V.) - Greece : ELOT (Hellenic Organization for Standardization) - Hungary: MSZT (Hungarian Standards Institution) - Ireland : NSAI (National Standards Authority of Ireland) - Iceland : IST (Icelandic Standards) - Italy : UNI (Ente Nazionale Italiano di Unificazione) - Latvia : LVS (Latvian Standards Ltd) - Lithuania : LST (Lithuanian Standards Board) - Luxembourg : ILNAS (Institut luxembourgeois de la normalisation, de l'accréditation, de la sécurité et qualité des produits et services) - Malta : MSA (Malta Standards Authority) - Nederlands: NEN (Nederlands Normalisatie-instituut) - Norway : SN (Standard Norway) - Spain : AENOR (Asociación Española de Normalización y Certificación) - Poland : PKN (Polish Committee for Standardization) - Portugal : IPQ (Instituto Português da Qualidade) - Czech Republic: UNMZ (Czech Office for Standards, Metrology and Testing) - Romania: ASRO (Association roumaine de normalisation) - United kingdom : BSI (British Standards Institution) - Slovakia : SUTN (Slovak Standards Institute) - Slovenia : SIST (Slovenian Institute for Standardization) - Sueden : SIS (Swedish Standards Institute) - Switzerland : SNV (Schweizerische Normen-Vereinigung) The country code usually precedes the European Norm. English language is often added to the National language.

Page 39 of the document IOGP 411 - January 2021 - continuation -	
Purpose: This page displays Appendix A Breathing Gas Purity – Air/Nitrox/Heliox - Continuation -	
Text document IOGP	**Our comments**
Equipment Diver breathing gas from LP compressor, or any diver breathing from HP storage while any HP compressor is filling that HP storage receptacle. • Real-time analysis will be afforded to each diver's gas supply including the standby diver. • Real-time analysis will test for oxygen, carbon monoxide, carbon dioxide • Real-time analysis will test for water vapor when risk assessment indicates the need • Display will be in dive control and should be fitted with audio visual warning	Note to take into account: DMAC 19 says: *DMAC wishes it to be known that a higher level of water vapour in breathing mixtures is not detrimental to the health of divers and is beneficial to their respiratory system. An example of the practical application of this concept is breathing mixture which is voluntarily humidified to achieve a high water vapour content, administered to hospital patients. So, the condensation is not the problem* However, as indicated in the text too much moisture in the gas may lead to freezing during diving operation in cold conditions.
Operational Factors • All Breathing gas used for the storage of Divers in saturation should be tested for contaminants including microbiological organisms, oil mist or droplets, and VOCs • Long term occupational exposure limits should be based on the parameters of EH75/2 'Occupational exposure limits for hyperbaric conditions' or equivalent • Compressed breathing air shall have a dew point sufficiently low to prevent condensation and freezing • Where the apparatus is used and stored at a known temperature, the pressure dew point shall be at least 5 degrees C below the likely lowest temperature to which any part of the compressed breathing air pipeline or the respirator can be exposed at any season of the year in the applicable geographic location	VOC = Volatile organic compound . This acronym is not listed in the document Note that the US Navy has already published a list of contaminants. I have used and increased it with the descriptions and effects of the substances indicated on the body in my study of the Norman 15. The values are in PPM instead of Mg.M3. Also, the UK HSE says that EH75/2 is purely theoretical, so it is prudent to use it in parallel with the references US Navy, and select the most stringent results. Also, it should be indicated that the design of the saturation systems can reduce the exposure of the living chamber to contaminants. As an example, a transfer through the transfer lock and the entry lock before accessing the living chamber. Also, systems such as the "gas Pure Divex" are incredibly efficient to remove most chemical and bacterial contaminations.

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Purpose:
This page displays Appendix B. Habitats

Text document IOGP	Our comments
Definition A ‘dry’ subsea compartment located on seabed or structure to support divers whilst repairing pipelines or structures. Divers enter the Habitat by either mating a bell, or through water transfer. There is a wide variety of habitats, with no one being described as typical.	
Scope Used to shelter divers conducting hyperbaric cutting and welding in all depth ranges	
Minimum Team Size and Competence • Team size subject to formal risk assessment. There must be sufficient number of competent and, where appropriate, qualified personnel to operate all the diving plant and to provide support functions to the dive team. This may require additional deck support personnel and other management or associated technical support personnel, for example engineers or vessel maintenance technicians • Approved coded hyperbaric welder divers and inspectors for the task	
Equipment • Diving contractor must be satisfied that sufficient plant, suitable for the use to which it will be put, is provided for the diving project and that sufficient plant is available, whenever needed, which is suitable to carry out safely any action which may need to be taken in a reasonably foreseeable emergency • Compliance with relevant parts of NORSOK-U100 which relate to habitats **(see #1)**	**#1:** What I hate when I read a document is to interrupt my reading and be obliged to open another document to find the information I need, especially if I need to buy the document! The authors are supposed to list what they want for a habitat: Do it please!
Operational Factors • Maintain bell lock off/on times within guidance limits • Continuous gas sampling and analysis for maintaining contaminates within defined life supporting threshold limits. • Maintenance of Habitat life support services • Surface support vessel position keeping • Potential for seabed contaminates and/or suction • Currents	
Emergency and Contingency • Habitats shall be equipped to maintain vital functions for a minimum of 48 hrs when primary supplies are not available. • Potential for loss of pressure • Potential for fire	

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Purpose:
This page displays Appendix C. Inshore/Inland Diving

Text document IOGP	Our comments
Definition Inside territorial waters (within 12 miles or 19.25 kilometres from shore), including docks, harbours, canals, culverts, rivers, estuaries, lakes, reservoirs, dams, flooded tunnels, and tanks. ***(See #1)***	***#1:*** Why separate inland procedures from offshore procedures? This is against consistency as the authors suggest several levels of safety!
Scope The preferred method of diving on Inshore/Inland Diving Operations uses Surface Supplied Air or Nitrox ***(See #2)*** The diving technique to be used should be defined through risk assessment	***#2:*** Lake Tanganyika is an African great lake whose average depth is 570 m and may contain oil and gas reserves. These depths are unreachable using air and Nitrox. Also, there is no reason not to use Heliox for depths below 40 m that can be found in lakes, rivers, and within the 12 miles from the shore. So, why using the word "preferred"? *Considering the requirements from IOGP, this appendix should be called "SHALLOW Inshore/Inland Diving operations". Also, see the comment above.*
Minimum Team Size and Competence • Minimum of 5 (Diving Supervisor, working diver, stand-by diver, tender for working diver, tender for stand-by diver) • Team size subject to formal risk assessment. There must be sufficient number of competent and, where appropriate, qualified personnel to operate all the diving plant and to provide support functions to the dive team. This may require additional support personnel and other management or associated technical support personnel, for example project engineers or maintenance technicians. The Diving Supervisor shall be competent for the task and be in possession of a letter of appointment from the diving contractor	
Equipment Diving contractor must be satisfied that sufficient plant, suitable for the use to which it will be put, is provided for the diving project and that sufficient plant is available, whenever needed, which is suitable to carry out safely any action which may need to be taken in a reasonably foreseeable emergency. Equipment should conform to IMCA D 018 and the appropriate sections of IMCA DESIGN 023 or IMCA D 040. Proximity to a Recompression Chamber based on Table 1. The Chamber should conform to the standards contained in IMCA DESIGN D 023	
Operational Factors • Compliance with local port, harbour and other local regulations • Local environmental conditions, e.g., current, tides, restricted surface visibility, surface conditions, sun, temperature (hot and cold), wind-chill • SIMOPS, e.g., surface craft movements, managing general public, neighbouring operations • Diving at altitudes requires compliance with special diving tables • Diver Safe Access and Egress • Maximum Bottom times based on Table 2 • Operational guidance from the Association of Diving Contractors International (ADCI) for activities related to Inland/Inshore diving. ***(See #3)***	***#3:*** Same remark as for NORSOK in Appendix B. The difference is that ADCI guidelines are free of charges.
Emergency and Contingency • Remoteness of worksite and access to emergency services may require a higher degree of medical competence and equipment to be immediately available at site (see the continuation on the next page)	

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Purpose:
This page displays Appendix C. Inshore/Inland Diving - Continuation -

Text document IOGP	Our comments

Emergency and Contingency - Continuation -

- Recovering an injured/unconscious diver from working depth to safe place for treatment, and consequential treatment, including possible recompression requires a detailed site specific plan
- Demonstration that the designated recompression chamber is staffed and available for the duration of diving program and suitable to perform treatment of diving illness/injuries.

Table 1: Proximity to a Recompression Chamber
The diving contractor has responsibility to ensure the provision of facilities so that a diver can be recompressed in an emergency, should this be necessary. Treatment of a DCI in a compression chamber should commence as soon as possible and the safest option is to have a Recompression Chamber located as near as practicable to the diving site.

Deco	*Depth*	*Chamber requirement*	*Travelling distance*
No deco	0 to 33 feet or 0 to 10 m	Diving contractor should identify the nearest suitable operational two-person, two-compartment chamber. Under no circumstances, should this be more than - ***(See #4)***	2 hours
All dives	33 to 165 feet or 10 to 50 m	A suitable, operational, two-person, two-compartment chamber should be provided for immediate use at the site of the diving project Additional DDC/s maybe required where treating a DCI incident may stop diving operations if only one DDC is available	Immediately available on Site

#4:
This text seems based on section 115 / page 26 of the UK HSE document "Commercial diving projects inland/inshore Diving at Work Regulations 1997" that says: *"For dives that are shallower than 10 metres with planned in-water decompression not exceeding 20 minutes, the diving contractor should identify the nearest suitable operational two-person, two-compartment chamber. Under no circumstances should this be more than 6 hours travelling distance from the dive site"*.
However, although this text is from an official body, it cannot be considered a scientific reference. It must be taken into account that when they promulgate laws, states are often confronted with situations they must manage by compromise not to destruct the employments of the citizens to protect. As a result, national rules sometimes do not follow in full scientific considerations for practical reasons, which is the case of this rule.
Another problem is that this limitation of 10 m (33 ft) considers only decompression accidents and forgets potential barotraumas. However, what is said regarding the maximum elasticity limit of pulmonary alveoli should be considered. As an example, in their book "diving medicine" Bove & Davis say: *"Under experimental conditions, it has been demonstrated that a transpulmonic pressure (the difference between the intra-tracheal and the intra-pleural pressure) of 95 to 110 cm H2O is sufficient to disrupt the pulmonary parenchyma and allow gas into the interstitium"*. Because a diver using a breathing apparatus at 10 m has an air pressure of 2 bar in his lungs, pulmonary barotrauma is possible in case of an ascent without exhaling.
It is recognized that compression to a depth of relief is a beneficial treatment of mediastinal and subcutaneous emphysema, in addition to decompression accidents. For this reason, the ideal scenario is to have a chamber on the worksite, or close to it, like in appendix F of this IOGP document, where the travel time to the mother vessel (where the chamber is) is limited to less than 15 minutes.
It must be considered that the likelihood and consequences of pulmonary barotraumas and decompression accidents are similar for shallow dives at sea and inland/onshore. For this reason, apply weaker rules for onshore projects than for offshore ones is not suitable. Thus, if IOGP considers that pulmonary barotraumas are sufficiently under control to allow for a chamber at more than 15 minutes distance from the job site, that must be justified by a risk assessment that demonstrates that the likelihood of such accident is scarce and that they are under control due to suitable control measures. Then the limits for diving without a chamber on the job site can be established and justified.

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Purpose:
This page displays Appendix D. Underwater Ships Husbandry

Text document IOGP	Our comments
Definition Use of surface supplied diving methods to perform cleaning, inspection, survey or repair on the underwater systems of ships, MODUs, barges and vessels. ***(See #1)***	***#1:*** MODU = Mobile Offshore Drilling Unit . The definition of the acronym is not in the book. It should be.
Scope Performed inland/inshore or offshore and may include inspections using visual or non-destructive techniques for certification by class societies. Hull cleaning and prop polishing is typically performed in conjunction with inspections. Repairs may be performed on the hull, to propulsion and steering systems, or anti corrosion systems.	
Minimum Team Size and Competence • Minimum of 5 (Diving Supervisor, working diver, stand-by diver, tender for working diver, tender for stand-by diver) • Personnel should be trained in underwater inspection and in the use of hull cleaning and repair equipment. • Personnel should also be familiar with systems/equipment relevant to the ships propulsion, steering, water suction/discharge, sonar and anti-corrosion systems when perform tasks on or in the vicinity of those systems. • Team size subject to formal risk assessment. There must be sufficient number of competent and, where appropriate, qualified personnel to operate all the diving plant and to provide support functions to the dive team. This may require additional support personnel and other management or associated technical support personnel, for example project engineers or maintenance technicians. The Diving Supervisor shall be competent for the task and be in possession of a letter of appointment from the diving contractor.	
Equipment • Diving contractor must be satisfied that sufficient plant, suitable for the use to which it will be put, is provided for the diving project and that sufficient plant is available, whenever needed, which is suitable to carry out safely any action which may need to be taken in a reasonably foreseeable emergency • Diving system audited to IMCA D 040 DESIGN or IMCA D 023 DESIGN standard, which ever system is used • Decompression chamber (when operating > 10m water depth) ***(See #2)*** • Dive vessel suitable in size and manning to accommodate the dive system, inspection/repair/cleaning equipment, and anticipated sea state • Hull and prop cleaning/buffing equipment designed for safe diver manual operation • Inspection and welding equipment designed for diver operation	***#2:*** See my comments regarding the distance of the chamber on the previous page.
Operational Factors • Isolation of any ships underwater equipment which could potentially harm the diver (Propulsion, steering, suction/discharge, electrical corrosion, sonar, etc.) • Small boat/Daughter craft diving next to a large vessel • Diving under a ship (Restriction to surface) • Maximum umbilical lengths and obstruction/fouling hazards (Propellers, rudders, sea chests, etc.) • Dropped objects from the vessel onto the dive worksite • Diving near high vessel traffic area (jetties and anchorages)	

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Purpose: This page displays Appendix D. Underwater Ships Husbandry - Continuation -	
Text document IOGP	**Our comments**
Operational Factors - Continuation - • Anchored vessels moving exposing dive workboat to sea changes • Changing environmental conditions and forecasting • Diver and umbilical must remain unattached from cleaning equipment • Operational guidance from the Association of Diving Contractors International (ADCI) for Ships Husbandry ***(See #3)***	***#3:*** I have spent several hours looking for this document, and I did not find it. If it still exists, the author should indicate the link to download it *(As already said, when you recommend a document or an organization, indicate the link)* Note that IMCA M 210 "Guidance for the selection of diving contractors to undertake underwater ship husbandry" could have been indicated as another reference.
Emergency and contingency • Distance to decompression chamber as stated in Table 1 • Bail-out cylinder duration consideration of extended umbilical distances when working on large vessels	

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Purpose:
This page displays Appendix E. Live-Boating

Text document IOGP	Our comments
Definition Term applied to supporting diving operations from a non-DP 2 or 3 class vessel while the vessel is underway. However this also includes diving from a DP vessel on auto track	
Scope There are unlikely to be any circumstances where an ROV could not be deployed, a 4-point vessel moored, or a DP 2 or 3 class vessel used. *Live-boating is considered an unsafe working practice and is not recommended.* ***(See #1)***	***#1:*** The name of this document is "recommended diving practices" For this reason this procedure should not be in the middle of recommended practices and listed in another point.
Minimum Team Size and Competence Not applicable	
Equipment Not applicable	
Operational Factors • High dependency on communication between dive team and Master to maintain vessel in a safe position relative to the diver at all times • Normal practice is for divers to access water by jumping, and egress through ascent of a diving ladder • Potential for divers umbilical to become fouled in propellers or intakes • No subsea refuge immediately available for diver, e.g., basket or stage • Deployment of stand-by diver delayed until propellers stop turning • Recovery of an injured/unconscious diver to surface delayed, and the subsequent treatment • Environmental forces changing • Restricted to daylight hours and good surface visibility	
Emergency and Contingency Not applicable	

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Purpose:
This page displays Appendix F. Mobile/Portable Surface Supplied Systems or Scuba Replacement

Text document IOGP	Our comments
Definition Mobile or portable surface supplied diving system which aims to provide the flexibility of SCUBA ***(see #1)*** without the safety limitations. The system may be moved to different locations on an installation or mounted on a small boat operating from a support vessel.	***#1)*** Self-Contained Underwater Breathing Apparatus – SCUBA is not explained in the text as it should be. Also, this topic that is explained in a next appendix should be explained before to let the reader understanding the reason for “Scuba replacement” . As SCUBA use is forbidden in this industry, it should be grouped in a special chapter with all the procedures not accepted by IOGP members.
Scope Used for shallow water air or nitrox diving at depths less than 30msw (100fsw). It could be used up to a maximum of 50msw (165fsw), but only in exceptional circumstances and after risk assessment. ***(see #2)***	***#2:*** Every dive must be organized according to a risk assessment!
Minimum Team Size and Competence • Minimum of 5 (Diving Supervisor, working diver, stand-by diver, tender for working diver, tender for stand-by diver) • Team size subject to formal risk assessment. There must be sufficient number of competent and, where appropriate, qualified personnel to operate all the diving plant and to provide support functions to the dive team. This may require additional deck support personnel and other management or associated technical support personnel, for example project engineers or vessel maintenance technicians	
Equipment • Diving contractor must be satisfied that sufficient plant, suitable for the use to which it will be put, is provided for the diving project and that sufficient plant is available, whenever needed, which is suitable to carry out safely any action which may need to be taken in a reasonably foreseeable emergency • Sufficient POB/living requirements when using a Mother vessel • Suitable deployment cranes and adequate deck space required when using a Mother vessel • Two suitable surface craft, one a daughter craft and the other a means of rescue or transport between the mother vessel and daughter craft. • Decompression chambers ***(see #3)*** • Audit to IMCA D 040 - Mobile/Portable Surface Supplied Systems DESIGN 023 Recompression Chamber requirements	
Operational Factors • Size of mother vessel with POB/living requirements and deck space • Safe launch and recovery limitations of daughter crafts • Man-riding cranes and crane operators maybe required • Travel time between mother and daughter craft to be less than <15 mins • Working depth limited • No decompression diving ***(see #3)*** • Restricted to daylight hours and good visibility only unless suitable power provided (see IMCA D 015) • Propeller or grill guards to prevent divers umbilical becoming fouled in machinery • Exposure to environmental forces and elements • Potential for overhead working and dropped objects • Mooring arrangement • Daughter craft Lockout/Tagout (LOTO)	***#3:*** As already indicated in "Appendix C. onshore/Inland diving", there is a conflict between what is stated here and in this appendix because we have two safety standards, which is not acceptable as the risks for pulmonary barotraumas and decompression accidents are the same offshore and onshore/inland. Thus, to make it simple and logical, the rule explained here should apply for onshore/inland dives. If it is agreed that operations with the chamber away from the worksite can be organized, the limitations must be the same for offshore and Inshore/Inland diving and risk assessed by the IOGP's authors to prove to the reader that the control measures are suitable Note that the maximum time in the water in not indicated

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Purpose: This page displays Appendix F. Mobile/Portable Surface Supplied Systems or Scuba Replacement - Continuation -	
Text document IOGP	**Our comments**
Emergency and contingency • Need to consider and risk assess time constraints for recovering an injured diver from working depth, onto daughter craft, and transportation to mother vessel, into chamber and re-pressurisation to depth	

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Purpose:
This page displays Appendix G. Observation Diving

Text document IOGP	Our comments
Definition Using a submersible decompression chamber (SDC) ***see #1)*** as an observation chamber when the internal pressure is at atmospheric pressure and external pressure ambient	***#1:*** Submersible decompression chamber (SDC). As previously said, We call that a BELL for more than 100 years! Why inventing new terminology that is unnecessary! Diving bells used for observation diving: The viewports of modern bells do not allow a proper observation of a work-site as there are often dead angles between them. They are used by the bellman to locate a diver through them if he can and show to the divers when the bell leaves and return to the surface. They can also be used by the people in charge of the bell to observe the divers and communicate with them through this means if needed. An observation bell, such as those built by the SORIMA to salvage the gold of the SS Egypt in 1930 - 1932 has an entirely different design and typically allows for 360 degrees observation (They called that "Observation shell"). This bell should be provided with a back up cable (clump weight) capable of recovering it to the deck. It should be provided with gas reserves + air supply umbilical, communications , cameras, lights, and a heating system for the comfort of the operator.  THE OBSERVATION-SHELL GOING DOWN. THE DIVER IS INSIDE IT AND THE LID HAS BEEN SCREWED ON *Also, I have never seen any company using such a system of scrutiny that has been superseded by Remotely Operated Vehicles (ROV), observation submarines, and sometimes atmospheric diving suits.*
Scope Perform subsea inspections without need for decompression after dive ***(see #2)***	***#2:*** As said above this system is static and has been replaced by ROVs and submarines
Minimum Team Size and Competence Team size subject to formal risk assessment. There must be sufficient number of competent and, where appropriate, qualified personnel to operate all the diving plant and to provide support functions to the dive team. This may require additional deck support personnel and other management or associated technical support personnel, for example project engineers or vessel maintenance technicians ***(see #3)***	***#3:*** What is said here does not help us! Note this: The person in the bell does not need to be a diver as he/she is at atmospheric pressure and does not swim. The people in charge of the deployment of the bell should have the level of those familiar with the deployment of baskets and diving bell.

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Purpose: This page displays Appendix G. Observation Diving - Continuation -	
Text document IOGP	**Our comments**
Equipment • Diving contractor must be satisfied that sufficient plant, suitable for the use to which it will be put, is provided for the diving project and that sufficient plant is available, whenever needed, which is suitable to carry out safely any action which may need to be taken in a reasonably foreseeable emergency • IMCA D 024 - Diving Equipment Systems Inspection Guidance Note for Saturation Diving Systems (Bell) - relevant sections	This bell should be provided with a backup lifting system (clump weight) capable of recovering it to the deck. It should be provided with gas reserves + air supply from the surface (umbilical), communications, cameras, lights, and a heating system for the operator's comfort. It should also be provided with means of localization. Thus everything provided to a diving bell.
Operational Factors • Chamber and ports certified for external working pressure at depth • Very limited viewing, mobility and agility at depth if using a diving bell • Possible requirement to cross-haul bell using certified man-riding system • Any castellated door should prove that it cannot operate at depth	
Emergency and Contingency • Secondary method of recovery to surface and deck, and exercised • Need to consider and plan for locating and recovering to surface, the observation chamber within the period of its on-board independent emergency life support systems	

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Purpose: This page displays Appendix H. ROVs During Diving Operations	
Text document IOGP	**Our comments**
Definition Unmanned vehicles covering a wide range of equipment, with no one vehicle being described as typical	
Scope Working depths and radius vary, ROV classification are: • Class I - Observation ROV - Used for diver observation and inspection tasks, fitted with camera/lights and sonar • Class II - Observation ROV with Payload Option • Class III - Work class ROV • Class IV - Towed and Bottom Crawling Vehicles • Class V - Prototype or Development Vehicles ***(See #1)***	***#1:*** Add Class VI: Autonomous Underwater Vehicles & Unmanned Untethered Underwater Vehicle
Minimum Team Size and Competence • Subject to Class of vehicle, and 12 or 24 hr operation • Team size subject to formal risk assessment. There must be sufficient number of competent and, where appropriate, qualified personnel to operate all the diving plant and to provide support functions to the dive team. This may require additional deck support personnel and other management or associated technical support personnel, for example project engineers or vessel maintenance technicians • IMCA Competence Assessment Process ***(See #2)***	***#2:*** The maximum time a member of the ROV team pilots the machine is not indicated. IMCA R 04: The maximum number of hours that a member of the ROV team pilots an ROV should not exceed six hours in every 24 hour period under normal circumstances. It is an important point, as it directly influences the size of the team!
Equipment • IMCA R006 - Standard ROV Audit Document needs modifying to suit Class and model of ROV • Tether management systems • The launch and recovery system designed, fabricated, and certified to an IACS member standard	
Operational Factors • Need to integrate with Dive Control and Bridge for SIMOPS • SIMOPS document and Risk Assessment to be in place when operating with divers • Small vehicles = limited power weight ratio, affected by environmental forces • Large vehicles may require own power generation units to guarantee supply and prevent ‘spikes’ from use of onboard supplies • Potential to become fouled in vessel thrusters - recommend use of tether management systems • Moon-pool deployment/recovery preferred. Overside subject to environmental conditions	
Emergency and Contingency • Procedure for dead vehicle or vessel	

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Purpose:
This page displays Appendix I. Saturation Diving

Text document IOGP	Our comments
Definition The practice where divers reach a full saturation state for the pressure and breathing mixture being used. When this state has been reached the time required for decompression is the same no matter how long they remain saturated A closed diving bell is used to transfer divers under pressure to and from the worksite Breathing medium is generally heliox, although shallow air saturation dives are carried out occasionally	
Scope Heliox saturation starts at approximately <>15 msw with formal risk assessment and can be used to > 600 msw depending on diving contractor's procedures and medically approved tables	
Minimum Team Size and Competence • Team size should comply with IMCA D014 Section 5.2.5.3 as absolute minimum. An additional supervisor should be considered • Team size subject to formal risk assessment. There must be sufficient number of competent and, where appropriate, qualified personnel to operate all the diving plant and to provide support functions to the dive team. This may require additional deck support personnel and other management or associated technical support personnel, for example project engineers or vessel maintenance technicians • Specialist divers, e.g., DMT's [minimum one per bell team] welder divers, inspector divers, etc. • All bell occupants to be competent in the use of all equipment to be held in a Diving Bell specified in DMAC 15	IOGP has adopted IMCA guidelines in replacement of those of the previous document, which is more correct. However, there is no technician planned in this guideline. On my humble advice, this is insufficient, and the very minimum of a saturation team, should not be below 11 people to have a technician available at all times.
Equipment • The diving system and the HRS must be under Class and free of all outstanding notations • Diving contractor must be satisfied that sufficient plant, suitable for the use to which it will be put, is provided for the diving project and that sufficient plant is available, whenever needed, which is suitable to carry out safely any action which may need to be taken in a reasonably foreseeable emergency • The diving system is to be audited to verify compliance • Towing / reception vessel to support hyperbaric evacuation • Life support package for hyperbaric rescue system • Reception location to complete decompression and surface interval **(See #1)** • Medical equipment held on site which includes that of a minimum specification that is capable of measuring: blood pressure, temperature, heart rhythm, and SPO2 **(See #2)**, and able to transmit this information from the inside of the chamber to a doctor remote from the worksite, such that the information can be viewed in real time • Any SDC **(See #3)** to contain equipment that can measure H2S and hydrocarbon contamination of an equivalent or greater Specification to the Analox Hypergas. This equipment to be capable of alarming and notifying both the Surface Diving Supervisor and the SDC inhabitants of contamination of the breathing atmosphere • Saturation systems should be capable of electronically recording and storing pressure variations in chambers, SPHL(s), SDC(s),**(See #3)** transfer locks and medical/equipment locks.	**#1:** I suppose that the author speaks of Hyperbaric Reception Facility . I do not understand what he calls "surface interval" , which is a term used for surface decompression? **#2:** SPO2 is not in the list of acronyms and not explained in the text. SpO2 stands for peripheral capillary oxygen saturation, an estimate of the amount of oxygen in the blood. More specifically, it is the percentage of oxygenated haemoglobin (haemoglobin containing oxygen) compared to the total amount of haemoglobin in the blood (oxygenated and non-oxygenated haemoglobin) **#3:** SDC: I have already said that we call that a "bell". It does not give any advantage as it uses 3 letters and BELL four letters. Is the word BELL we use for generations needs to be changed? I do not think so! SPHL (Self Propelled Hyperbaric Lifeboat) is also not defined in the document. Warning: Contrary to what the authors' statement suggests, the Analox Hypergas does not detect H2S. Refer to the UK HSE report 030 "Development of the ANALOX Hyper-Gas Diving Bell Monitor" by Valerie Flook, published in 2003 at this address: https://www.hse.gov.uk/research/rrpdf/rr030.pdf

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Purpose:
This page displays Appendix I. Saturation Diving - Continuation -

Text document IOGP	Our comments
Life support parameters: temperature, humidity, oxygen and carbon dioxide levels should also be electronically recorded and stored **(See #4)**	**#4:** It seems that the authors of this IOGP document have forgotten to promote this essential aspect that is comfort and ease of work of the supervisors and the divers and focus only on elements that can be used to control and eventually blame them. So it looks that the only world they promote is the one described in the famous novel "1984" written by George Orwell. The Diver Monitoring Systems (DMS), mandatory with NORSOK standards, is an equipment primary designed to help the supervisor to refine the diving parameters and avoid incidents. It displays and records at least the following elements and provides relevant alarms: · Divers' depth (Diver 1 & 2 and bellman). · Bell internal depth. · Bell external depth. · Bell internal temperature. · Divers' breathing gas PO_2 and ppm CO_2. · Sampled bell internal gas PO_2 and ppm CO_2. · Hot water temperature supply to the bell measured at the surface · Hot water supply flow rate supply to the bell measured at the surface · Hot water temperature supply to each diver measured at the bell · Duration of each bell-run. · Duration of the "in-water time" of each diver. · Depth of each chamber lock in the saturation system. · For each chamber in the system: PO_2 ppm CO_2 Temperature Humidity These parameters are grouped in a video combo in direct view of the supervisors, and classical instruments can also be used in parallel, so the supervisor has two references. Note that more parameters can be provided.
Operational Factors • Suitable vessel for the work scope • Suitable saturation diving system for the work scope **(See #5)** • Remoteness of worksite and access to suitable emergency rescue support • Minimum HeO_2 & O_2 gas storage levels below which diving stops – see IMCA D 050 • IMCA D 014 **(See #6) - Missing**	**#5:** Remark: How can we be sure that the diving system is "suitable"? **#6:** IOGP should promote ethical practices - There is no text to limit the time a supervisor is on the panel. - Provision of two diving supervisors for each shift, where one supervisor only is in control and can hand over for operational or refreshment breaks. - Rebreathers should be promoted in place of classical bailouts below 60 m. - There is no limitation of the excursions even though scientists have proved that excursions such as those of the US Navy performed within the full range indicated create Bubbling. . - Diving profiles such as those recommended by Norsok and MT 92 that are based on square profiles should be promoted.

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Purpose: This page displays Appendix I. Saturation Diving - Continuation -	
Text document IOGP	**Our comments**
Emergency and Contingency • Depending on remoteness of worksite and availability of suitable emergency rescue support, consider option of on-board ROV intervention • Hyperbaric evacuation of all chamber and Bell occupants to a safe refuge and decompression to surface as specified in IOGP 478 **(See #7)**	**#7:** There is plenty of space on the page, so a summary of what is discussed in this document could help the reader and avoid interrupt his/her reading.

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Purpose:
This page displays Appendix J. Self-Contained Underwater Breathing Apparatus – SCUBA

Text document IOGP	Our comments
Definition Diving equipment where the supply of breathing air is carried by the diver, making him independent of any other source. There are unlikely to be any circumstances where surface supplied equipment cannot be used SCUBA diving is considered an unsafe working practice and outside its use in Scientific and Archaeological Diving (appendix 14), not recommended within the scope of this RP **(See #1)**	**#1:** Procedures not to be used should be grouped at the beginning or the end of the appendices in a particular article, indicating that they are forbidden and why they are forbidden.
Scope Refer to IMCA Guidance D 033 - Limitations in the Use of SCUBA	
Depth Limitation Not Applicable	
Minimum Team Size and Competence Not Applicable	
Equipment Not Applicable	
Operational Factors • No communications - unless fitted with full face mask, hard wire or through water communications units • Without communications unable to: – Request assistance – Direct crane operations – Activate/de-activate underwater tools – Perform real-time video/verbal inspections • Cylinder sizes and working pressure vary • Limited volume of available breathing air • Potential to hold-breath to conserve air • Limited depth / bottom time • Reliance upon diver monitoring own depth and time to working out own decompression schedule • Requires diver to hold a regulator between teeth (normally) • Requires diver to use of half-mask (normally) • Higher risks if used at night, limited to daylight hours • Poor underwater visibility and currents lead to potential disorientation • Need to have a tended lifeline	
Emergency and Contingency Not Applicable	

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Purpose: This page displays Appendix K. Surface Supplied Offshore Diving – Air	
Text document IOGP	**Our comments**
Definition Surface supplied diving not using a closed bell. Carried out outside the territorial waters of most countries (normally 12 miles or 19.25 kilometres from shore). Or inside territorial waters where offshore diving, normally in support of the oil and gas industry, is being carried out. Specifically excluded are diving operations being conducted in support of civil, inland, inshore or harbour works or in any case where operations are not conducted from an offshore structure, vessel or barge normally associated with offshore oil and gas industry activities. (See Appendix 3)	This definition is the one promoted by IMCA. Note that working outside the territorial waters does not mean that the company is not under the rules of the coastal country, as working on the bottom make it falling under the exclusive economic zone agreement described in the Law of the sea published by the International Maritime Organization.
Scope Maximum depth 50 msw	
Minimum Team Size and Competence • Minimum team of 5 (Diving Supervisor, working diver, stand-by diver, tender for working diver, tender for stand-by diver) • Provision of two diving supervisors for each shift for multiple diving operations,***(See #1)*** where one supervisor only is in control and can hand over for operational or refreshment breaks. • One tender for each diver tended from the surface. For umbilicals tended from a basket or wet-bell, one tender for every two divers in the water • One stand-by diver for every two divers in the water • Team size subject to formal risk assessment. There must be sufficient number of competent and, where appropriate, qualified personnel to operate all the diving plant and to provide support functions to the dive team. This may require additional deck support personnel and other management or associated technical support personnel, for example project engineers or vessel maintenance technicians. • Diving Supervisors and Divers may need additional training before using mixes other than air • The controls of a decompression chamber should only be operated by persons competent to do so. The degree of supervision provided should reflect the experience of the operator	***#1:*** The authors must give the definition of "multiple diving operations"
Equipment • Diving contractor must be satisfied that sufficient plant, suitable for the use to which it will be put, is provided for the diving project and that sufficient plant is available, whenever needed, which is suitable to carry out safely any action which may need to be taken in a reasonably foreseeable emergency • The diving system is to be audited against IMCA DESIGN D 023 – Surface Orientated Diving Systems • Decompression chambers: • Offshore - ***(See #2)*** One as a minimum. Additional DDC/s maybe required where treating a DCI incident may stop diving operations if only one DDC is available • Sufficient quantities of air must be available for two emergency dives to full intended diving depth as a reserve • Sufficient quantities of air must be available to pressurise both of the deck decompression chamber to the maximum possible treatment depth plus sufficient air for three complete surface decompression cycles • Ninety 90 m3 (3200 ft3) breathing oxygen must be available for emergency treatment procedures • Launch and recovery of Diver and Stand-by Diver must be risk assessed:	***#2*** Why decompression chambers only for offshore works?

Page 51 of the document IOGP 411 - January 2021 - Continuation -	
Purpose: This page displays Appendix K. Surface Supplied Offshore Diving – Air - Continuation -	
Text document IOGP	**Our comments**
Equipment - Continuation - – Ladders should not be the primary means of exit from the water if the deck is more than 2 metres above the water surface – When used, ladders should extend at least 2 metres below the water and have sufficient hand holds above water to allow the diver to step easily onto the deck – Diving baskets are recommended as a minimum for all diving and must be equipped to IMCA requirements ***(See #3)*** – Lifting plant and equipment must be certified man-riding	***#3:*** This wording can be misinterpreted as, depending on the culture, recommended can be interpreted differently from something to be done to something that is only optional. Also, what is said must be consistent. For this reason, the authors should indicate more precisely when diving baskets and ladders can be employed. As an example: - If ladders are used as primary and secondary means of deployment, the dive system is to be considered a scuba replacement: Also, ladders should not be used when the waves are above 60 cm at the launching point - The basket should be used in the case that decompression dives are to be performed; The reason is that the diver performs a better decompression in it. Also, an incident may happen that oblige the use of surface decompression, and the basket allows to control the ascent of the diver accurately and is a means of recovery that avoids him making efforts. Besides, diver rescue is more comfortable using a basket. - However, the surface support can be too small to accommodate two baskets, and a basket "two in one" *(standby diver basket and main basket arranged with a single Launch and recovery frame)* may not be available: In the case that only one basket is used, the diving conditions must be limited to those that allow the deployment of the standby diver using a ladder.
Operational Factors • Limited to 50 msw • Divers not jumping into the water • Umbilical management to restrict divers accessing identified hazards ***(See #4)*** • Maximum bottom time limitations (Refer Table 2) • Decompression method (in-water vs Surface) selected with due regard to operational environment • IMCA D 014 ICOP	***#4:*** The umbilical length limitation is forgotten: It should be based on the range offered by the Bailout: NORSOK standard U 100, which limits the umbilical length to 45 m, says in point 7.8.3 that the bail-out system should provide the diver with gas for 10 min based on average consumption of 62,5 1/min. This consumption value that should be considered as a minimum is confirmed by the UK HSE study "The provision of breathing gas to divers in emergencies," which recommends a rate between 50 & 75 litres. This study is also to be used with all types of commercial diving operations.
Emergency and Contingency • Standby diver free from any residual decompression penalty. • Recovery of an injured / unconscious diver from working depth to a safe place for treatment, and any consequential decompression treatment • Secondary recovery of diver deployment and recovery system • Emergency evacuation to a safe refuge from DDC in a vessel/worksite abandonment scenario • HeO2 therapeutic breathing mixtures maybe required to treat some DCI incidents ***(See #5)*** • Remoteness of worksite may, through risk assessment: – Identify the need for additional qualified Diver Medical Technicians within the dive team – Increased level of medical equipment to be held at the worksite ***(See #6)***	***#5:*** This point is not well explained: Instead, say that decompression illness treatments are under the responsibility of a recognized diving medical specialist (he must be a doctor) and that the use of HeO2 therapeutic treatments has been considered beneficial for decompression illness cases. ***#6:*** Instead say: Depending on the remoteness of the worksite, a risk assessment should be performed to identify additional needs: - Additional qualified Diver Medical Technicians within the dive team. - Increased level of medical equipment to be held at the worksite - Reinforced means of MEDEVAC.

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Purpose:
This page displays Appendix L. Surface supplied diving – NITROX

Text document IOGP	Our comments
Definition Surface supplied diving using Nitrox ***(See #1)***	***#1:*** The purpose of this point should be to explain to the reader what is "Nitrox". Thus, that what divers call "Nitrox" is a mix of Nitrogen and oxygen where the percentage of oxygen is more elevated than in air, so above 21% (in fact, air is nitrox)
Scope Any diving using enriched air, nitrogen depleted air or premixed nitrogen/oxygen mixtures with an oxygen content exceeding 25% to a maximum depth of 50 metres ***(See #2)***	***#2:*** Inexact definition: Nitrox use is limited by the maximum partial pressure of oxygen that must not be above 1.4 bar according to the Diving Medical Advisory Committee (DMAC) & IMCA, or 1.5 bar according to NORSOK standards, or 1.6 bar in some countries. In case of use of low O2 mixes (as an example 22%) The maximum depth is the one of air diving
Minimum team size and competence • Minimum team size --- See Appendix 11 ***(See #3)*** • The competence of all personnel shall be demonstrated according to their roles and responsibilities ***(See #4)***	***#3:*** Appendix 11 does not exist! ***#4:*** I think that what the reader would like to know which competence, roles and responsibilities are necessary!
Equipment • Equipment used with mixtures containing 25% or more oxygen shall be oxygen cleaned • It is recommended that all divers breathing supplies are from HP stored gas • At no time should any diver's breathing gas be taken from any storage receptacle that is in the process being refreshed from an outside source • Oxygen, Carbon monoxide and carbon dioxide contents in any gas storage receptacles will be verified as meeting the requirements of appendix 1 ***(See #5)*** prior to use • The supply of any breathing gas to any diver will require separate real time oxygen monitoring that is located downstream and immediately prior to entering that diver's umbilical. • Gas composition of the diver's bail out cylinder shall be the same as the primary breathing supply. ***(See #6)*** • The diving contractor should ensure and demonstrate that all lubricants, tapes, fittings and equipment are suitable for use with NITROX.	***#5:*** Appendix 1 does not exists ***#6:*** DMAC says: *The committee recommends that the maximum pO2 supplied to the diver from the bail-out bottle should be 1.4 bar.* Nothing forbids having a bailout filled with a "richer mix" than the one used during the dive as long as it is not above the maximum value stated by the legal organization. What we can agree on is that the O2 percentage of the mix of the bailout should not be below the one used for the bottom mix. Also DMAC says: *The committee recommends that the minimum pO2 supplied to the diver from the bail-out bottle should be the same as the pO2 in the diver's primary breathing gas mixture,*
Operational Factors • Limited to a depth or maximum pressure of 50 msw ***(See #7)*** • Maximum bottom time using EAD and following table 2 • Maintain PPO2 at or below 1.4 bar • NITROX exposure and the associated risks of acute or chronic oxygen toxicity must be identified, mitigated and any controls detailed as part of the operational safety management system, including the planned use of any surface decompression • The Diving Contractor shall ensure the use of NITROX for any in water decompression cannot result in NITROX of PPO2 of greater than 1.4 bar being supplied to any diver or subsequent diver's using the equipment. ***(See #8)***	***#7:*** See "scope" above ***#8:*** There is currently no commercial diving table with in-water oxygen stops at less than 1.6 bar because oxygen decompression at 1.3 bar is not as efficient as 1.6 bar. All these tables have been tested by recognized competent bodies and provide safe decompressions! Thus, 1.6 bar in the water at rest is recognized safe and must not be confused with such a value when the diver produces efforts at work. USN proposes decompressions in the water at 1.9 atm, DCIEM proposes 1.9 bar and 1.6 bar, and COMEX MT92/2019 offers 1.6 bar in the water and 2.2 bar in wet bell, which is perfect! There is no reason for changing these procedures, and IOGP has no competency regarding this point, which is a domain of specialists.

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Purpose:
This page displays Appendix L. Surface supplied diving – NITROX - Continuation -

Text document IOGP	Our comments
Emergency & contingency Hazards from acute or chronic oxygen toxicity associated with the use of oxygen in emergency therapeutic recompression should be evaluated in a risk assessment and any controls detailed	
Table 2 – Maximum Bottom Times Maximum bottom time limitations for surface decompression (SD), in-water decompression and transfer under pressure (TUP) decompression diving	This table conforms with the UK HSE exposure limits for surface-orientated diving, published page 16 of the document *"Commercial diving projects offshore - Diving at Work Regulations 1997 - Approved Code of Practice and guidance"* They are the result of the studies of doctors Shields & Lee

Depth		***Bottom times limits (According to deco. Procedure)***	
Metres	***Feet***	***Transfer under pressure***	***Surf. Deco. & in-water***
0 -12	0 - 40	240	240
15	50	240	180
18	60	180	120
21	70	180	90
24	80	180	70
27	90	130	60
30	100	110	50
33	110	95	40
36	120	85	35
39	130	75	30
42	140	65	30
45	150	60	25
48	160	55	25
51	170	50	20

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Purpose:
This page displays Appendix M. Surface Supplied Mixed Gas Diving - Heliox

Text document IOGP	Our comments
Definition Surface supplied diving using a properly equipped Wet Bell Surface Supplied Mixed Gas Diving can lead to a Serious injury or Fatality should the diver not complete the prescribed in-water decompression due to an emergency such as: Manta Ray entanglement of umbilical, extreme current (Solitons), equipment failure or loss of station etc. Safer alternatives are available and before accepting this technique these should be carefully considered. ***(See #1)***	***#1:*** What is indicated here can happen with every dive. Not only with this kind of procedure! The main problem with gas dives is that they oblige longer decompressions than air dives. Also, surface decompression is not provided with some decompression tables. That limits the number of tables available to perform such diving operations because this procedure must always be ready, even though the decompression is performed in the bell or the basket. Another problem with wet bells with the umbilical terminated in the bell is the limited time to rescue the team if it is stuck at depth as escaping from the bell as from a basket is not possible, and the necessary decompression time will continue to increase quickly. Note that rescue procedures are described in the relevant document CCO Ltd Is the manta ray the only cause of an incident that can happen with marine life when diving (laughing)? Also, how the manta ray does to detect what gas the diver is breathing (laughing again)? Note that we have not seen any record of such accident linked to manta ray in the databases we have access to, so that it may have happened, but only in exceptional circumstances. This is a typical example of a single and exceptional occurrence that is made a generality. Note that the cause of entanglement of the umbilical is more usually the diver himself.
Scope Maximum depth 75 msw and maximum bottom time 30 mins ***(See #2)***	***#2:*** There are various procedures that can be used with gas dives and result of limitations: - Heliox diving operations with a basket. In this case, they must be limited to 50 m maximum. - Heliox diving operations from a basket with a dome: They are also limited to 50 m. The advantage of the dome is that the diver has a refuge available at depth. However, it cannot be considered a wet bell. - Heliox diving operations limited to 75 m using a wet bell: It can be a wet bell supplied by a main umbilical with the umbilicals terminated in the bell or a bell with also a main umbilical, but with the divers' umbilicals tended from the surface and passing through the bell.
Minimum Team Size and Competence • Minimum team of 7 (Diving Supervisor, working diver, stand-by diver, tender for working diver, tender for stand-by diver, short notice surface standby and tender) • One tender for each diver tended from the surface. • One stand-by diver for every two divers in the water. Standby Diver to be located in wet bell ***(See #3)*** • Team size subject to formal risk assessment. There must be sufficient number of competent and, where appropriate, qualified personnel to operate all the diving plant and to provide support functions to the dive team. This may require additional deck support personnel and other management or associated technical support personnel, for example winch operator, project engineers	***#3:*** This is incorrect: The authors should have considered the use of heliox with every means of deployment and not only a wet bell: 1) Using a basket: The composition of the team is the same as for air diving. 2) Using a wet bell with the umbilical(s) passing through the bell, the system can be used similarly to a basket. However, additional personnel may be neces-sary to deploy the bell umbilical Note that tending the divers' umbilicals may become difficult at depths below 50 m, and for this reason umbilicals terminated in the bell is recommended for

Page 55 of the document IOGP 411 - January 2021 - continuation -	
Purpose: This page displays Appendix M. Surface Supplied Mixed Gas Diving - Heliox - continuation -	
Text document IOGP	**Our comments**
Minimum Team Size and Competence - continuation - or vessel maintenance technicians. Diving supervisor and divers may need additional training before using mixes other than air.	**#3** - continuation - such dives. 3) Using wet bells with the umbilicals terminated in the bell (supplied by the main umbilical of the bell). A minimum of 2 divers in the bell with one operating as bellman, plus 1 stand by diver at the surface and his tender + Winch man + supervisors + helpers for the umbilical and the launching of the bell.
Equipment • Diving contractor must be satisfied that sufficient plant, suitable for the use to which it will be put, is provided for the diving project and that sufficient plant is available, whenever needed, which is suitable to carry out safely any action which may need to be taken in a reasonably foreseeable emergency • The diving system is to be audited against IMCA DESIGN D 037 - Surface Supplied Mixed-Gas Diving Systems ***(See #4)*** • Properly equipped Wet Bell • Decompression chamber one as a minimum. Additional DDC/s maybe required where treating a DCI incident may stop diving operations if only one DDC is available • Sufficient compressed gas always needs to be available for two emergency dives to the full intended diving depth and time. This gas is to be kept as a reserve. This gas should be stored in containers. • Sufficient compressed air needs to be available to pressurise both locks of the deck decompression chamber to the maximum possible treatment depth plus sufficient gas for three complete surface decompression cycles. This gas should either be stored in containers or else supplied by two totally independent dedicated sources. ***(See #5)*** • Bail out cylinder(s) must have sufficient endurance to allow the diver to return to a place of safety. This will normally mean that a calculation should be available showing that the capacity of the cylinder(s) at the depth of diving will allow breathing of a suitable gas for one minute at a rate recommended by the manufacturer of the breathing equipment for every 10 metres horizontal excursion in order to return to the wet bell. ***(See #6)***	***#4:*** This point is linked to the means of deployment indicated previously: It can be D 023 if the deployment is made through a basket, or D 037 if a wet bell is used. Do not confuse the breathing gas with the means of deployment, which what the authors of this document are doing. In fact , they should have separate heliox (or trimix) dives using baskets and domes from those using a real wet bell.. ***#5:*** Consider that we dive with heliox and that in this case, it is preferable to use heliox in the chamber instead of air. Most diving medical specialists say that air treatment is not the recommended practice after a heliox dive. In addition, in the case of the use of heliox, the provided quantities must be those of oxygen as this mix is the substitute of oxygen for the treatment at 30 m. COMEX medical book recommendations are 90 m^3 oxygen + 90 m^3 heliox 50/50 + 90 m^3 heliox 20/80. ***#6:*** The horizontal distance is insufficient to calculate the distance of the diver from the wet bell. For example, if the bell is stored 5 m above a worksite that is horizontally at 10 m from the bell, the diver is at 11.18 m from the bell. Thus, instead of the horizontal distance, it is suitable to calculate the length of umbilical deployed. The rate should be between 50 & 75 l/min (see UK HSE report RR 1073)
Operational Factors • Limited to 75 msw and 30 mins bottom time • Divers not accessing the water by jumping • Umbilical management to restrict divers accessing identified hazards ***(See #7)*** • Diver's bail out must have an oxygen partial pressure of a minimum of 180 mbar at surface ambient and a maximum 1500 mbar ***(See #8)*** at the maximum depth of the dive • IMCA D 014 ICOP	***#7:*** This point should be developed. The authors do not explain how the umbilical is managed. ***#8:*** The authors are not consistent with what they say in the previous points, where the partial pressure of oxygen in the bailout they promote is the one from DMAC 04, which says the following: *The committee recommends that the maximum pO2 supplied to the diver from the bail-out bottle should be 1.4 bar. The guidance recognises that the bail-out situation may involve periods of intense exertion but might also involve much longer periods of low physical strain.* *The recommended limitation is somewhat more conservative than calculated limits based on the Morrison and Reimers equation.* *The committee recommends that the minimum pO2 supplied to the diver from the bail-out bottle should be the same as the pO2 in the diver's primary breathing gas mixture, with an absolute minimum of 0.4 bar.*

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Purpose: This page displays Appendix M. Surface Supplied Mixed Gas Diving - Heliox - continuation -	
Text document IOGP	**Our comments**
Emergency and Contingency • Recovery of an injured/unconscious diver from working depth to chamber • Secondary recovery of dive deployment and recovery system • Emergency evacuation to a safe refuge from DDC in a vessel/worksite abandonment scenario ***(See #9)***	***#9:*** This point must be more explained. Do the authors say that we need a system similar to those used for saturation systems?

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Purpose:
This page displays Appendix N. Surface Swimmer

Text document IOGP	Our comments
Definition A person who enters the water, or other liquid, to perform work and who will be subjected to a pressure less than 100 millibars above atmospheric pressure ***(See #1)***	***#1:*** The title of this document is "Recommended Practices for Diving Operations" and the definition of diving operations is when the diver has the airways at more than 100 millibars above the atmospheric pressure (in other words 1 m below the surface) . For this reason, the use of surface swimmers is a subject which should not be addressed in this document.
Scope Able to perform general surface work tasks on: • Beach and surf zone • Piles, legs, walls • Floating bundles, risers and booms • SBM's and buoys	
Minimum Team Size and Competence Team size subject to formal risk assessment. There must be sufficient number of competent and, where appropriate, qualified personnel to operate any plant and to provide support functions to the dive team. This may require additional deck support personnel and other management or associated technical support personnel, for example project engineers or vessel maintenance technicians ***(See #2)***	***#2:*** Qualified personnel: This is very imprecise! Who is the swimmer? What should his qualifications be? The swimmer should be a diver or a person who has a proven background of a swimmer. So he must be trained to do it. Also, there should be a rescue swimmer ready to go.
Equipment Personnel equipment to be defined by formal risk assessment e.g. • Fins, boots or other foot protection • Protective suit or coveralls dependent on location • Appropriate gloves for task • Head protection to be considered • Harness with leg straps and recovery D rings • Tended lifeline • Personal flotation device • Weight belt • Knife • Flare and/or light • Face Mask • Tools with straps • Personnel locator beacon • Surface support craft and competent crew • Propellers and Intakes fitted with guards • LOTO • Sufficient fuel of correct mix • Fenders • First aid kit • Radios and spares • Lights, flares • Protection from environment • Water and food • Radar reflector ***(See #3)***	***#3:*** A swimmer must be fluid in the water and not be obliged to make additional efforts due to a handicapping flotation device and other equipment. Also, there is no precise description of the devices listed. Thus, the authors made a list of items they wish the swimmer equipped with, but there is no real description of how they would be selected and arranged: - Protective suits: which models to select and why? - Appropriate head protection should be more described. Which type of helmet is preferable and why? - Harness: Which configuration is the most appropriate to swim with? - Lifeline: How it is arranged not to disturb the swimmer and recover him with the airways above the water ? - Face mask - Not to be confused with a full face mask. The authors have forgotten the snorkel that must be in place to allow the swimmer to put his head in the water and breathe (snorkels are used in swimming with fins competitions). - Buoy: which model is preferable and why? - Beacon locator: which model is suitable?
Operational Factors • Generally a daylight operation only - unless subjected to robust risk assessment and rigorous risk reducing measures applied • Limited by environmental forces, visibility and weather • Look-out on mother vessel or beach • Regular radio checks ***(See #4)***	***#4:*** Describe the environmental forces limits (Waves less than 0.5 m and current at less than 0.8 knots)! Also, the water where the swimmer operates should be analyzed to ensure that there is no pathogen or aggressive marine/river life!

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Purpose: This page displays Appendix N. Surface Swimmer - Continuation -	
Text document IOGP	**Our comments**
Emergency and Contingency • Recovery and transfer of injured personnel from worksite to medical treatment room and consequent treatment • Failure of primary engine on surface support craft • Standby rescue swimmer with equipment for recovery in immediate readiness • Mother craft kept within defined travel time	

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Purpose: This page displays Appendix O. Atmospheric Diving Suit	
Text document IOGP	**Our comments**
Definition A tethered one man submersible in which the operators limbs move inside articulated joints to provide the effort to carry out the underwater task.	
Scope Use of ADS suits avoids the need for decompression to atmospheric pressure at the end of each diving operation. ADS systems have worked in depths >300msw There are a variety of ADS systems, with no one being described as typical.	
Equipment • The contractor must be satisfied that sufficient plant, suitable for the use to which it will be put, is provided for the diving project and that sufficient plant is available, whenever needed, which is suitable to carry out safely any action which may need to be taken in a reasonably foreseeable emergency • Refer to AODC 022 ***(See #1)***	***#1:*** AODC 022 has been withdrawn
Operational Factors • Deployment vessel or sufficient lay-down area on rig or platform • Team size smaller than saturation dive teams • No decompression penalties • Slow operational productive work rate • Agility limited in congested subsea areas • Can become fouled or damage subsea infrastructure • Requires high maintenance • Deployment and recovery limited by environmental forces	
Operational Factors • Deployment vessel or sufficient lay-down area on rig or platform • Team size smaller than saturation dive teams • No decompression penalties • Slow operational productive work rate • Agility limited in congested subsea areas • Can become fouled or damage subsea infrastructure • Requires high maintenance • Deployment and recovery limited by environmental forces	

<table>
<tr><th colspan="2">Page 60 of the document IOGP 411 - January 2021</th></tr>
<tr><td colspan="2">Purpose:
This page displays Appendix P. Bounce or TUP Diving TUP= Transfer Under Pressure</td></tr>
<tr><th>Text document IOGP</th><th>Our comments</th></tr>
<tr><td>Definition
The transfer of divers in a closed bell from their working depth to a surface decompression chamber whilst maintaining bottom pressure, and their subsequent decompression to surface ambient (See #1)</td><td>#1:
That could be the definition of saturation diving. The description should describe the full process to show the difference with saturation diving and also surface decompression:
TUP means Transfer Under Pressure.
This diving procedure consists of transferring the divers to the working depths using a closed bell, which is then connected to a chamber where they perform their Decompression…
Opposite to saturation procedures, the divers have not sufficient time at depth to be saturated. Thus, they can be decompressed within a reasonable time at the end of the dive. The difference with other methods of surface-orientated diving operations is that there is no decompression phase in the water, so the divers are isolated from the external conditions, which is an advantage in rough seas.
This procedure can be used for depths up to 90 metres and sometimes below using heliox or trimix, and can also be used up to 50 m with air.
Note saturation procedures are usually preferred for deep dives because they allow for longer working times. Also, new strategies to solve high-pressure nervous syndrome (HPNS), which may happen at the depths reached with this technic, require stabilization periods at depth before launching the divers, which limits the available bottom time.

According to Worksafe. Govt. New Zealand
"Bounce diving" is a common term for repeatedly diving to depths shallower than 21 metres with less than 15 minutes surface interval between consecutive dives. However, other governments allow for deeper exposures. This procedure should not be discussed at the same time as Transfer Under Pressure.</td></tr>
<tr><td>Minimum Team Size and Competence
• Team size subject to formal risk assessment. There must be a sufficient number of competent and, where appropriate, qualified personnel to operate any plant and to provide support functions to the dive team. This may require additional deck support personnel and other management or associated technical support personnel, for example project engineers or vessel maintenance technicians (See #2)
• Divers must be qualified for diving from closed bells
• Bellman to be located in the SDC
• Supervisor must be suitably qualified for this technique, including gas mixes used</td><td>#2:
The authors have been able to decide on a team size for saturation diving but not for this procedure that consist of using a closed bell! As a minimum, At least it should be:
· 1 supervisor.
· Two divers in the bell (one of them is the bellman).
· Two Life Support Technicians or people who have the qualification to manage a decompression in a chamber.
. One stand by diver + his tender.
· One system technician.
. Personnel to manage the umbilical and the recovery and the connection of the bell.</td></tr>
<tr><td>Equipment
• Equipment should comply with the relevant sections of IMCA D 024</td><td></td></tr>
<tr><td>Operational Factors
• IMCA D 014 International Code of Practice Diving should be adhered to (See #2)

(continuation on the next page)</td><td>#2:
There are no specific procedures for transfer under pressure, the methods for the launching, and the recovery of the bell are the same as those of saturation diving. Bottom time limitations for dives above 50 m are those</td></tr>
</table>

Page 60 of the document IOGP 411 - January 2021 - Continuation -	
Purpose: This page displays Appendix P. Bounce or TUP Diving - Continuation - TUP= Transfer Under Pressure	
Text document IOGP	**Our comments**
Operational Factors • IMCA D 014 International Code of Practice Diving should be adhered to ***(See #2)***	***#2:*** from UK HSE adopted by IOGP, which result from the study made by doctors Shields & Lee in 1982/83. Bottom time limitations of deep dives are those provided by the tables. It is preferable to summarize these procedures here instead of sending the reader to another document.
Emergency and Contingency • Treatment of decompression illness, or omitted decompression, for a particular breathing medium being used • Hyperbaric evacuation for all persons under pressure ***(See #3)***	***#3:*** This point obliges the use of a Hyperbaric Rescue Unit or directly use a hyperbaric Rescue Chamber. Note that air dives using the Transfer Under Pressure (TUP) technic allows for faster decompression than air dives using surface decompression and that the authors do not require this system for such a diving procedure… This is not really consistent.

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Purpose:
This page displays Appendix Q. Scientific and Archaeological Diving

Text document IOGP	Our comments
Definition Scientific diving projects include all diving projects undertaken in support of scientific research or educational instruction. Archaeological diving projects include activities carried out in support of the investigation of sites of historic interest, the analysis of physical remains, the recovery from such sites of articles for preservation and further analysis and educational instruction. This appendix contains the requirements necessary where SCUBA is required to be used to undertake this activity ***(See #1)***. Where SCUBA is not required by operational necessity the Inshore Appendix should be used (Appendix 3) ***(See #2)***	***#1:*** In appendix Appendix J. Self-Contained Underwater Breathing Apparatus - SCUBA - the writers said that SCUBA is an unsafe practice and should not be used. Providing procedures where scuba can be used in this document that is supposed listing the everyday practices on oilfields is conflicting and not consistent. You cannot oblige divers to use a procedure when other people can used another one! ***#2:*** Appendix #3 does not exists ! I suppose that the authors want to say Appendix F. Mobile/Portable Surface Supplied Systems or Scuba Replacement
Depth Limitation 30 metres	
Minimum Team Size and Competence • Team size subject to formal risk assessment. There must be sufficient number of competent and, where appropriate, qualified personnel to operate any plant and to provide support functions to the dive team. • The minimum Team Size is 4 – 2 divers (attached by Buddy line), 1 Standby Diver at the surface and a Diving Supervisor. • Divers should be qualified in the technique they are using and experienced at the depth of diving. One should be trained in First Aid including Oxygen administration. • All divers must be certified fit by a suitable medical advisor. ***(See #3)***	***#3:*** This point is insufficiently explained: The author does not indicate the level of the divers (formation, experience) - Divers usually practicing such diving operations are recreational divers. What is the qualification of the divers? How can I be sure that they are qualified to dive at the depths planned? - Diving supervisor: formation, level required??? - Who manages the chamber? - Team organization? IMPORTANT NOTE: You cannot organize commercial diving with a level of safety for some activities and another level for some other activities. In other words, you cannot impose a level of security for some operations and open the gate to other ones where you authorize a weaker level of safety to the people under the responsibility of your company! For this reason, such actions are to be classified as something else, and the people who are performing them cannot be under the responsibility of your employer. To explain it more in details, you have two solutions: 1 - If the activity involves commercial divers who are under the responsibility of your company, you have to apply the procedures indicated before this appendix in full. 2 - If this activity involves people who are not commercial divers, such as scientists who are also recreational divers, this activity cannot be under the direct responsibility of your company. You have to organize a contract that disengages your company in case of an accident and, of course, arrange for avoiding any conflict with the normal activities of the oilfield. That includes the authorized date and time of intervention, the involvement of the legal authorities of the country and the organization in charge of these scientific activities, and also the insurances that cover them, so your company is protected in the case of an accident that becomes the responsibility of these people. Note that recreational diving centres ask their clients to sign similar documents. As a result, their clients become

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Minimum Team Size and Competence - Continuation - *(See #3)*	#3: - Continuation - responsible for the accidents that may happen to them. If the risk of conflict with the activities on site is too elevated, such diving operations must not be started, and the intervention must be organized with commercial divers applying in full the diving procedures we are used to. To conclude: This appendix should be withdrawn from this document, and a specific document that explains the problems arising with such operations should be published.
Equipment • Equipment should comply with the relevant sections of IMCA D 023 and IMCA D 018. • 2 way means of communication between supervisor and the divers Should be provided and maintained throughout the diving operation. • Each Diver including the Standby must wear an emergency breathing Supply. This must be totally independent of the main supply – Including cylinder and 1st and 2nd Stage Regulator. • Proximity to a Recompression Chamber based on Table 1 - The Chamber should conform to the standards contained in IMCA DESIGN D 023.	This appendix should be withdrawn from this document, and a specific document that explains the problems arising with such operations should be published.
Operational Factors • All activities covered by a Risk Assessment • Generally a daylight operation only - unless subjected to robust risk assessment and rigorous risk reducing measures applied • Compliance with local port, harbour and other local regulations • Local environmental conditions e.g., current, tides, restricted surface visibility, surface conditions, sun, temperature (hot & cold), wind-chill • SIMOPS e.g., surface craft movements, managing general public, neighbouring operations • Diver Safe Access and Egress including surface deployment craft provision • Divers Travelling by Air after diving should comply with DMAC 07 • Bottom times should not exceed the maximum contained in Table 2	This appendix should be withdrawn from this document, and a specific document that explains the problems arising with such operations should be published.
Emergency and Contingency • Recovering an injured/unconscious diver from working depth to safe place for treatment, and consequential treatment, including possible recompression requires a detailed site specific plan • Appropriate first aid kit including emergency oxygen administration set available at dive site • When diving in polluted waters suitable decontamination/disinfection procedures should be in place before and after diving project	This appendix should be withdrawn from this document, and a specific document that explains the problems arising with such operations should be published.