Høringskommentarer – utkast 6. utgave NDBT
Comments received to draft 6th ed of NDTT

Innholdsfortegnelse

Introduction

The 6th edition of the Norwegian Diving and Treatment Tables (NDTT) were circulated for comments Feb 12th 2023 with a deadline for comments March 15th.
Comments received in Norwegian language has initially been commented in Norwegian (first part of document). We have then translated the comment to English and presented the *translated text in italics*. This translation is done by the editorial team, and is not committing for the person providing the original comment(s) in Norwegian language.
Comments received are copy/pasted into this document. We have not tried to correct spelling errors, but for some comments we have inserted a reference or cited the appropriate NDTT text to improve readability.

We appreciate kind suggestions for text improvements received from many individuals, but in particular Kåre Segadal (NUI), Christian Skauge (Forlaget Dykking) and Ulrik Junge/Øyvind Loennechen (PTil). We have not listed such text improvements or minor corrections to save some work and reduce the volume of this document. We nevertheless appreciate the effort, and we have to a large extent included such text improvements.

Abbreviations used in this document:

HUS	Haukeland Universitetssykehus. I dette dokumentet brukt om samlet høringssvar fra Seksjon for hyperbarmedisin, Norsk Senter for Maritime og Dykkemedisin og Yrkesmedisinsk avdeling. (Haukeland University Hospital. In this document used for the collated review from the hyperbaric medical unit, The Norwegian Centre for Maritime and Diving Medicine and the Department of Occupational Health)
HVL/DU	Høgskulen Vestlandet, Dykkerutdanningen (Western Norway University of Applied Sciences, Diver Education)
NBU	Norsk Bransjeforening for Undervannsentreprenører (Norwegian Society for Underwater Contractors)
NDBT	Norske dykke- og behandlingstabeller
NDTT	Norwegian Diving and Treatment Tables
PTil:	Petroleumstilsynet (nå Havindustritilsynet). (Petroleum Safety Authority Norway. Now: Norwegian Ocean Industry Authority).

Suggestions related to layout

- Consider changing color on front page to make it easier to identify the edition
  - We will investigate this further with the printing office
- Consider using physical indentations in the book to make it easier to find the most important sections
  - We will investigate this with the printing office
- Consider collecting emergency procedures in one part of the document
  - We will investigate this possibility

Changes to NDBT/NDTT done by the editorial team after the hearing *not* listed in the review table

- The chapter on diving computers has been removed
- The chapter on deep chamber dives has been removed
- Layout changes, spelling and text adjustments

Comments submitted in Norwegian/Kommentarer mottatt på norsk

Side	Punkt	Kommentert av	Kommentar/innsigelse	Forfatterkollegiets vurdering
Generelt				
		HUS	Et generelt problem ved revisjonene av Norske dykke- og behandlingstabeller er mangelen på god og helst vitenskapelig dokumentasjon som underbygger behov for endringer. Det er ikke vedlagt referanseliste.	NDBT er en operasjonsprosedyre – ikke en lærebok og ikke en vitenskapelig publikasjon. Tabellene ville fått et uhåndterlig omfang og være lite anvendelige hvis de enkelte elementene skulle begrunnes. Ingen andre dykketabeller vi kjenner til – inkludert den mest autoriative USN Diving Manual – har referanselister. Se også respons til Ole Martin Haugan under.
		HUS	Påstanden om at «Data tyder på at dykking flere dager på rad har en akklimatiserende effekt» er basert på tolkning av studier som i hovedsak omhandler andre problemstillinger og er dårlig designet. Det er fremdeles et skrikende behov for systematisk registrering av dykkeeksponering og et program for helseoppfølging av yrkesdykkere. Inntil det foreligger solide vitenskapelige data for det motsatte, mener vi at en reduksjon i nitrogenbelastning er det beste bidraget til å unngå dekompresjonssykdom.	Vi er kjent med innvendingen. Vår påstand er begrunnet i et systematisk review av tidligere studier med valide utfallsmål (TFS og egenopplevet helse) som har vært fagfellegransket før publisering i en vitenskapelig artikkel. Innholdet er ikke imøtegått vitenskapelig og Norge er det eneste landet som hittil har anbefalt dykkefri dag. Når et systematisk review sannsynliggjør at dykkefri dag kan *øke* sannsynligheten for sykdom så påhviler det dem som ønsker å opprettholde praksisen å sannsynliggjøre at *nye* data tilbakeviser påstanden *eller* at eksisterende data er feiltolket.

Side	Punkt	Kommentert av	Kommentar/innsigelse	Forfatterkollegiets vurdering
		Kjartan Alnes (Tehcnip FMC)	Forsatt så holder man på dekompresjons stop på 3 meter som den site stop. NDBT er basert på US Navy men der er siste stop på 6 meter hvorfor forsetter man å holde på 3 meter stoppen? Videre så bruker man argumentet ved OD-O2 å holde dypere stop i sjøen grunn uroligheter på grunnere dybder. Samt så kan en sikerhets stop gjøres på 6-3m. Burde vel være forsvarlig gjøre endringer i dekopresjonen slik at det lar seg gjøre at 6 meter blir siste stoppen? 6 meter stop blir jo praktisert i store deler av dykkeverden ellers.	Dekompresjon med grunneste stopp på 6m har den åpenbare fordelen at dykkeren blir mindre utsatt for sjøgang. Ulempen er at dekompresjon blir mindre effektiv (det kreves noe lengre dekompresjonstid for å oppnå samme sannsynlighet for TFS). De norske standardtabellene er basert på den britiske Royal Navy Table 11. USN har tabeller med grunneste stopp på 6m, men disse tabellene ville gi vesentlig lengre dekompresjonstid med en marginal reduksjon i sannsynlighet for TFS sammenlignet med NDBT. Vi vil heller anbefale å bruke Nitrox36 (eller mer) der det er mulig. Det vil muliggjøre å flytte samtlige dekompresjonsstopp 3m dypere.
		Kjartan Alnes (Tehcnip FMC)	Hvorfor tar man ikke med dekompresjon med oksygenanriket luft i pustegasen under dekompresjon i sjø/vann som 50/50 og 100% ?	Det har vi ikke tatt med fordi det foreløpig ikke har vært en etterspørsel. TUP tabellene kan imidlertid brukes med pusting av 100% O_2 under dekompresjon i sjø.
		Ole Martin Haugan	Hvilken forskning ligger til grunn for de endringer som er foreslått?	Vi tar initiativ til endringer i tabellen basert på tilbakemelding fra brukere og ny kunnskap (inkludert vitenskapelig) som vi (forfatterkollegiet) blir kjent med. Et viktig formål med høringsrunden er nettopp å få tilbakemelding på tekst som bør endres enten dette skyldes ny kunnskap eller innsigelser mot vår tolkning av eksisterende kunnskap. Se også respons til HUS over.

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		Industri Energi	Vi mener imidlertid at det må stilles krav til risikoaksept på en slik måte at det ikke kan aksepteres større fare for akutte- eller langtidsskader for arbeidstakere ved bruk av dykketabeller, enn det som aksepteres i industrien for øvrig.	
		Industri Energi	Vedrørende forslag om fjerning av dykkefri dag, har Industri Energi mottatt en rekke bekymringsmeldinger fra arbeidsdykkere og dykkeledere. En del tilbakemeldinger går på at dykkerne erfaringsmessig ikke kjenner seg igjen i at man blir akklimatisert ved å fjerne den dykkefrie dagen. Andre bekymringer går på at dykkerne har behov for en dykkefri dag «for å ta seg inn igjen». Det hevdes at det ikke finnes faglig grunnlag for å beholde den den dykkefrie dagen. Samtidig vil vi hevde at det ikke finnes tilstrekkelig faglig grunnlag, som er godt vitenskapelig fundert, for å fjerne den dykkefrie dagen. Vi savner et grundig og systematisk eksponeringsregister og erfaringsdata fra dykkingen. Vi vet ikke hvordan tabellene brukes i praksis. Vi mangler en god og systematisk helseovervåking av dykkere i Norge. Vi erfarer, spesielt innen dykking i havbruk, at det dykkes opp til 3 ganger daglig samtidig som dybdene er varierende under ett og samme dykk. Belastende dykk er en objektiv,	Vi har kommentert spørsmålet om dykkefri dag over.

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			men også en svært subjektiv vurdering. «Jojo-dykking, som ofte foregår innen havbruksdykking, er ikke sammenlignbart med dykkeprofiler som følger en «firkantprofil» etter en konstant arbeidsdybde. Det hevdes fra enkelte industri-representanter at det å opprettholde den dykkefrie dagen gir økt fare for trykkfallsyke. Er det slik at dykkeren bør ha ett bunntidstillegg i tabellen ved oppstart av dykking, før man eventuelt blir akklimatisert? Hvor lenge er dykkeren eventuelt akklimatisert etter avsluttet dykking? Dersom det blir noen dagers opphold i dykkingen, bør dykkeren da ha et tillegg i bunntiden? Vi vil på det sterkeste fraråde å fjerne den dykkefrie dagen inntil det foreligger gode eksponeringsdata samt erfaringsdata, både psykososialt og fysiologisk som tilsier at slik praksis er forsvarlig	
			Vi registrerer at det kan oppstå høy N2 og O2-eksponering dersom man dykker TUP-tabellen fult ut. Vi stiller spørsmål om hvor godt vitenskapelig kunnskapsgrunnlag vi har for å fastsette tåleevnen av høy O2-eksponerg over lang tid. Er det tatt høyde for at tabellene kan bli benyttet med maksimal O2-belastning, for så å bli behandlet med O2 i etterkant, dersom dette blir nødvendig?	Vi har i en serie artikler dokumentert hvordan man bør beregne oksygeneksponering. I de samme artiklene har vi angitt anbefalte grenseverdier for å unngå oksygenrelatert lungeskade. Det er hensyntatt at det kan være nødvendig å gjennomføre behandlingstabeller etter TUP-dykking.

Side	Punkt	Kommentert av	Kommentar/innsigelse	Forfatterkollegiets vurdering
		Deep X, Barotech, Marinmed	Det er presisert at selv om tabellene har en statistisk sannsynlighet for TFS på ca. 2- 5% ved vitenskapelig testing så vil den operasjonelle forekomsten være en ti- faktor mindre (altså 0,2-0,5%) fordi tabellene i praksis aldri dykkes helt ut, dekomprimerer mer konservativt grunnet individuell vurdering av risikofaktorer samt underrapportering. (Rev L). Me er generelt tvilande til fastsettinga av både 2-5 % og 0,2-0,5 %. Tvilen byggjer på det faktum at der ikkje ligg føre nokon analyse av operasjonelle dykkedata som stadfester dei nemnde talverdiane og som samstundes kan koplast til verifiserte tilfelle av TFS.	Vi har utarbeidet operasjonelle dekompresjonstabeller. En vitenskapelig gjennomgang av det statistiske grunnlaget for tabellsikkerhet faller utenfor rammene av det arbeidet vi har gjort. For å imøtekomme innvendingen har vi likevel laget et sammendrag som forklarer grunnlaget for de estimatene vi har gitt. Sammendraget kan lastes ned fra nettsiden vår. Vi har også i forkant av 4. utgave utgitt et dokument hvor vi i detalj redegjør for våre TFS estimat. Dokumentet kan lastes ned her (gå Vedlegg 1). Det vil være lettere å imøtekomme kritikken hvis dere kan avklare hvilke fortolkningsfeil vi har gjort i vår tidligere vurdering.
		Deep X, Barotech, Marinmed	Standardtabeller: Forfatterkollegiet har mottatt forslag om å innarbeide en formel for beregning av bunntid for direkteoppstigningsdykk for dybder mellom dybdeintervallene på 3m. Der er gamle og enkle «rekneregla» for utrekning av maks botntid for direkteoppstiging. Desse vert ikkje tilrådt.	

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			Bruk av steg på 3 meter har i seg ein sikkerheit som ein lyt ta vare på.	
		Deep X, Barotech, Marinmed	Vi har fjernet den tidligere anbefalingen om å ha en dykkefri dag etter tre dager med dykking hvor minst en av disse var anstrengende dykk. Data tyder på at dykking flere dager på rad tvert imot har en akklimatiserende effekt (Rev H). 1 Det ligg ikkje føre ein detaljert analyse av noverande operasjonell dykke-praksis med omsyn til bruk av ein dykkefri dag. 2 Om regelen vert fjerna, og om ein seinare får på plass både data og verktøy til å analysere dei, vil det ikkje vera mogeleg å samanlikna gamal og ny praksis. 3 Konsekvensane av eit «frislepp» utan alternative grenser verker veldig uansvarleg, særskilt i lys av manglande verktøy for å analysere operasjonelle data. 4 Me meiner at framlagte data ikkje er representative nok for å kunne trekkje konklusjonen om akklimatisering. Me meiner samspelet mellom akkumulering og akklimatisering er dårleg forstått. Til dømes er «ekskursjonar» ikkje definert og effekten av dei er ikkje kjend.	Vi har kommentert dette spørsmålet over. Vi har begrunnet vårt valg i en vitenskapelig artikkel som ikke har blitt imøtegått av fagfeller.

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			5 Me veit berre om eit prosjekt (Hades 1987-1997) som tok for seg dette problemet. Meir arbeid blei gjort enn det som er publisert. Prosjektet vart ikkje ferdig slik det var planlagt, men prinsippet for arbeidet kan tene som mal for vidare arbeid.	
		Deep X, Barotech, Marinmed	Ein bør laga ein totaloversikt over alle faglege hovudendringar, med grunngjeving, som er gjort sidan grunnlagsdokumentet (NUI Rapport 30-80) vart laga.	Vi merker oss bruken av personlig pronomen («Ein»….) NDBT er et ufinansiert dugnadsarbeid. Det er allerede et stort arbeid som nedlegges i selve revisjonsprosessen. Etter tredje utgave har vi beskrevet endringene på vår nettside. Merarbeidet som er foreslått, og som vi støtter, har vi likevel ikke ressurser til å realisere foreløpig. Vi mener likevel at revisjonshistorikken slik den er framlagt på nettsidene tilgjengeliggjør informasjonen for hver enkelt utgave selv om den ikke er systematisert i et enkeltstående dokument slik det er forslått.
		Deep X, Barotech, Marinmed	Informasjonen i NDBT bør betre skilje mellom arbeidsdykking og anna dykking. Til dømes gjeld dette a) korleis dykkefirma sin dykkelege skal vera ein integrert del av varslinga i ein nødsituasjon og b) utforming av krav til dykkefirma med omsyn til bruk av eige beredskapskammer.	Forfatterkollegiet har definert den primære målsettingen med NDBT å tilgjengeliggjøre tidsriktige dekompresjonstabeller og behandlingstabeller for overflateorientert dykking. Tabellene har over tid fått et bredere innhold enn dette, men vi ønsker å være tilbakeholdende med å inkludere

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				nye problemstillinger som tradisjonelt har vært oppfattet som selskapsinterne eller myndighetsregulerte. Vi er enige i at de forholdene som er nevnt i kommentaren bør inkluderes i selskapenes dykkeprosedyrer, men vi ønsker foreløpig ikke å normsette dem i NDBT.
		Deep X, Barotech, Marinmed	Arbeidet de forfattarar har lagt ned i revisjonane av NDBT er imponerande i seg sjølv. Korleis de får kompensert for dette arbeidet er uklårt for oss, men me trur dykkeindustrien og dei styrande organ haustar meir enn dei sår. Det er kanskje på tide å sjå nærare på korleis formalia rundt ansvar og finansiering skal vera. Til dømes kan det nemnast at Deep X, saman med Barotech og Marinmed, kunne ha laga ein langt meir detaljert vurdering, men det vert feil for oss å gjere dette på «ProBono» basis.	Takk for anerkjennelsen av det arbeidet forfatterkollegiet nedlegger i revisjonsarbeidet. Arbeidet er ikke kompensert og gjøres utenfor arbeidstid. Vi tar gjerne imot forslag på hvordan forfatterskapet for fremtidige utgaver kan formaliseres.
		Deep X, Barotech, Marinmed	At erfaringa med NDBT er “gode”, kjem kan hende av at det er lagt inn diverse tryggleiksmodifikasjonar under praktisk dykking, avhengig av til dømes temperatur og arbeidsintensitet. Oversikt over korleis tabellane er blitt brukte i praksis, manglar stort sett. Eg ville ha venta med revisjon til slike data låg føre. Eg skjønar heller ikkje	Vi er helt enig i at et bredere datagrunnlag vil muliggjøre ytterligere forbedring av tabellene. Vårt utgangspunkt er at vi reviderer tabellene når vi blir gjort kjent med ny kunnskap som gjør det riktig å oppdatere dokumentet. Det har vi gjort denne gangen også. Det er naturlig at ikke alle er enige i de vurderingene vi gjør, men mangel på kunnskap på et område (utilstrekkelige data på operasjonelt

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			kvifor det no, før slike data ligg føre, hastar slik med å fjerne dykkefri dag.	gjennomførte dykk) kan ikke forhindre at vi utvikler tabellene der det har kommet ny kunnskap (TUP, dykking flere dager på rad, oksygentoksisitet). Vi har svart på spørsmålet om dykkefri dag tidligere. Vi har begrunnet endringen ut fra vitenskapelige kriterier. En meningsfylt diskusjon forutsetter at det påpekes hvilke mangler eller feiltolkninger vi har gjort i det vitenskapelige grunnlaget. Øvrige endringer i denne utgangen er knyttet til behovet for TUP-tabeller og ny kunnskap om hvordan dykkernes oksygeneksponering bør beregnes.
		Jan Christian Warloe	Som før virker revisjonen å være grundige og sikkerhetsbevarende for alle forhold tabellverket gjelder for. Mine kommentarer blir vel litt repetering av de tidligere. Vil igjen si at det bør komme tydeligere frem hva som kan sies å være «sann, entydig»prosentmessige risiko, risika, for TFS ved tidligere bruk av tabellene fram til nå, jfr NBUs og andre pålitelige statistikker, også for tilsvarende, sammenlignbare, tabeller.	Takk for tilbakemeldingen. Med unntak av spørsmålet knyttet til risiko for TFS og ønsket om å inkludere de gamle «Grøndal-tabellene» (egtl USN 1957) så ser vi ikke konkrete forslag til omformulering eller innsigelse her. Når det gjelder risikovurdering av tabellene så henviser vi til grunnlagsdokumentet vi har utarbeidet til dette formålet. Denne kommentaren er ikke oversatt til engelsk fordi vi mener den er dekket av øvrige kommentarer.

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			Vil også gjenta at tabeller bør være absolutte, uten grunnlag for diskusjon for grunne og dype (sikkerhets)-stopp. Vil også gjenta at tabbellene, som uten unntak angis i hele minutter, bør være grunnlag for «avstressende» beroligelse til elever om at sikkerhet er bygget inn i tabellene for å ivareta alle dykkere som godkjennes medisinsk, og at selv om det kan være rett å gi tillegg for bunntider, ikke er nødvendig å stresse tidsgrenser med stoppeklokker og sekunder. Som tidligere nevnt mener jeg de gamle dykketabellene, «Grøndal-tabellene», som ga svært utvidete nødstopp, bør være tilgjengelige eller oppnåelige for dykkeledere, dykkeleger, som utgangspunkt ved overflateorienterte dykkeoperasjoner som ikke kan avsluttes innen NDBTs grenser. Forøvrig synes jeg det bør fokuseres mer på Delta-P ulykker, grenser for fare ved pusting mot undertrykk (mindre enn 0,1 atm), og tiltak som valg av freeflow-utstyr kontra demand-basert dykkeutstyr der fare for Delta-P kan oppstå, ved dykking i sug-fare som ved skrog- og inntaks-/uttaks-lekkasjer. Lykke til videre med dette viktige arbeidet.	

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		Norsk bransjeforening for undervanns-entreprenører (NBU)	Standardtabeller Forfatterkollegiet har mottatt forslag om å innarbeide en formel for beregning av bunntid for direkteoppstigningsdykk for dybder mellom dybdeintervallene på 3m. Et praktisk eksempel: 15m tabelldybde tillater 90 min bunntid for et direkteoppstigningsdykk, mens tilsvarende bunntid på 18m er 60 min. Ved lineær interpolering kunne man foreslå en bunntidsgrense på 80 min på et dykk til 16m (i stedet for 60 min som man i dag må benytte for å være innenfor 18m tabelldybde). Forfatterkollegiet har ikke tatt stilling til denne forespørselen, og i tillegg til det sikkerhetsmessige aspektet så vil vi gjerne få avklart om det er et operasjonelt behov for en egen tabell med 1m intervall for angivelse tid for direkteoppstigningsdykk. Ta gjerne kontakt om du har meninger i sakens anledning! NBUs kommentar: NBU ser ikke behov for en egen tabell med 1m intervall for angivelse tid for direkteoppstigningsdykk.	Takk for presiseringen. Vi er enige og vi introduserer ingen rutine for interpolering av dekompresjonsprosedyrer for dykkedybder som ligger mellom de standardiserte 3 m tabelldybdene.
		Norsk bransjeforening for undervanns-entreprenører (NBU)	(Sitat fra følgeskrivet): *Vi har fjernet den tidligere anbefalingen om å ha en dykkefri dag etter tre dager med dykking hvor minst en av disse var anstrengende dykk. Data tyder på*	Takk for avklaringen.

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			at dykking flere dager på rad tvert imot har en akklimatiserende effekt (Rev H). NBUs kommentar: NBU støtter fjerningen av den tidligere anbefalingen om dykkefri dag.	
		PTil	Kan alle eksempeloppgavene samles på nettsiden?	Forslaget vil være besparende på antall sider. Vi er foreløpig usikre på om brukervennligheten vil opprettholdes hvis vi fjerner dem fra publikasjonen. Vi beholder dem i denne utgaven, men vil avklare dette bedre ved neste utgave.
Innledning				
1	5	Kjartan Alnes (Tehcnip FMC)	Inledningen Punkt 5. Dykkelederes Ansvar side 1., Standardtabell Punkt 17. Belastendedykk side 8 og Oksygenforgiftning Punkt 3. Risikofaktorer. Her er det en samenheng og det tydliggjør dykklederens ansvar. Men for at dette skal kunne bidra til riktig forståelse og tolkning burde man kanskje tatt med under Standardtabell Punkt 17. Belastendedykk også det som har med arbeid med Roterende / vibrerende verkøy som meisel, borhammer o.s.v samt rystelser fra andre nærligende aktiviteter. Sunn fornuft tilsier når man tar en Farris flaske og lar den blir ristet over kortere eller lengre tid så utløses / frigjør dette betydlig mere gassbobler ved normal åpning. Det er	Umiddelbart kan det framstå som en risikofaktor for TFS å arbeide med vibrerende verktøy under vann. Det foreligger likevel ingen studier som kan belyse risikoen. Det er verdt å merke seg at eksponering for vibrasjon skjer i bunnfasen – når dykkeren tar opp gass. Dykkeren eksponeres ikke i den sårbare dekompresjonsfasen når gass frigjøres fra vev til blod. Faktisk er det to studier (Germonpre et al 2009 og Balestra et al 2016) som har sannsynliggjort at helkroppsvibrasjon *før* dykk reduserer forekomst av venøse gassembolier *etter* dykk. Det har ikke vært gjort tilsvarende studier på helkroppsvibrasjon i bunnfasen, men hypotesen er faktisk at vibrasjon frigjør boblekjerner som ellers ville ha

Side	Punkt	Kommentert av	Kommentar/innsigelse	Forfatterkollegiets vurdering
			bort imot det samme som skjer i kropen til en dykker skulle man tro. Man nevner jo dette som en risikofaktor under Oksygenforgiftning. Så hvorfor skulle ikke dette være en reel risiko og definere dette som en belastning når en dykker jobber med Roterende / vibrerende verkøy?	vært utgangspunkt for skadelige gassbobler – altså at vibrasjon *før* dekompresjon kanskje kan være gunstig! Derimot kan arbeid med vibrerende verktøy *etter* dekompresjon tenkes å øke sannsynligheten for TFS.
4	15	Ole Martin Haugan	På hvilket grunnlag kan det hevdes at tabellene i praksis aldri dykkes helt ut, at det dekomprimeres mer konservativt og at det derfor er mulig å redusere sannsynligheten til 1/10 del av statistisk sannsynlighet? Underrapportering er vel noe man ikke vet. Tøying av tabeller, urapportert tfs.	Vi ***fastslår*** at *observert/rapportert* forekomst av TFS ved operasjonell yrkesdykking er i størrelsesorden 2-3/1000 dykk (Shields, Imbert, PTil/DSYS m.fl.). Insidensen av TFS er ca 2-3% når tabellene testes vitenskapelig (USN). Vi prøver å forklare denne forskjellen og feilrapportering av operasjonelle dykk har vært rapportert av andre tidligere (Arntzen, Sterk, Imbert).
4	15	Ole Martin Haugan	Under punktet Innledning hevdes det at det at tabeller i praksis aldri dykkes helt ut og at det dekomprimeres mer restriktivt. Her virker det som det er et forslag til å åpne for en mer liberal holdning hvor grenseverdier i enkelte tilfeller kan overstiges?	Nei, det er absolutt ingen intensjon at tabellene skal brukes mer liberalt eller at det er vårt ønske at de skal utvikle seg i mer liberal retning. Tabelldybder og bunntider er maksimalgrenser og det er tydelig beskrevet i tabellen.
Standardtabell				
8	17	Kjartan Alnes (Tehcnip FMC)	Se kommentar «Innledning» side 1 pkt 5	Se kommentar «Innledning» side 1 pkt 5
9	19	Ole Martin Haugan	Hvilke data tilsier at dykking flere dager på rad har en «akklimatiserende effekt». Er det holdbar forskning som viser denne effekten? Ordningen med dykkefri dag fungert fint i	Innspillet kommer fra forfatterkollegiet til 4. og 5. utgave – ikke "industrien". Vi drøftet i 4. utgave hvilke andre forhold enn dybde og tid som kunne påvirke

Side	Punkt	Kommentert av	Kommentar/innsigelse	Forfatterkollegiets vurdering
			mangfoldige år. Er dette et innspill som kommer fra dykkeselskap/operatører? Etter mitt syn kan dette føre til økte belastninger på dykkerne	sannsynligheten for TFS. NDBT anførte den gangen at dykking flere dager på rad kunne være en risikofaktor, men uten at vi var kjent med noe vitenskapelig dokumentasjon som underbygget påstanden. I et nylig vitenskapelig arbeide (Risberg 2021) er det dokumentert at dykking flere dager på rad enten ikke påvirker sannsynligheten eller har en akklimatiserende (sannsynlighetsreduserende) effekt.
Flyging etter dykking				
15	9	HVL/DU	Ventetid endres slik at ikke det samme tallet verserer i to kolonner (601-1000 osv).	Vi er i prinsippet enig, men dette har ingen praktisk relevans. Tabellen er enklere å lese ved å angi skillet i hele ti-meters intervall. Vi beholder grensene av hensyn til lesbarhet
Flernivå-tabell				
17	4	HVL/DU	(2. kulepunkt) Skal det være manuell beregning eller dykkecomputer som legges til grunn? FUA § 26-30 a. sier begge deler.	Våre flernivå-tabeller er beregnet for selvstendig bruk, uavhengig av dykkecomputer. Dere påpeker likevel et viktig krav i regelverket som ikke har kommet klart fram av teksten. Vi har nå endret pkt 11 i samme avsnitt slik at myndighetskravet om å avslutte dykket før dykkecomputeren pålegger dekompresjonsstopp i sjø framkommer tydelig.

Side	Punkt	Kommentert av	Kommentar/innsigelse	Forfatterkollegiets vurdering
17	6	HVL/DU	Hvor stor overskridelse kan tillates med bruk av denne prosedyren?	Her er det ikke ment at det er «tillatt» å overskride tiden på den aktuelle etappedybden, men hva dykker og dykkeleder må gjøre hvis tiden overskrides. I et slikt tilfelle går flernivå-dykket over til å bli et ordinært dykk med etappestopp (dekompresjonsstopp i sjø). Prosedyren med 30 min O2 pusting følges sjablongmessig uavhengig av hvor lenge overskridelsen har vært. (Oksygepusting vil være en ekstra sikkerhet i en slik situasjon.)
19	12	HVL/DU	Skal dykkeprofilen administreres av dykkeren selv som leser av computeren med rapport til dykkeleder som kun har digital dybdemonitorering (3. og 15. side 20) og FUA §26-30 b.?	Igjen et meget godt spørsmål som bør besvares av ATil og ikke av oss i forfatterkollegiet. Vår tolkning er likevel at siden dykkecomputer vanligvis bare kan leses av dykkeren så vil det være dykkerens ansvar å informere dykkeleder om dykkecomputerens angivelse av gjenværende tid for et direkteoppstigningsdykk slik at man unngår etappestopp i sjø. Vi antar at det ikke er hensiktsmessig å rapportere andre tids- og dybdedata fra dykkecomputeren til dykkeleder fordi disse kan avvike fra elektronisk dybdemonitorering og dermed introdusere uklarhet og slik forhindre en sikker gjennomføring av dykket.
Dykkecomputere (Dette kapittelet er fjernet!)				

Side	Punkt	Kommentert av	Kommentar/innsigelse	Forfatterkollegiets vurdering
23	12	HVL/DU	(Siste setning: "I slike tilfeller bør dykkecomputerens anbefalinger følges selv om det vil forkorte dykketiden i forhold til hva dekompresjonstabellene anviser.") Gjelder det alle typer computere eller fremdeles RGBM-, Bühlmann- eller Thalmann-algoritme?	Ja, vi mener det bør gjelde enhver dykkecomputer uavhengig av algoritme.
Oksygenforgiftning				
26	7	HVL/DU	(Andre setning: "Denne indeksen er fortsatt mye brukt, men den er unøyaktig og *bør erstattes* av ESOT (Equivalent Surface Oxygen Time.") Burde denne vært erstattet med *skal erstattes*?	NDBT er en anbefalt prosedyre, ikke et regelverk. Vi ønsker å unngå begrepet "skal" så langt som mulig.
Dykking med Nitrox				
29	7	HVL/DU	(Andre setning: For overflateforsynt utstyr skal det gå raskt å skifte pustegass fra nitrox til luft.) Er denne prosedyren bare norsk? Kan den unngås med å sette grenseverdi fast.	Det er ønskelig at dykkeren tilføres magrere nitroxblanding (helst trykkluft) ved alle tilfeller av mistenkt oksygenforgiftning. Oksygenforgiftning kan skje ved feilblandet gass, selv om man har etablert en trygg grenseverdi.
Overflatedekompresjon med oksygen				
30	2	HVL/DU	(Sjette setning: Oksygenfraksjonen skal ikke tillates å overstige 23 %.) NORSOK U-100 har grense på 22%, denne medfører avvik for offshore. Hva med samsvar?	Grenseverdien på 23 % er videreført fra tidligere utgaver av NDBT, vi har ikke fått tilbakemelding på den tidligere og vi antok at det ville være store praktiske ulemper ved å sette grenseverdien så lav som 22 % (mye støy og kontinuerlig lufting selv ved små lekkasjer). Vi har forhørt oss med erfarne dykkeledere som

Side	Punkt	Kommentert av	Kommentar/innsigelse	Forfatterkollegiets vurdering
				bekrefter at det ikke er et praktisk problem å justere FO_2 til maks 22% og vi har derfor senket grenseverdien.
31	6	PTil	Ved innføring av nye elementer i teksten kan det være nyttig å legge til et praktisk eksempel som en forklaring og for å unngå misforståelser.	Vi er enig. Vi har lagt til et eksempel.
31	7-8	HVL/DU	I pkt 7 står det at oppstigningshastighet skal være 10 m/min, men i pkt 8 står det at man skal bruke 1 min fra 12 meter til overflaten. Dette vil si en hurtigere oppstigning enn ellers. Skal dette være tilfelle?	Nei, det er ikke meningen at oppstigning fra 12 m skal være raskere enn 10 m/min. Samtidig mener vi at vi er sitert unøyaktig. Vi har skrevet at oppstigningshastigheten *ideelt* skal være 10 m/min og vi skriver at oppstigning fra 12 m til overflaten skal være *ca* 1 minutt. Det er helt korrekt at en oppstigningshastighet på 10 m/min vil innebære 1 min 12 sek fra 12 m til overflaten. Men punkt 8 er med hensikt skrevet med angivelse av tider og ikke hastigheter for å få fram at overflateintervallet bør begrenses til 5 min. Vi har satt "ca" i kursiv for å understreke dette forholdet enda tydeligere.
31	9	HVL/DU	Burde det vært presisert i teksten at oksygentiden starter på oksygen på 15 m?	Vi er enig. Dette er presisert (ny setning tilføyd).
31	9	HVL/DU	(Andre setning: Det samme gjelder rekompresjonen som bør starte umiddelbart etter at døren er lukket, uavhengig av om dykkeren har fått på seg oksygenmasken eller ikke.)	Her er vi uenig. Første setning angir tydelig at oksygenpusting skal starte så snart som mulig. Andre setning påpeker bare at rekompresjon ikke skal utsettes

Side	Punkt	Kommentert av	Kommentar/innsigelse	Forfatterkollegiets vurdering
			Viktigheten av oksygenpusting under nedblåsning er noe uklar.	selv om dykkeren er forsinket med å ta på seg BIBS-masken.
33	18	Ole Martin Haugan	«Det er satt inn tabell som gir en forenklet oversikt over profiler hvor bruk av Nitrox kan overstige anbefalt grenseverdi for enkelt dykk eller som nødvendiggjør to dykkefrie dager etter dykking flere dager på rad.» Hva menes med dette. Kan grenseverdiene for O2 påvirkning tøyes slik at to dykkefrie dager nødvendiggjøres? I såfall, hvorfor er dette ønskelig?	Som det framgår av pkt 9 i kapittelet om oksygenforgiftning så kan man dykke inntil åtte etterfølgende dager med forhøyet pO_2 hvis ESOT ikke overstiger 420 for hver dykkedag. Eter det må man ha to dager uten oksygenbelastning. Ved større oksygenbelastning (høyere ESOT) blir antallet tillatte etterfølgende dykkedager færre. Det er nokså tidkrevende å beregne ESOT. For å forenkle dykkeleders jobb så kan tabellen brukes for å finne ut om oksygenbelastningen ved Nitrox dykk (med OD-O2 eller TUP) overstiger 420. Det er ikke snakk om å tøye ESOT-grensen, tabellen er laget for å gjøre dykkeleders jobb enklere. "To dykkefrie dager" er innført som et krav for å begrense oksygenbelastning og har ikke noe med tidligere krav om dykkefri dag for å redusere sannsynligheten for TFS.
33	18	Ptil	(Fjerde setning: *Hver celle i tabellen viser maksimal bunntid som kan tillates for hver dykkedag avhengig av antall etterfølgende dager med dykking (første kolonne) og pO2 (øverste rad).*)	Maksimalt tillatt bunntid for OD-O2 dykking er vesentlig kortere enn for TUP. For de fleste tabelldybdene så vil de generelle bunntidsbegrensningene begrense oksygeneksponering, og det vil i praksis ikke være mulig å overskride ESOT-begrensningene..

Side	Punkt	Kommentert av	Kommentar/innsigelse	Forfatterkollegiets vurdering
			"Maximum allowed bottom time". See page 38 serial 14 for TUP stating maximum allowed exposure time. Why this difference? "maksimal bunntid" Se side 37, punkt 14 for TUP. Her står det "samlet eksponeringstid". Hvorfor er det forskjell?	En tabell som anger samlet eksponeringstid for Nitrox og oksygen vil ikke være hensiktsmessig for OD-O2.
33	18	PTil	Mangler det et tall i nederste rad under kolonnen for pO2 på 1,1 bar?	Ja. Tabellen er rettet.
Dekompresjon med lukket klokke				
35	3	PTil	Kapittelreferanser vil andre seg i neste utgivelse av NORSOK'en. Mulig det er bedre å utelate kapittelreferansene siden det er en fullstendig omlegging av standarden	Vi er enige. Vi har fjernet referansen til kapittelnummer.
35	4	HUS (se spesifisering over)	Finnes det gode rapporter eller vitenskapelige dokumenter som viser at prosedyrene ved TUP er å anbefale? I pkt 4, side 36 er det skrevet at TUP gir risiko for DCI 4-5%. Kan det dokumenteres og er det i tilfelle en akseptabel risiko?	Første del (.. «viser at prosedyrene ved TUP er å anbefale») er vanskelig å svare på. Vi har nettopp publisert en vitenskapelig artikkel hvor vi har vi foretatt en systematisk gjennomgang av kandidater til TUP-tabeller og konkludert med at USN IW Air/O2 prosedyren er den sikreste. Vi skriver ikke at risikoen er 4-5%. Vi skriver at: *Estimert sannsynlighet for trykkfallssyke er ca 3,5-4,5% for de lengste bunntidene, altså i samme størrelsesorden som standardtabell.* Denne *estimerte* sannsynligheten (probabilistisk modell) er basert på NEDU Rapport TR 12-01 (Gerth WA,

Side	Punkt	Kommentert av	Kommentar/innsigelse	Forfatterkollegiets vurdering
				Doolette DJ. VVal-79 Maximum Permissible Tissue Tension Table for Thalmann Algorithm Support of Air Diving). Risikoaksept vil trolig variere avhengig av hvem som blir spurt. I hvilken grad en estimert sannsynlighet for TFS på 3,5-4,5% er akseptabel må derfor hver enkelt leser, bruker, organisasjon osv. ta stilling til. Vi påpeker bare at TUP tabellene kan forventes å ha sammenlignbar sannsynlighet for TFS som standardtabell.
37	14	PTil	Femte setning: *Hver celle i tabellen viser maksimal samlet eksponeringstid som kan tillates for hver dykkedag avhengig av antall etterfølgende dager med dykking (første kolonne) og pO2 (øverste rad).* Her står det "samlet eksponeringstid". Hva er forskjellen fra "maksimal bunntid"? (ref. side 33 punkt 18) pO2 under deko kan være på 1,6bar og 1,9bar som er utenfor tabell. Eller gjelder dette kun bunntid før O2-pusting under deko?	Det er riktig at det skal være samlet eksponeringstid for oksygenanriket pustegass. Overskriften presiserer at dette bare gjelder TUP med Nitrox som pustegass i bunnfasen. Tidene i tabellen gjelder altså for summen av bunntid og dekompresjonstid med oksygenpusting i kammer, men fratrukket luftpustetid i kammer. Imidlertid ser vi at kolonneoverskriften "pO_2" kan misforstås. Denne er derfor endret til "pO_2 i bunnfasen".
37	14	PTil	Her bør det legges inn et praktisk eksempel for bruk av denne tabellen.	Vi er enig. Eksempelet i pkt 16 er utvidet.
37	14	Ole Martin Haugan	Se spørsmål fra samme person relatert til OD-O2 s33 pkt 18 over	Se vårt svar knyttet til spørsmål vedr OD-O2 s33 pkt 18
Korreksjon for dykkestedets høyde over havet				

Side	Punkt	Kommentert av	Kommentar/innsigelse	Forfatterkollegiets vurdering
59		HVL/DU	Bør endres slik at man ikke kan velge hvilken kolonne man skal bruke ved for eksempel 500 mtr o.h.	Vi ser på dette som en rent teoretisk problemstilling. Tabellen framstår enklere å lese ved å unngå "9" eller "1" som siste siffer og vi opprettholder dagens tekst.
TUP Tabell				
75 76 77 78		PTil	Det er samme dekompresjonsprosedyre for: 33 m tabell 95 og 100 min 36 m tabell 85 og 90 min. 39 m tabell 75 og 80 min 42 m tabell 65 og 70 min Stemmer dette?	Ja. Dekompresjonsprofilene er riktige. Men fordi maks tillatt bunntid for TUP dykk til 33, 36, 39 og 42 meter er hhv 95, 85, 75 og 65 min måtte vi føye til en rad for å tydeliggjøre bunntidsbegrensningen.
77		Ptil	Mangler raden for 65 min bunntid	Nei. Bunntiden øker med 10 min fra 60 mn, men vi måtte sette inn en linje for 75 min pga bunntidsbegrensningene.
Forebygging av trykkfallssyke				
86	27	HVL/DU	(Siste setning: "Dybde" skal forstås som vanndybde ved dykking iht. Arbeidstilsynets regelverk, mens det ved dykking underlagt Petrolumstilsynets tilsynsområde skal forstås som Ekvivalent Luftdybde der det dykkes iht. Norsok U-100 og U-103.) Viser til teksten nedenfor. Ekvivalent luftdybde er kun nevnt i forbindelse med dykkefri dag. Utklipp fra NORSOK U-100: *8.2.2 Surface oriented diving* *Diving procedures in accordance with NDTT [52] should be used, but the restrictions for*	Dette har blitt endret i NORSOK U-100:2023 hvor det i 11.4.1 nå står: *When using Nitrox, the maximum bottom time may be calculated from equivalent air depth (EAD).*

Side	Punkt	Kommentert av	Kommentar/innsigelse	Forfatterkollegiets vurdering
			maximum bottom time exposure limits given in Table 11, shall be adhered to.	
Tiltak ved utelatt dekompresjon og ukontrollert oppstigning				
88	1	HVL/DU	(Andre setning: Vår klare oppfatning er at det ved all dykking (både fritids- og yrkesdykking) skal finnes utstyr for oksygenpusting på overflaten med en kapasitet på minimum 30 min, helst 60 min beregnet ut fra et ventilasjonsvolum på 15 l/min.) Ordet «skal» gjenspeiler absolutt mens senere i teksten omtales tilfeller der oksygen ikke er til stede. Er «bør» mer riktig? Hva med skal for yrkesdykking (lovfestet) og bør for fritidsdykking.	Vi begrenser bruk av "skal" til et minimum fordi vi ser at alternative løsninger til det vi foreslår kan gi tilfredsstillende sikkerhet. Det kan fortsatt være at vi har vært unøyaktig i bruk av "bør" og "skal", men når det gjelder tilstedeværelse av oksygen så mener vi "skal" er riktig uavhengig av dykkekategori. Vi innser at det kan finnes situasjoner hvor det ikke er oksygen på stedet og derfor har vi også utarbeidet prosedyrer for slike siutasjoner. Teksten opprettholdes uendret.
88	3	PTil	(3. kulepunkt, 3. underkulepunkt: Utelatt dekompresjonstid i vann er 15 minutter eller mer) Flytskjema side 91 sier 10 mintter?	Nei, flytskjema på side 91 sier *mer* enn 10 minutter. Ettersom dekomprsjonstid øker i 5 min intervall så er beskrivelsen identisk med flowchart, men for å unngå enhver misforståelse så har vi omformulert.
88 89	4 5	HVL/DU	Leser man AMK sin orientering til leger vil begge tilfellene som beskrevet på side 88 og 89 at pasienten med kvalifisert følge møter direkte opp hos dem for behandling. Orienteringen synes å skille mellom pasienter med sentralnervøse symptomer som skal i trykkammer snarest, og pasienter med andre symptomer på TFS der ulike undersøkelser er	Den henviste plakaten til Haukeland omtaler ikke spesifikk håndtering av våkne, selvpustende, ikke-kritisk-skadede dykkere med mulig TFS *med trykkammer på stedet*. I slike tilfeller er det vår klare oppfatning at det vil være riktig å igangsette rekompresjonsbehandling på stedet.

Side	Punkt	Kommentert av	Kommentar/innsigelse	Forfatterkollegiets vurdering
			prioritert for å utelukke førstnevnte. Transport til dykkerlege ved nærmeste kammer er nevnt, men ikke behandling på stedet av dykkepersonell slik NDBT oppfordrer til. Teksten fra utklippet henviser til NDBT med link dersom dykker ikke får symptom. Med andre ord ser det ut som at teksten på side 88: «Dykkeren har eller får symptomer på TFS: Behandle etter tabell 6» ikke er i tråd med deres rutiner. Kan man likevel med dykketabellen i hånden sette i gang en tabell 6, deretter varsle AMK at man har en dykkerulykke og pasienten er i trykkammer på 18 m lokalt på dykkestedet.	Rekompresjonsbehandling må ikke forsinke varsling av AMK. Forutsatt at AMK er varslet så er det likevel fullt forsvarlig å igangsette rekompresjonsbehandling uten ytterligere rådgiving hvis pasienten puster selv, er våken og ellers uten alvorlige skader. Vi har justert teksten for å ivareta dette.
91		Ptil	Ref tekst i kapittelet for kammer tilgjengelig er 15 min (i praksis 10min). Det blir litt forskjeller som kan gi usikkerhet. Burde flytskjema ha 15 minutter eller burde teksten si 10 minutter?	Vi har nå endret teksten på foregående sider slik at ordlyden blir identisk (og muligheten for misforståelse mindre).
Undersøkelsesliste				
114		PTil	Her har hjelpeteksten i utgave 5 forsvunnet - er det med vilje. Jeg antar at hjelpeteksten ville vært en god påminnelse til hva man ønsker registrert. Evnt sett den som tabelltekst i bunnen av tabellen. Burde det vurderes å legge til hjelpelinjer for kolonner / rader?	Vi har endret denne siden basert på denne tilbakemeldingen og skrevet inn hjelpeteksten igjen.

Comments in English

Page	Serial	Responder	Comment	Decision
			Comments in italics have been submitted in Norwegian. They have been translated by the editorial team for the service of readers not fluent in Norwegian language. The translation should not be considered precise and is not binding neither for the responder nor the editorial team.	
General				
		Jean-Pierre Imbert	The "N" in the NDTT title stands for "Norwegian", but this term is misleading because the ownership of the tables is unclear. Are the NDTT tables: • Norwegian Navy tables, published as part of a Navy documentation, signed by the admiralty as it was at least until 2007? • The result of scientific programs carried out by a Norwegian research centre, as for instance NUTEC or SINTEF? Up to our knowledge, there is no scientific reports nor pear review papers documenting the NDTT development and validation.	We find it difficult to express an *ownership* of this document (NDTT), but the *authorship* is clearly defined. NDTT can be used free of charge for anyone interested and it is freely available on the internet (www.dykketabeller.no). The tables have been developed by an editorial team, The editorial team has no commercial benefit from the use of these tables. The editorial team has granted The Western Norway University of Applied Sciences permission to print the tables and charge the printing cost for those who want a printed version. The editors receive no royalty from this sale. The historical background for table development has been described in the introduction (historical development since 1980). It is of course possible to raise a legal claim against the editors of these tables, but we

Page	Serial	Responder	Comment	Decision
			• Tables that have been endorsed by Norwegian authorities such as PSA? However, we could not find any official document referring to a review and a decision to endorse the NDTT at national level • A commercial product sold by a Norwegian company or a group of persons. • Historical tables promoted by a Norwegian lobby? This question of ownership is important for international diving companies whenever the local conditions force them to change their procedures. In case of an acute DCS incident related to the use of the NDTT tables, their juridical department would seek liability and search for the responsibility behind the edition the NDTT tables.	believe that details of such legal liability is beyond the scope of this (NDTT draft 6th ed) review process.
		Jean-Pierre Imbert	The document is presented as an official edition of tables but sometimes is written as a diving manual or even a diving school textbook.	This is a diving procedure intended for surface-oriented diving in Norway and as described above, published by an editorial team of three persons. We know from experience that the structure of the publication meets the expectations from the

Page	Serial	Responder	Comment	Decision
			These multiple goals make the document unclear, and it is difficult for the reader to differentiate between: • A strict decompression procedure, as for instance the printed version of the tables. • An operational instruction as for instance page 17, para 3: "To avoid exceeding the table time it is a good idea to prepare the diver for ascent shortly before the maximum time is up". These sorts of recommendations should be read in the diving company diving manuals but not in a reference official document. • A policy as for instance page 33 all the considerations and recommendations on the use of dive computer. This is definitively a matter of regulations and should not be discussed in a document presenting decompression tables. • General information and explanations. This document is not the place to educate a diver nor a diving supervisor. It the responsibility of the diving	end users: ***The divers and the diving supervisors***. Not many Norwegian diving contractors have sufficient resources to develop and maintain such diving procedures. The fact that it is used by commercial (and in part military) diving schools ensures that divers experience the same set of procedures. That minimize training requirements and chances of misunderstanding. The procedure has not been written neither for regulatory bodies, industrial organizations, offshore diving contractors nor scientists. The feedback we have received from our *end-users* ensure us that the principal layout of these tables is relevant. The comment regarding the flowchart underscore the different expectations from the reviewer and ourselves: We consider the flow-chart to be invaluable for those diving contractors not having resources to develop these by themselves. The consistency in handling diving emergencies is retained since this flowchart follows the diver from diving training school through top-up training and company-internal procedures. Sharing such procedures in the open, and asking for feedback from the end users, ensure that the routines are maintained and developed.

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			companies to train and familiarize their personnel. Typically, the front page that includes a decision flow chart for DCS could make sense in a dive control room on some procedures binder but seems out of context in the present document.	Some diving companies decide to modify procedures. The flowchart on front page could be modified with internal relevant phone numbers. We welcome and support such company-internal adjustment. But for those not having the resources this nationwide accepted table fulfils an important role.
		Jean-Pierre Imbert	There is no study available indicating that the NDTT document is complying with the Norsok standards, would it be the previous version or the next to come revision. Assuming that once the Norsok standards are published in their newer version, a compliance document is published demonstrating that the various issues (max PO2, multiday diving, etc.) are in line with the requirements, who will sign and the document?	It is not our intention to make a compliance measurement against NORSOK U-100 (or NORSOK U-103). The NDTT have been published for inshore as well as offshore diving. Inshore diving in Norway is not required to meet the NORSOK standards. We would welcome any initiative to clarify non-conformances to the NOSOK standard, but we consider that effort beyond the scope of our document.
		Jean-Pierre Imbert	<u>Norsok compliance</u> Reference is made to the last revision of the Norsok U100, para 5.5 Management of changes. According to this paragraph, it is expected that the various editions of	The reviewer (JPI) raises a concern regarding quality-assurance of changes in the NDTT relative to NORSOK U-100 requirements.

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			the NDTT should be associated to "*a risk assessment of the proposed change, peer acceptance of the modification, documented implementation, testing and verification after implementation and final close-out*". Today, such information can be found in the diving documentation of any diving company, called a justification document (TFMC) or provenance document (SS7). There is no equivalent document provided for the justification of the NDTT development and validation, except some general information presented in the introduction. The NDTT website does not fulfil this function either because it does not contain any formal presentations of the various difficulties encountered, the changes introduced, the results obtained after the modifications, the decision taken for implementation, etc. It is also only partly translated in English. It is therefore considered that at the moment, the NDTT do not comply with the above Norsok requirement.	This is a concern that should be addressed to the various workgroups developing the NORSOK standard. As editors of the NDTT we use the website to address proposed changes to the text long time before the actual revision takes place. We are transparent on all changes proposed and explain the rationale. We address concerns raised in review documents like this. Comments to previous editions are public available on our website and we have responded to the majority of them. We agree that the review process and formal (written) provenance/justification documents could be expanded. However, we consider that we have made a significant effort explaining the background for all changes and for a number of these (multiday-break, pDCS estimation method, oxygen toxicity, TUP decompression tables) we have either personally published or referred to other scientific work. The final decision on the selection of table will be the risk owner. We consider that the relative frequent update intervals of our tables are beneficial compared to other official tables that they remain relatively static, not implementing new knowledge or experience.

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		Jean-Pierre Imbert	Reference is made to the last revision of the Norsok U100, para 8.6 New technology. According to this paragraph, it is expected that the evolution of the NDTT should be associated to "*following steps prior to be implemented:* • *definition of international requirements and standards to which the technology shall prove conformity.* • *necessary technical and operational risk evaluations to prove the technology is fit for purpose.* • *assurance process for acceptance of this technology by the technology's end user (divers / supervisors).* • *an implementation plan including, but not limited to, training and familiarization of personnel, necessary technical upgrades of the diving system etc.*" It is noted that the international standard for conformity are not defined. It is noted that the safety performances of the NDTT are presented as: • Page 14, para 12: Standard tables are associated to a DCS risk	We politely disagree with this comment and we believe that our message on pDCS has been misunderstood. The NDTT has never been intended to serve as a reference tool for theoretical and statistical decompression modelling. The repeated comments to the 2-5% (5-6% for exceptional exposures) DCS probability has been misinterpreted by many reviewers. For this reason we have elaborated a specific response (document) that can be downloaded from our website.We hope this document will clarify that observed DCS incidence will most likely be small comparing modern surface-oriented decompression tables unless bottom times are very long. We partly agree with the critzism related to peer review of DCS incidence data such as the one cited from Kalstø. However, the Kalstø data has been published scientifically (Arntzen,AJA, Proceedings XI EUBS annual meeting p 221-228). But a *proceedings manuscript* does not meet similar strict quality requirements as an *original paper* in a scientific journal. The proceedings paper is significantly less scrutinized than an original scientific report. The same publication bias/confounder holds true for many other similar reports such as

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			typically ranged 2% to 5% for non-indexed dives. • Page 14, par 13: SurD2 tables are associated to an estimated DCS risk … to range 7-8%. This is to be compared to the practice of international diving companies that are all operating the UHMS standards for validation of decompression tables and have documented safety performance of a DCS incidence of less than 0.2%. The consequence is that diving companies are faced with a problem of DCS risk that is outside current values and that cannot be accepted by end users. It is noted, Page 13, para 8, that during the Kalstø project the DCS incidence of the NDTT was 0.18%, but because this information is not available scientifically nor published under pear review, this reference data cannot be considered as relevant.	those reporting diving and incidence data from Comex decompression procedures. We recognize these publication and review shortcomings but disagree on the position that operational experience should be ignored or considered irrelevant unless presented formally in a scientific paper. On the contrary we believe they should be considered and accepted with due diligence for relevant bias. We, and others, have discussed important reporting biases such as underreporting of symptoms, concealed DCS treatment, inaccurate reporting of diving profiles and the fact that many reports on operational experience simply state that "x cases of DCS occurred in y dives" without detailing the profiles of the dives.
		Jean-Pierre Imbert	<u>Tables proposed in the NDTT</u> The NDTT contains various set of tables, put together at different times,	We agree on most of the facts written here (historical background of the tables and different underlying algorithms).

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			by different persons, from different sources. In particular: • The Air standard tables were derived from 1979 Royal Navy tables to which multiple empirical adaptations have later been added. • The Sur-D tables were directly copied from the US Navy diving manual. • The TUP table have been adapted from the US Navy Air-Oxy in-water decompression tables under the sole responsibility of the authors of the NDTT. The NDTT are not the result of computations of a unique algorithm but rather a patchwork of algorithms and experiences. Algorithms are mathematical models that have the capacity to transfer the experience from one validated area to the other. Using one single algorithm (as for the DCIEM or the MT92 tables) is important because it introduce homogeneity. There are situations when this homogeneity is important.	We completely disagree on the proposed importance of algorithm homogeneity. Although the NDTT has been used for more than 40 years we have yet to hear of any diver or diving supervisor requesting to convert from an in-water decompression to SurDO2 decompression during the dive. The dives are sometimes planned as "no-decompression" dives but due to unforeseen causes changed to an in-water decompression dive. We respectfully disagree on what we consider a constructed and operationally irrelevant transition from one type of decompression to another. Like Royal Navy, French, DCIEM and USN the NDTT has a heritage. We have argumented that they perform with what we consider an acceptable DCS incidence. Others may decide on another risk acceptance. We do of course respect that decision; we still consider the NDTT to perform satisfactory. Using one algorithm for all diving procedures does not by itself qualify for safety. Modification of algorithm parameters may allow the procedure to be safer – or less safe – than other alternatives. We are focused on estimated DCS probability, heavily leaning to the USN probabilistic models. As argumented in our report, we believe probabilistic modelling to

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			Consider that for a given dive exposure, Standard tables and the Sur-D tables do not have the same first stop depth (because they are issued from different algorithms) and imagine a diver who started his decompression with in-water stop and now faces an emergency situation that requires him to switch to a Sur-D table. Which Sur-D table is he going to use? It would be more efficient for the diving industry if the NDDT tables were containing only US Navy tables.	have the benefit of better prediction accuracy than what can be extrapolated from operational experience.
		Haukeland University hospital (HUH), Dep. of occupational medicine, Norwegian Centre for Maritime and Diving Medicine and Section for hyperbaric medicine	*A general problem with NDTT is the absence of good and preferably scientific documentation supporting suggested changes. No list of references is enclosed.*	NDTT is an operational procedure, not a textbook and not a scientific publication. The volume of these tables will make them impractical if each advise should be substantiated by references. No other diving manual, as far as we know (including the most authoritative USN Diving Manual) holds scientific references. In addition, we refer to our response to Ole Martin Haugan below.
		Technip FMC (Andy Butler, David Scott)	Due to the multiple areas this document is aimed at both on shore and offshore it is very hard to separate relevance for our area and makes the document hard to navigate	The document has been intended for use in Norway, for in-shore as well for off-shore diving. Users may prefer to use only parts of the document within their procedure(s).

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		Technip FMC (Andy Butler, David Scott)	There is common agreement that standardisation is good for instilling best practice and consistency into process and removes commercial gain. Normal practice is that you take the highest standard, however, in this instance we feel that where a diving contractor has a proven track record for safe surface diving which all of its personnel are fully familiar with and has been audited by the clients we should not be switching to instructions which have multiple variances in operational and emergency use. Both TFMC and SS7 are expected to change to another set of instructions when diving in Norway and then revert back when working elsewhere.	Our objective is not to force anyone to use a procedure with less safety than acceptable. We see no problem using a standard (e.g. another table) that has at least as good safety performance as the NDTT. However such compliance measurement is beyond the scope of this document. We provide a *minimum* standard for what we (the editorial team) consider acceptable.
iv		Technip FMC (Andy Butler, David Scott)	Unusual to start a document with a contingency flow chart, and there is no info on whether its onshore offshore or diver at surface or depth.	This is due to the fact that this document primarily was developed as a book. It was intended to read as such. This flowchart is on the inner binder of the book. The book is usually present on the dive site (dive control) by Norwegian in-shore diving contractors.
			As noted previously the document is not user friendly due to it trying to encapsulate all diving methodology. There is an offshore section	The readers of this book are primarily Norwegian divers and in-shore diving supervirors. They get training in the use of this book during basic diver training and

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			however, there is a lot which has to be captured elsewhere for compliance	top-up training later on. The book is not targeted to the diving manager of off-shore diving contractors and we can understand their frustration. However, the present structure seems to meet the operational need for a large proportion of Norwegian in-shore diving contractors.
		HUH (see abbreviation above)	*The claim that «Data suggest that diving for successive days has an acclimatizing effect» is based on interpretation of poorly designed studies with other objectives. It is still a desperate need for systematic registration of diving exposure and a program for health surveillance of occupational divers. Until firm scientific data proof the opposite, we believe that a reduction in nitrogen load is the best way to avoid decompression illness.*	We are aware of this objection. Our position is based on a systematic review of previous studies with valid outcome measures (DCS and self-reported health). The review has been peer reviewed and published scientifically in a peer reviewed manuscript. The manuscript has not been disputed in the scientific literature. Norway is presently the only nation recommending a day off diving after three successive days of diving. We believe that the present state of knowledge should oblige those *recommending* a multiday break to prove that multiday diving will sensitize rather than acclimatize for DCS. This should either be done by providing new data substantiating the claim for a multiday break or to demonstrate flaws in methodology in the published systematic review.
		Kjartan Alnes (Tehcnip FMC)	*The tables still recommend the most shallow stop at 3 meter. NDTT is based on USN, but USN has 6m as the shallowest stop. Why continue recommending 3m stop? The text*	Decompression with the shallowest stop at 6m has the obvious benefit of exposing the diver to less swell. The disadvantage is that the decompression is less effective (a longer decompression time is required to reach the

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			recommends SurDO2 to allow deeper in-water stops. A safety stop is recommended at depths 6-3m. It would probably be safe to adjust the last stop to 6m? A 6m stop is commonly practiced in other parts of the world.	same safety against DCS). The NDTT are based on Royal Navy Table 11. USN has published tables with the shallowest stop at 6m, but these tables stipulate significantly longer decompression time – with a marginal improvement i DCS probability – compared to NDTT. We would rather recommend use of Nitrox 36 (or higher) which will allow for a 3m downward shift in the staged decompression stops.
		Kjartan Alnes (Tehcnip FMC)	*Why isn't decompression with in-water Nitrox breathing described such as 50/50 or 100%?*	The main reason is that no request has been received for such procedures so far. However, the TUP tables can be used for breathing 100% O_2 at the in-water decompression stops.
		Ole Martin Haugan	*Which scientific studies substantiate the proposed changes?*	We take the initiative to text changes based on feedback from the users and new knowledge (including scientific studies) that we (the editorial team) are made aware of. An important objective of the hearing, before a new revision is published, is to receive suggestions for text changes whether this is substantiated by new knowledge or objections to our interpretation of existing data. Further comments are given to HUS above.
		Industri Energi (Offshore workers trade union)	*Our opinion is that there should be a requirement for risk acceptance such that there is no greater acceptance for for short- or long-term injuries related to the diving tables than*	The question of risk acceptance is a matter relevant for all stakeholders. Our position is that the risk for DCS using NDTT should be in the range of 2-5% which is within the

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			those accepted for workers in the surface based industry in general.	range expected for decompression tables from e.g. US, France, UK and Canada
		Industri Energi	*Concerning the suggestion to remove the multiday-break (one day off diving after three successive days of diving). Industri Energi has received a number of feedback messages from occupational divers and diving supervisors. Some of these messages state that they don't recognize the claim the statement that acclimatization will be reached if the multiday break is removed. Other concerns are related to divers' need to be restored.* *It is claimed that there is no professional reason to maintain the multiday break. At the same time we will claim that there is insufficient professional reason, scientifically documented, to remove the multiday break. We miss a register holding thorough and systematic registration of exposure as well as outcome/experience of the diving. We don't know how the tables are used practically by Norwegian divers. In particual, it is our experience, that there may be three dives per day with*	We have commented on the question of multiday-break earlier in this document.

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			diving depth being varying during the course of each dive. Strenous dives is an objective, but at the same time, subjective assessment. *"Sawtooth diving", that frequently takes place within aquaculture, is not comparable to dive profiles with a square dive profile.* *It is claimed from some industrial representatives that continuing the practice of a multiday break will increase DCS risk. Should a time penalty be added to the actual bottom time until acclimatization is reached? For how long time will a diver be acclimatized after finished diving? If there is a break in diving exposure, should a time penalty be added to the bottom time?* *We will strongly warn against the suggestion to remove the multiday break until there is sufficient exposure and outcome data, psychosocially as well as physiologically, assuring that such a praxis could be recommended.*	
			We observe that there might be a high N2 and O2 exposure if the TUP tables are used to their limits. We question whether there is sufficient scientific knowledge to establish	We have in a series of scientific papers documented how diving-related hyperoxia should be monitored to allow estimation of pulmonary oxygen toxicity. We have provided guidance on the limitation of

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			acceptable endurance for high O2 exposure over long time. Have the tables considered the fact that they may be used with maximum O2 exposure followed by trailing O2 load if so needed?	hyperoxia in the SUP and SurDO2 sections on how to avoid pulmonary oxygen toxicity. We have considered the fact that treatment tables – with a high hyperoxic load - may follow SurDO2 and TUP dives.
		Deep X, Barotech, Marinmed	*It is specified that though the tables are expected to give a 2-5 % probability of DCS based on scientific studies, the operational incidence would be in the order of one tenth of this (0.5-0.5%) due to the fact that the dives are not completed to the end of the table bottom time, decompression is made more conservative and (under-)reporting bias.* *We are in general sceptic to the assumption of 2-5 % as well as 0.2-0.5 % probability. Our doubt is motivated by the fact that there is no analysis of operational dive data confirming the probability figures which could be connected to verified DCS cases.*	We have developed operational decompression tables. A scientific review of the statistical data for table safety is beyond the scope of our work. We have elaborated a summary explaining how we reached these esitmates. We have prepared a similar document as part of our preparation of the fourth edition of the NDTT. You may download the document here (Go attachment 1 – Norwegian text only). It would be easier to comment on the criticism if you could comment errors or misinterpretations in the document.

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		Deep X, Barotech, Marinmed	*Standard tables. The authors have received a proposal to include an equation allowing bottom times for no-decompression dives within the 3 msw ranges listed as table depths.* *There are some old and simple rules allowing calculation of maximum bottom times for no-decompression dives. We dissuade against their use. The 3 msw table depth stages allow a safety factor that should be retained.*	
		Deep X, Barotech, Marinmed	*We have removed the previous recommendations on a multiday break after three days of diving. Data suggest that multiday diving has an acclimatizing effect (Rev H)* 1. *There is no detailed analysis of present operational practice regarding multiday break.* 2. *If the recommendation of multiday break is removed, and if tools for data analysis of diving data is made*	We have commented this above. We have discussed and defended our position in a scientific paper which hasn't been disputed (commented) in the scientific litterature.

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			available later, it will be impossible to compare new and previous practice. 3. *The consequences of a liberalization without alternative restrictions seems irresponsible, in particular considering the present lack of tools available for analysis of operational data.* 4. *It is our position that the presented data is not sufficiently representative to draw conclusions on acclimatization. For instance, the term "excursions" is not defined and the effect of these are unknown.* 5. *We are only aware of one project (Hades 1987-1997) that will handle this problem. More work was done after the published manuscript. The project was not finished as planned, but the principles for this work could serve as a template for future work.*	

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		Deep X, Barotech, Marinmed	*One should make a summary of all substantial changes done since the parent document (NUI Report 30-80)*	We notice the use of personal pronoun («one»….). NDTT is developed on a voluntary/unpaid basis. Even our present practice force us to put down a significant effort and workload in each revision. Since the third edition we have described changes on our website. We don't have sufficient resources to complete the additional work as suggested (though we support the intention). Nevertheless, we believe that revision history as presently published on our website makes this information available though this information requires the reader to trace changes for each individual edition rather than reading a grand summary in one document.
		Deep X, Barotech, Marinmed	*The information in NDTT should differentiate better between occupational and recreational diving. For instance, a) How the company diving doctor should be included in the alerting of an emergency b) requirements for use of companyprovided recompression chambers.*	The authors have defined the primary objective of NDTT to provide updated decompression and treatment tables for surface-oriented diving. The document has expanded beyond this primary objective during past revisions, but we want to hold back on further expansion of new topics traditionally covered in company-internal diving manuals or regulations. We do agree that the questions addressed should be covered in the diving manuals, but we we consider them out of scope for NDTT and we will presently not include them as new stipulations.

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		Deep X, Barotech, Marinmed	*The work placed down by the NDTT editorial team is impressive. We are not aware how this work has been economically compensated. We do believe that the diving industry is rewarded by the work. It might be appropriate to consider the formalities related to responsibility and financing. We would like to mention that Deep X, in co-operation with Barotech and Marinmed could contribute in further detail, but it would not be appropriate to do this on a pro bono basis.*	We appreciate the recognition of our unpaid work. The work done on NDTT is done for the common good outside office hours. We would welcome suggestions for formalizing the future authorship and upgrading of NDTT.
		Deep X, Barotech, Marinmed	*The fact that the experiences with NDTT are «good» may possibly be due to the fact that additional safety measures have been added such as consideration of temperature and work load. Data on how these tables have been used operationally are largely missing. I would recommend to delay revision until such data is available. I neither can understand why there is such a hurry to remove the multiday break before such data is available.*	We fully agree that more data would allow further improvement of the tables. Our principle is to revise the tables once we are aware of new knowledge that should impact the contents. We have done so this time as well. We understand that there may be different opinions, but lack of knowledge on none area (e.g. insufficient data on operational diving) can't be a reason for delay on revision of other areas (TUP diving, multiday diving, oxygen toxicity). We have commented on the question of multiday break above. We have provided our advice based on scientific criteria. A worthwile discussion will require the

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				oppononents to adress the deficiencies or errors in the scientific work. Other changes in this revision are related to TUP-tables and new knowledge on monitoring of hyperoxic exposures.
		The Norwegian Society of Underwater Contractors (NBU)	*<u>Standard tables</u>* *The authors have received suggestion to include an equation allowing estimation of allowed bottom times for diving depths within the 3 msw standardized table depths. For instance: A dive to 15 msw table depth would allow 90 min bottomtime for a no-decompression dive while the allowed bottom time for 18 msw would be 60 min. Through linear interpolation you could suggest a bottom time of 80 min for a 16 msw dive (in contrast to 60 msw which would be the case today). The authors have not taken any decision in this matter and we would appreciate to learn whether there is an operational request for tables with 1 msw intervals for no-decompression dives. Please contact us if you have an opinion in this matter!* *<u>NBUs coment:</u>* *We (NBU) don't see any need for tables with 1 msw table depth*	We appreciate the clarification. We agree with NBU and we will not introduce any routine for interpolation of decompression procedures for diving depths within the fixed 3 msw table depth intervals.

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			increments for no-decompression dives.	
		Norsk bransjeforening for undervanns-entreprenører (NBU)	(Cited from the editors summary of changes): *We have removed the previous recommendation of a multiday break after three successive days of diving. Data suggest that multiday diving has an acclimatizing effekt (Rev H).* *NBU comment* *We (NBU) support the decision to remove the recommendation of multiday break.*	We appreciate the advice.
		PTil	*Could the examples be moved to the website*?	Such a measure would reduce the number of pages. We are presently in doubt whether this would affect readability. We will retain the examples in the 6th edition, but we will investigate this in more detail in the future.
Preface				
		Technip FMC (Andy Butler, David Scott)	Change "book" to document	Not at this stage. This text has been elaborated for the book format. We allow sharing it free of charge through PDF, but that is not the primary format of the contents.
Introduction				
		Technip FMC (Andy Butler and David Scott)	This is where there is an option to include text on diving contractors	We agree that other procedures may give equal or better safety, but given the fact that we produce one procedure rather than

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			using their own surface instructions with the required caveat's	governmental regulations or industrial standards we find this beyond the scope of work.
1	4	Technip FMC (Andy Butler and David Scott)	Reword to state that its uncommon when used in conjunction with Sur DO2	No. Nitrox combined with SurDO2 has previously been common in Norway. (SurDO2 is less common now due to bottom-time limitations)
1	5	Kjartan Alnes (Technip FMC)	*Introduction serial 5, Standard Air Decompression Table serial 17 and oxygen toxicity serial 3. Relationships are demonstrated and the responsibility of the dive supervisor clarified. For this to allow understanding and interpretation you should consider to include (Standard Air Decompression Table Serial 17) even work with rotating and vibrating tools such as chiesels, rotary hammer and others as well as vibrations from activities nearby.* *Common sense suggest that shaking a soda bottle for a longer or shorte time will release more gas bubbles than a gentle conventional opening. This is mentioned with oxygen toxicity. Why is this not a real risk and identified as a risk factor for the diver working with rotating or vibrating tools?*	Immediately it may seem that working with vibrating tools may be a risk factor for DCS. There are however no studies on this potential concern. It should be recognized that the diver's exposure to vibration takes place during the bottom phase when inert gas is diffusing into the tissues. The diver is thus not exposed to vibration during the sensitive period of decompression and offgasing. It has been published two studies (Germonpre et al 2009 and Balestra et al 2016) demonstrating that whole-body vibration *before* diving reduced venous gas embolism *after* the dive. No studies have been published on the effect of vibration imposed during the bottom phase, but the hypothesis is actually that vibration may release bubble nuclei that otherwise would be the source of gas bubbles during decompression. Vibration *before* decompression may theoretically reduce the risk of DCS! However, working with vibrating tools *after* decompression may

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				possibly increase DCS risk since vibration potentially may release bubbles.
2	8	Phil Bryson	*(Third sentence.)* This is very small and as I expect but then this is very different from what is claimed elsewhere.	We have cited the numbers reported by the industrial body NBU.
2	8	Phil Bryson	*(Last three sentences.)* There is a difference here between 1) unreported Signs and symptoms of DCI with either no treatment or self treatment and 2) declaring, being treated but the company does not notify the treatment.	We agree, but we have no means of quantifying these numbers.
2	9	Phil Bryson	*(Overstriked "PRT").* Is there an abbreviation list somewhere?	Presently no. One reason is the intention to avoid expanding the number of pages.
3	12	Phil Bryson	*(First two sentences.)* How does this work with point 8 above where you say the risk is 0.05% per hour when using Norwegian tables? 2-5% DCI rate is high and certainly I do not see this in the companies I work for.	We can appreciate the confusion, but this question is further detailed on page 4 serial 15 (as mentioned below). The 2-5% incidence estimate is based on the USN probabilistic model. The model has been validated against a large number of experimental dives. Observed DCS incidence will be many orders less than 2-5% for reasons described in serial 15. Please consider our supplementary document on DCS probability estimation.
4	15	Technip FMC (Andy Butler and David Scott)	Due to the level of under reporting noted is the data sufficient to back up the % used for probability of DCS	Please see our comment directly above.
4	15	Jean-Pierre Imbert	There is a confusion between:	We believe we have explained this in the text. The PSA and Norwegian Labour

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			• The definition of exceptional dives, marked with "*", that should not be planned. • And the depth / bottom time limitations of the PSA, that should not be exceeded. In some tables, the limit defined by the "*" and the solid black line do not correspond. Which limit is to be used?	Inspection Authority have imposed a bottom-time limitation. We don't agree on that decision, but we don't consider it appropriate to discuss the relevance of bottom-time limitations within the document. The reader is informed that no dive should be planned to exceed the bottom time limitations presented with a thick, bold line in the tables. Some procedures have an exceptional high likelihood of DCS (pDCS 5-6 %). We dissuade against planning such dives – irrespective of whether the bottom time is allowed or illegal according to the legal regulations.
4	15	Phil Bryson	*(First sentence).* Again the most recent Norwegian tables give an incidence way lower than this as outlined in Point 8 - so I am confused. Also why should tables produce a 10 fold higher DCI rate when tested scientificaly - I may have thought the opposite - ie in the "field" these tables may be the subject of much battering , where as in scientific situatiosn they will have exactly the right times, ascent rates and so on.. You also make it clear in point 8 that the "number of such unreported treatments are small" there is a clear	A detailed discussion on decompression table DCS probability is beyond the scope of the NDTT but we would welcome an informal discussion on this topic later. In the mean time consider our supplementary document.

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			difference of course between unreported symptoms and signs and no treatment or self treatment and those who reported and were treated but the treatment was not declared.	
4	15	Ole Martin Haugan	*What is the basis for the claim that tables in operational practice never are dived to the limits, that decompression is done more conservatively than prescribed and that this will allow the probability for DCS to be 1/10 of the statistical estimate? Underreporting is probably something we don't know? Sretching tables, under-reported DCS.*	We conclude as a fact that observed/reported DCS incidence for operational diving is in the order of 2-3/1000 dives (Shields, Imbert, PTil/DSYS m.fl.). The incidence of DCS in experimental verification dives (USN) is in the order of 2-3%. We suggest that this difference may be due to inaccurate reporting of operational dives as has been suggested by others (Arntzen, Sterk, Imbert).
4	15	Ole Martin Haugan	*In the section "Introduction" it is claimed that tables for all practical purposes never are dived to the margins and that decompression is done more conservatively than prescribed in the tables. Itt seems that this is suggestion to relax thresholds/limits and to allow these to be exceeded in som cases?*	No, it is absolutely not our intention to suggest that the tables should be used more liberally or that they should develop in a more liberal direction. Table depths and bottom times are limits not to be exceeded.
Standard Air Decompression Table				
		Jean-Pierre Imbert	It is explained that the NDTT tables were initially designed by Mr. Arntsen and Dr Eidsvik based on some algorithm derived from the	Whether the Royal Navy (Hempleman) algorithm has been considered published depends on the extent of information required. The fourth edition of Bennett and

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			Royal Navy (up to our knowledge, this algorithm has never been scientifically published). It is also explained that empirical modifications have been later introduced in the Standard tables. One of the last modifications was to replace critical tables corresponding to deep and/or long exposures by US Navy rev7 tables. The NDTT Standard tables are not consistent between themselves because they are not computed by a single algorithm. This can be easily seen by comparing tables such as 24m/80min and 24m/85min which present abrupt change in stop time sequences for only 5 additional minutes. The problem of this non-homogeneity is related to line separating the influence of the various algorithm, which is obviously empirical. It could be that a company is awarded a job requiring a combination of bottom depths and times on the border line that discovers that the line should have been moved.	Elliott holds the basic description of the diffusion-limited gas transport which is the core of the algorithm, but we agree that further details have not been published scientifically. We agree that the NDTT standard tables are not "consistent between themselves" since they are not computed by a single algorithm. Our approach has been to present tables that for non-exceptional dives should have a p_{DCS}<5%. (And to repeat: "p_{DCS}" means predicted DCS incidence, not observed DCS incidence). We are criticized because we introduce a supposedly excessive extension in total decompression time (TDT) (25 min increase from TDT 40 to TDT 65) by increasing bottom time for the 24 m table from 80 to 85 min. First of all: We consider both of these bottom times exceptional and they should not be planned for. Our reason for instructing this long extension of the TDT for the 85 and 90 min bottom time was to achieve a p_{DCS} <6 % (4.8 and 5.1 % respectively). We don't share the scepticism for exponential rise in decompression times for bottom times not to be planned for (i.e. dives

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			International diving companies operating in the Norwegian sector must be authorized to use their tables, which are consistent between the various decompression methods, and have documented safety performances.	with unacceptable long decompression times or high p_{DCS}). TDT for non-exceptional dives increase almost linearly as a function of bottom time. The question of international diving contractors' use of other decompression tables is beyond the scope of our procedures.
8	15	Technip FMC (Andy Butler and David Scott)	Thought to be given to adding sample diagrams as the samples are very text heavy	***We agree***. The document is VERY text heavy. The reasons for not including more graphics are twofold: Elaborating figures is time consuming. The work on this table is done outside office hours (unpaid) and that restrict resources. Secondly the book (yes – it is a book) is now closing in on 150 pages. The first edition was 70 pages. We have to carefully consider any new additions as we want to avoid making this book unreasonable large.
9	17	Kjartan Alnes (Tehcnip FMC)	*See «Introduction» page 1 serial 5*	See «Introduction» page 1 serial 5
9	19	Technip FMC (Andy Butler and David Scott)	Add text to clarify that for no top tables and standard air tables diving on consecutive days is permitted, however, when diving on TUP or Sur DO2 ESOT will define requirements for rest days	But this text is written specifically for air decompression tables. We have explained the reasons for multiday break in the appropriate sections for SurDO2 and TUP tables. We don't want to include information related to other procedures in this section.
9	19	Phil Bryson	So - do you have laws that prevent a diver diving every day for some weeks? My view would be that a diver needs to have 1 day off every	It is not a formal law/regulation but NORSOK U-100:2013 subclause 9.1.2.3 require a day off diving deeper than 9 msw

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			after 6 days of diving - a rest day both to help full off gassing and to support a diver's rest..	EAD after three successive days of surface-oriented diving.
9	19	Ole Martin Haugan	*What data suggest that diving for consecutive days has an "acclimatizing effect". Is it valid research substantiating this claim? The present practice with a multiday braek has worked fine for many years. Is this is a suggestion from diving contractors or clients? It is my opinion hat this may impact the divers wih more strain.*	The proposal for this change arose within the editorial team during work with the 4th and 5th edition. The "industry" has not been part of the initiative. As part of the development of the 4th ed we discussed which factors other than time and depth that could influence DCS risk. Previous editions of NDTT claimed at the time that multiday diving could be a risk factor, though we were not aware of scientific studies confirming this. In a recent work (Risberg 2021) it is shown that multiday diving either doesn't affect DCS risk or that it may show an acclimatizing (risk-reducing) effect.
20	20	Jean-Pierre Imbert	There is a confusion between: • The definition of exceptional dives, marked with "*", that should not be planned. • And the depth / bottom time limitations of the PSA, that should not be exceeded. In some tables, the limit defined by the "*" and the solid black line do not correspond. Which limit is to be used?	See our comment to the very same question in section "Introduction"
Flying after diving				

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14	4	Phil Bryson	*(Second sentence)* Is this manual also for recreational diving? I am getting confused.... :-)	We believe the advice to recreational divers on refraining from diving the last day before flying was sound. However, we agree that this advice is outside the scope of the document and it has been removed.
14	5	Phil Bryson	Out of interest why not simply refer to DMAC 07. You have refered to DMAC guidance in point 7 below - so why not here? is it because of the type of diving being done in Norway and its mountainous regions??	The guidance reflects the fact that guidance of Norwegian hospitals may deviate from that being provided in DMAC 07 and we want the readers to be prepared for this fact.
15	7	Phil Bryson	*(Last sentence.)* This is surely DMAC 07	Corrected
15	7	Colin Goff, JFD	Page 15 para 7 it mentions **Flying after DC**I. Whenever a diver has suffered DCI etc etc etc, DMAC has published a guidance note for this purpose (DMAC 13). DMAC 13 is - Fitness to Return to Diving after Decompression Illness DMAC 07 is - Flying after Diving: Recommendations (which incorporates flying after DCI) I am wondering if you have shown the incorrect reference.	Inaccurate reference to DMAC Guidance note. Corrected as suggested by responder.

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15	8	Phil Bryson	*(Last sentence, under the table)* Does this link with DMAC 07? I am not sure it does.	The table does not link to DMAC 07, it is mainly based on the USN Diving Manual guidance.
15	9	HVL/DU	*Waiting time should be adjusted to avoid that the same number exists in two columns (601-1000 a.s.o.).*	We agree on the principle, but this has no practical relevance. The table is easier to read by presenting the limits in ten-meters interval (avoiding "1" or "9" as last digit). We retain the structure to facilitate readability.
Multilevel diving				
18	4	HVL/DU	(Second bullet point) *Should this be calculated manually or should the dive computer's advice be followed? The regulation concerning the performance of work § 26-30 a. says both.*	Our multilevel-tables have been designed for use independent of dive computers. The comment nevertheless draws attention to an important regulatory requirement which has not been described satisfactory by us. We have now adjusted serial 11 in the same chapter to ensure that the reader better can understand the regulatory requirement to ascend to surface before the dive computer calls for a decompression stop.
18	6	HVL/DU	*Is this procedure dependent on how much (how long) the time at the depth level has been exceeded?*	It is not our intention to state that an extension of time at any depth level is allowed. We simply wanted to explain how the diver and dive supervisor should handle an unplanned situation when stay at any depth level has been exceeded. In such cases the dive should be completed adhering to conventional air decompression tables with appropriate in-water staged decompression stops. Thirty minutes of oxygen at surface

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				pressure should follow as an extra safety measure.
19	12	HVL/DU	*Should the dive profile be administered by the diver by means of communicating dive computer information to the dive supervisor? The dive supervisor will only have access to the digital depth monitoring system (same chapter page 21 serial 13 and 15) and The regulation concerning the performance of work § 26-30 b?*	Another highly relevant question that should be answered by the Norwegian Labour Inspection Authority rather than us. Our interpretation is that the diver should monitor his dive computer and regularly report remaining «no-decompression time" to avoid in-water staged decompression stops. We would assume that reporting other depth or time info from the dive computer to the diving supervisor may introduce conflicting values and ambiguity rather than be supportive of a safe diving operation.
Multilevel diving				
21	11	Phil Bryson	This is great - my understanding may be incorrect but do many of these computers now comes with the ability to switch risk level.... not sure but worth checking may be. You refer to this in point 10. Thus great care needs to be taken.	We agree, conservatism can be added manually for most of the dive computers. However, we have no means of providing guidance on how this guidance should be adjusted.
21	13	Phil Bryson	Of course here you ask for this type of data - which is verly logical but it may be worth pointing out that it may differ (even if slightly) from the Pneumo based as the divers lower chest that could be monitored by the supervisor in real time - of course I	We agree that pressure reading from a wrist-worn dive computer may differ from the pressure read at the inlet of the pneumo hose at chest level, but the difference here is many, many orders less than the underlying accuracy in p_{DCS} prediction of any present decompression tables.

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			would expect the computer to be wrist mounted - but...	
Dive computers (This chapter has been removed)				
22	6	Phil Bryson	This is written in a very personal manner - ie your, your etc not the diver ... most of this manual is not personal. Also i get confused when there is a mix of recreational and commercial stuff - yes the commercial industry can learn learn from the recreational one and visa versa - I am just concerned that this manual is a mix of recreational and commerical ... which may be fine but ..?? May be it might benefit from being more divided?	The text has been adjusted to remove the personal and verbal phrasing.
23	9	Phil Bryson	So how does this work in a commerical diving setting when you may have 2 divers in the water..	
23	10	Phil Bryson	This means a diver can change his tables ... Not sure if this is clever in commercial diving ..... for all sorts of reasons. But this is/may be covered in point 11 I suppose...	
23	12	HVL/DU	(Last sentence "In such cases one should comply with the decompression procedure advised by the dive computer even if the total	This advice is applicable for all dive computers, independent of algorithm.

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			dive time is shortened compared to what the decompression table prescribe.") *Does this apply for all computers, or only those adhering to RGBM, Bühlmann or Thalmann algorithms?*	
Diving Related to Oil and Gas Exploration				
24		Technip FMC (Andy Butler and David Scott)	Rename to " Offshore Energy"	Agreed.
24		Phil Bryson	*(Overstriked "Oil and Gas Exploartion" in the title.)* is the the latest way this sector is refered to??	See comment above
24	3	Technip FMC (Andy Butler and David Scott)	To align with final revision of U100 Rev 6	We will – once NORSOK U-100:2024 goes public.
24	3	Jean-Pierre Imbert	Multi days diving One paragraph explains that clause on multi days diving has been suspended. The other paragraph states that "the dive program shall be designed to ensure that the diver has one calendar day without diving for every 3 days of diving". Which one is to be used?	We understand the reviewer's question, but this paragraph explicitly discusses offshore diving adhering to NORSOK U-100. The latest edition (NORSOK U-100:2023) has preserved a slightly modified statement on multiday-break.
Oxygen Toxicity				
26		Jean-Pierre Imbert	The NDTT document should be consistent with the recent UHMS publication of the author: Hyperoxic	Thank you for referring to our 2022 manuscript. In the mean time we have published another manuscript with a third manuscript prepared for submission Q1

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			exposure monitoring in diving: A farewell to the UPTD. Jan Risberg, PhD, MD [1]; Pieter-Jan van Ooij, PhD, MD. The Ran Arieli's index should be mentioned instead of the elusive ESOT.	2024 arguing for the use of ESOT. ESOT has likewise been recommended by DMAC (DMAC guidance note 35).
26	2	Phil Bryson	You do not clearly state that there may be no prodrome at all. Is it worth saying this?	We believe that the current text "Some divers may get warning symptoms.." encompasses this fact.
26	4	Phil Bryson	*(Last sentence)* Is this "do develop" or "may develop". Has recent research supported the old research or is there still some debate on this issue. I am not sure the Elthi study found any issues for example	Agreed – may develop is correct (and text is adjusted)
27	7	HVL/DU	(Second sentence: "These indices are still used, but they are inaccurate and should be replaced with ESOT(Equivalent Surface Oxygen Time).") *Should this statement be replaced by shall replace?*	NDTT is a recomennded procedure, not a regulation. We try to avoid "shall" as far as possible.
27	9	Technip FMC (Andy Butler and David Scott)	Further clarification on factoring in divers who are working on different profiles each day and ease of calculation for offshore supervisors.	We understand the need for clarification, but more examples carry the burden of additional pages. DMAC 35 provide further details for those responsible for ensuring compliance with our occupational threshold limits. We believe that serial 18 in section

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				SurDO2 and section 14 in TUP will address the vast majority of concerns.
27	9	Phil Bryson	You are really allowing your norwegian divers to be pushed to the limit. Won't this allow abuse of divers...	We fully respect that there may be different opinions on the allowed threshold limits for multiday hyperoxic exposure and there is no consensus on this question. We have based our advice on review of the scientific literature.
Nitrox Diving				
29	6	Jean-Pierre Imbert	The rationale behind a 1.5 bar max bottom PO2 and a 1.6 bar max deco PO2 should be explained and documented, at least in a justification document.	We agree with this. A justification document is in place, but the work responding to comments on this 6th edition was exhaustive. We simply don't have the resources to start yet another elaborative process. For the time being we have to limit our comments to state that we have reviewed the literature, absence of reported cases of underwater seizures in Norwegian commercial diving and the fact that these tables are intended for diving to max 50 msw. The pO_2=1.5 bar has been retained since the original version of NDTT. We don't claim that these short sentences should be accepted as "justification", it is merely a notion that we are aware of the disparity between NDTT and IMCA advice on this topic.
29	6	Phil Bryson	This is not current Guidance from DMAC or IMCA.	We are aware of that fact, our advice is based on our national experience and more importantly on our review on the literature on this question.

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30	7	HVL/DU	(Third sentence: In surface supplied diving, provisions must be made to allow an instant gas switch to air.) *Is this procedure Norwegian only. Can this be avoided by establishing a fixed threshold limit?*	This question is pending further clarification from the respondent. We advise to change breathing gas to a less hyperoxic, usally compressed air, breathing gas in the cased of suspected acute oxygen toxicity. Acute oxygen toxicity may develop in the event of inappropriate gas mixing even if a "safe" threshold limit has been established.
30	7	Phil Bryson	I have a concerns with this para. We need to be clear whom we are dealing with in terms of divers - recreational on scuba or commercial wearing a hard hat - there is a lot of difference. Then of course you may have the fish farmer - commerical but on scuba. I would not underestimate the risk of Pulomonary Barotrauma - but of course if the diver's mouthpiece has dropped out then... It appears this bit of guidance is being written for the mainly scuba orientated diver...	No, this section is written for the commercial diver – recognizing that these very often (but not always) use hard hat or at least full-face masks. We do however consider the risk of suffocation during an underwater seizure higher than the potential consequences of a pulmonary barotrauma or DCS secondary to a rapid ascent/extraction to surface. We have discussed this in a scientific manuscript *relevant for military diving* earlier, but we consider the arguments equally relevant for commercial diving.
30	7	Technip FMC (Andy Butler and David Scott)	For offshore diving the use of diving helmets negates the risk of drowning and therefore this instruction goes against industry best practice where the diver should be restrained until the tonic stage has passed prior to surfacing. The greater risk is	See comment above. We disagree. Though a helmet most likely will protect against drowning it will not protect against suffocation due to a compromised airway (strangulation, aspiration). If the reason for seizures is hypoxia, delay will worsen.

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			embolism due to the diver not being able to exhale during surfacing.	
30	9	Jean-Pierre Imbert	A tolerated variation of the nitrox oxygen percentage corresponds to a tolerated error in the selection of the table. It would be preferrable to describe a procedure with two entries: • A nitrox mixture with 32 to 35% oxygen is to be considered as a nitrox 32 • The maximum bottom PO2 must not exceeds 1.5 bar That would be always on the safe side.	First of all thank you for notifying us on this subject. We notice that the present English text was ambiguous, and the sentence has been rephrased. We agree that a conservative approach would be to calculate EAD based on a lower FO_2 than the actual content of the Nitrox blend but always ensure that pO_2 subceeds the maximum allowed level. Our approach to this has been to publish EAD and pO2 tables on our website for use with non-standardized mixtures.
30	10	Jean-Pierre Imbert	This paragraph is particular obscure and difficult to understand. What is the issue? Could it be written in a better way?	We have tried to explain that if you dive with a Nitrox blend with at least 36% O2 you may do the decompression stops 3 msw deeper than that stipulated in the tables (without affecting inert gas offloading).
30	10	Technip FMC (Andy Butler and David Scott)	Nitrox “dives” not divers.	Corrected
Surface Decompression Using Oxygen				
		Jean-Pierre Imbert	Surface decompression using oxygen It is explained that these table are copied from the US Navy diving manual rev 7. This causes two problems.	The comment/criticism seems to underscore that there is a fundamental misunderstanding – or alternative a fundamental disagreement – on how DCS probability should be estimated.

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			The first problem is that the US Navy has published detailed statistics on the safety performances of their air Standard tables but not on the Sur-D tables. The risk of DCS for these tables is undocumented. Page 47, it is stated that the estimated risk should range between 3.5-4.5%. The question is how was this estimation obtained and who published it? The second problem is that these tables are to be used in commercial diving. There are differences in the diving culture that should be considered, as for instance: • keeping the divers on BIBS while decompressing the DDC to surface would be on the safe side. • using nitrox as bottom mix with Sur-D requires a complex monitoring of the oxygen toxicity dose. For this reason, Sur-D is rarely conducted on nitrox in offshore diving. • International diving companies operating in the Norwegian sector must be authorized to use their Sur-D tables, for which they can document	The USN SurDO2 tables are computed out of a deterministic (Thalmann) model. The parameters for the Thalmann model as used in the SurDO2 table (VVal 18M) has been adjusted to ensure an acceptable pDCS as estimated from the two probabilistic model (NMRI98 and BVM). We have shared the relevant references in our guidance document. Yes, breathing O2 on BIBS during surfacing would be on the safe side, but we have opted to trust the probabilistic model, and we consider it highly improbable that a 1 min difference in oxygen breathing time would make a relevant mixture. We disagree on the opinion of absent operational relevance of Nitrox as bottom gas and SurDO2 decompression. This has repeatedly been used in Norway. The fact that it may be irrelevant for offshore diving does not make the procedure irrelevant for inshore diving. The question of "authorization" is beyond the scope of these tables.

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			the DCS risk and good operational procedures	
31	2	HVL/DU	(Sixth sentence: The oxygen fraction shall not exceed 23 %.) *NORSOK U-100 has a limit of 22 %, there is accordingly a discrepancy to offshore standard. Would you consider compliance?*	The 23 % limit has remained unchanged since the first edition of NDTT, we have not previously received any comments on it and our thought was that a 22 % threshold would cause much inconvenience with much ventilation and noise even with small oxygen leakages. We have consulted experienced dive supervisor and learned that there is no practical problem to respect a 22 % threshold value and for this reason we have reduced it (i.e. followed the advice we have received.)
31	2	Technip FMC (Andy Butler and David Scott)	Noted O2 maximum allowable states 23%, but NORSOK states anything over 22% should be classed as Oxygen and equipment cleanliness should align with oxygen clean	Noted, but we can't see reason to adjust the text for this reason (?).
31	6	PTil	It could be useful to add an example an example to explain new elements that are added to the text..	We agree. We have added an example.
32	7-8	HVL/DU	*Serial 7 states that the ascent rate should be 10 m/min while serial 8 states that the diver should use 1 min from 12 m to surface. In that case this will be a faster ascent rate than usual. Is this the case?*	No, it is not our intention to suggest that ascent rate from 12 m should be faster than 10 m/min. On the other hand, we believe we have been cited inaccurately. We have written that the ascent rate should be approximately 10 m/min (Norwegian version, corrected in next draft of English version. We additionally write that the ascent time from 12 m to the surface should

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				be approximately one minute. It is correct that ascent from 12 m to surface with an ascent rate of 10 m/min will last for 1 min 12 sec. But serial 8 is by intention not written detailing ascent rates but rather time (duration) to let the reader understand that the surface interval should be limited to 5 min. We have used italic font to provide the message more clearly.
32	9	HVL/DU	*Should it be written more clearly that oxygen breathing time starts running at 15 m?*	We agree. To avoid ambiguity this is now incerted as a new sentence.
32	9	HVL/DU	(Second sentence: The chamber should be pressurized as soon as the hatch is closed and secured, <u>whether the diver has put on the oxygen mask or not.</u>) The importance of oxygenbreathing during recompression is somewhat unclear	We disagree on this. The first sentence clearly states that oxygen breathing should start immediately. The second sentence simply ensure that recompression should not be delayed in the case diver has any problem donning the BIBS mask.
32	7	Technip FMC (Andy Butler and David Scott)	Define parameters as “minor deviation” is open to interpretation.	Agreed. We suggest that delay in ascent rate to first stop exceeding more than a minute should be added to the bottom time. This is the same procedure we advise for conventional air decompression
32	8	Technip FMC (Andy Butler and David Scott)	This equates to 12msw / min so outside of 10 msw in section 7 above.	We agree, that is why we write “*approximately* one minute”. The difference between 10 and 12 m/min amounts to a time difference of 12 sec to surface. We believe further discussion on such a small difference

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				would add complexity without affecting the safety or how these tables are used in reality.
32	9	Technip FMC (Andy Butler and David Scott)	It is unusual to have the divers breathing chamber atmosphere during the ascent periods and doesn't align with other industry tables.	The NDTT SurDO2 tables are based on USN SurDO2 tables. In contrast to the French (MT92) tables, all oxygen is breathed at 15 and 12 msw. Surface ascent is 10 msw/min (in theory 1 min 12 sec). The diver should be given a 5 min air break after 30 min oxygen breathing. The balance between risk of oxygen seizure vs reduced DCS probability can be debated, but we would argue that a discussion on this topic is largely academic.
33	12	Technip FMC (Andy Butler and David Scott)	Replace "await" with "postpone "or "delay"	Corrected
34	18	Phil Bryson	*(Overstriked "two days off diving" in third sentence*). is this two days off diving altogther or can they air dive as mentioned above?	Air diving is acceptable as well. Thank you for improving, text corrected.
33	10	HVL/DU	(Second sentence: "There should be no air break after the last oxygen session before commencing the chamber decompression.") *This needs clarification. Shall it be a 5 min air break before ascent from 12 m to surface if the last O2 breathing period of 30 min has been finished?*	We have corrected and changed "should" to "shall".
34	18	Ole Martin Haugan	*«A table has been inserted providing a quick overview of dive profiles where use of Nitrox may exceed*	As can be seen on serial 9 in the chapter on oxygen toxicity, a maximum of eight successive diving days are allowed with

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			recommended limits for single dive exposure or call for two days without diving following multiday diving." How should this be understood? Can O2 thresholds be relaxed and thus mandate two days without diving? In that case, why is this wanted?	raised pO_2 if ESOT subsides 420 for each day. Following this, two days without hyperoxic exposure are required. For higher oxygen exposure (higher ESOT) the number of allowed successive diving days are less. It is time-consuming to calculate ESOT. To facilitate the work for the dive supervisor, the table may be used to identify whether a Nitrox TUP or SurDO2 dive may exceed 420. It is not a question of relaxing ESOT-limits, but to facilitate the practical work for the dive supervisor. "Two days without hyperoxic exposure" is introduced to limit oxygen exposure. The advice is not related to the previous recommendation for a day off diving after three successive diving days. The latter advice was given on the assumption of DCS risk reduction.
34	18	Ptil	(Fourth sentence: Each cell in the table will hold the maximum allowed bottom time per day dependent on the number of successive days of diving (first column) and pO_2 (first row).) *"Maximum allowed bottom time". See page 38 serial 14 for TUP stating maximum allowed exposure time. Why this difference?*	Allowed bottom time for $SurDO_2$ is much shorter than TUP. For most exposures the bottom time limitation will restrict even the possibility to exceed the allowed ESOT threshold. A table with total oxygen + nitrox exposure time would not be useful for $SurDO_2$.

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34	18	PTil	Is a number missing in the lowermost row in the pO_2=1.1 bar column	Yes. The table has been corrected.
Transfer Under Pressure (TUP)				
		Jean-Pierre Imbert	The table presented are derived from the US Navy Air/oxy tables published for in-water decompression. Converting these tables for TUP diving causes one major safety issue related to the oxygen breathing period. • During in-water stop, the diver breathes 100% oxygen • During oxygen breathing sessions inside a DDC, the divers only breathe around 80% to 90% of oxygen due to mask leakages. This was demonstrated at Comex during some experiments (not published). It shown that divers with moustache or bear, or divers speaking in the mask, could lower the oxygen percentage to 70%. It is against the Norsok para 5.5 requirements to convert tables for in-water decompression to TUP	Again, we fundamentally disagree. On this specific subject we have reviewed the literature and published an original scientific report that has been peer reviewed. We consider the obligation of those disagreeing to demonstrate shortcomings in the accepted review. We can't see the relevance of in-water oxygen toxicity for TUP diving. Our procedures does not advice for 100% O_2 breathing in-water. We have taken due consideration to the fact that FiO_2<100% when breathing oxygen through BIBS, nevertheless we have chosen the TUP procedure with longest decompression time (USN).

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			decompression without running a full test and evaluation program. It is not indicated whether the US Navy is aware of the proposed use of their tables and if they have agreed with it. International diving companies operating in the Norwegian sector must be authorized to use their own TUP tables for which they can document the validation process	
36	1	Technip FMC (Andy Butler and David Scott)	Thought to be given to allow option for decompressing in the bell where an assessment has been carried out on the bell and the decompression time is no greater than 90 minutes. As diving is risk based there has to be a comparison on decompressing the divers in the bell versus carrying out a TUP.	We don't want to restrict decompression to the DDC if a proper decompression can take place in the bell. However, this is a risk analysis that has to be done by the diving contractor. We have added the modifier "usually within the DDC" to encompass this concern.
36	1	Technip FMC (Andy Butler and David Scott)	If we are advocating the use of Nitrox for TUP diving we also have to include guidance on the requirements for cleanliness of equipment as the majority of DSV's do not have the required level of cleanliness in the gas management /panels or main bell umbilicals.	We fully agree, but the (technical) questions related to oxygen cleaning is outside the scope of this document.

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36	1	Technip FMC (Andy Butler and David Scott)	If we are advocating Nitrox for TUP diving we have to take into account the bellman will decompress on the same profile which means he will be required to breath the same Nitrox mix as the divers. The challenges with this are captured in my previous note.	A valid point which we agree upon. For this reason we have added a new section explaining how the bell could be positioned at shallower water depth to avoid this concern.
36	1	Technip FMC (Andy Butler and David Scott)	Transfer under pressure on the majority of diving systems is safer the deeper you go due to the challenges of getting proper engagement of the mechanical interlocks with a reduced pressure differential. Using 12 msw as the minimum lock on depth goes a long way to negating the risk which has been learned through experience	We understand and would not disagree on a decision avoiding TUP to such a shallow depth due to the risks associated with interlocks. However, this would be a subject of risk analysis of the system user rather than a question related to decompression tables. We consider the TUP table for 12 msw to be safe out of a DCS incidence perspective. We would not like to instruct the end user for a particular minimum depth to engage TUP diving.
36	2	Phil Bryson	*(Overstriked word "interval" in second sentence.)* .. during surDO2. the last sentence includes some of the benefits against conventional surface orientated deco - is much more controlled etc... I am personally not so keen on SurDO2 but am aware that it has a relatively good saftey record. Should the risks be discused in more detail?	Discussing the safety aspect of SurDO2 and TUP is definitely both interesting and relevant, but beyond the scope of these tables. We have reviewed the issue of DCS probability of $SurDO_2$ tables in a document developed during Revision 4 of the tables (can be downloaded here but is regrettably in Norwegian language only). We have otherwise reviewed TUP decompression tables in a recent scientific manuscript and the tables proposed in the 6th ed of the NDDT are compliant with the USN IW

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				O_2/air decompression which was concluded to be conservative with respect to estimated p_{DCS}.
36	3	PTil	*NORSOK U-100:2023 will have new chapters (clauses) compared to NORSOK U-100:2015. It may be appropriate to omit clause references.*	We agree. Clause reference has been removed.
36	4	HUH (see abbreviation above)	*Are there any good report or scientific documents demonstrating that TUP procedures should be recommended? In serial 4 page 36 it is written that TUP gives a DCI risk of 4-5%. Can this be documented and if so: is this an acceptable risk?*	The first part (…. «demonstrating that TUP procedures should be recommended") is hard to respond to. We have previously (2019) published a report on candidate tables for closed bell diving. The content was presented at the Bergen International Diving Seminar the same year. We have published a scientific report detailing the background for our decision. The work compares candidate TUP tables. We conclude that USN IW Air/O2 procedure is the safest. We don't write that TUP gives a DCI risk of 4-5%. We write: "Estimated risk for DCS ranges 3.5-4.5% for the longest bottom times, i.e. in the same order as for conventional in-water air breathing decompression." This estimated probability (probabilistic model) is based on NEDU Report TR 12-01 (Gerth WA, Doolette DJ. VVal-79 Maximum Permissible Tissue Tension Table for Thalmann Algorithm Support of Air Diving).

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				Risk acceptance will in the end depend on the person asked. Whether an estimated P_{DCS} of 3.5-4.5% is acceptable will thus be a decision of the individual reader, user, organization etc. We simply conclude that the TUP tables can be expected to have a P_{DCS} similar to conventional air in-water decompression tables. For further discussion on observed, estimated and acceptable DCS incidence we advise to consider our report on this question.
38	14	Ole Martin Haugan	*See question related to identical concern for SurDO2 on page 34 serial 18.*	See our response above related to SurDO2 page 34 serial 18
38	14	PTil	Fourth sentence: Each cell in the table will hold the maximum allowed exposure time per day dependent on the number of successive days of diving (first column) and pO2 (first row). *It is written "exposure time". What is the difference between "maximum bottom time" (ref page 34 serial 18). pO2 during decompression can be 1.6 and 1.9 bar which is not listed in the table. Or is this only relevant for the the bottom time before O_2 breathing during decompression?*	The text is correctly written: It should read total exposure time breathing oxygen enriched breathing gas. The heading specify that this serial is applicable for TUP with nitrox as the bottom breathing gas. The numbers in the tables are accordingly maximum allowed sum of bottom time and decompression time subtracted the time for compressed air breathing in the chamber. We recognize that the column heading "pO_2" is ambiguous and it has now been corrected to "pO_2 in the bottom phase".
38	15	PTil	*Consider adding an example*	We have expanded the example in serial 17.
39	16	Technip FMC (Andy Butler and David Scott)	The example does not answer the question on Oxygen exposure.	Agreed. Has been corrected.

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Standard air decompression tables				
50-51		Hamed Haghparast	Bold borderline for bottom-time limitations for table depths 36 and 39 msw missing	Corrected. (No such error in the Norwegian version of the tables)
56-58		Hamed Haghparast	Bold borderling for bottom-time limitations missing for table depths 54, 47 and 60 msw	Borderline is removed by intention. Dives with air as breathing gas should not be planned for depths exceeding 50 msw.
58		Hamed Haghparast	For table 60 meters, there is no section to convert RGD to RNT (penalty time conversion under each table) while divers are not allowed to dive repeatedly dive at this depth. I suggest that this prohibition be stated in the same place (penalty time conversion) under the table of 60 meters or if they are allowed to perform repeated diving, the relevant table be added	We have added a line informing that there is no option for a RGD>RNT conversion for this table depth.
Corrections for Dive Site Altitude				
60		HVL/DU	*Should be changed to avoid ambiguity regarding procedure to follow for heights listed in two columns (e.g. 500 m.a.s.l.)*	We consider this a purely theoretical concern. The table is easier to read if we avoid "9" or "1" as last digit and for this reason we keep it unchanged.
TUP tables				
76 77 78 79		PTil	*The decompression procedure is identical for* *33 n: 95 and 100 min bottom time* *36 m: 85 and 90 min bottom time.*	Yes. The decompression profiles are correct.. Due to the fact that bottom time for the 33, 36, 39 and 42 mim TUP dive is limited to 95, 85, 75 and 65 min respectively

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			39 m: 75 and 80 min bottom time *42 m: 65 and 70 min bottom times* *Is this correct?*	min we had to split these rows to clarify this bottom time limitations.
78		Ptil	*Is the row for 65 min bottom time missing?*	No. Bottom time increases in 10 min steps from 60 min, but we had to insert a 75 min bottom time due to the bottom time restriction.
Prevention of Decompression Sickness				
84	6	Technip FMC (Andy Butler and David Scott)	All divers are required to maintain a minimum level of fitness which is clearly defined and part of their annual medical. Facilitating allowances for a lesser standard introduces risk to the contractor and will drive an ageist culture by precluding divers over 50 due to a drop in efficiency.	Norwegian guidelines for divers' physical fitness are similar to UK. Nevertheless, there are significant differences in physical fitness between divers and we would *advise* for some extra consideration in old, overweight and relative unfit divers.
86	12	Technip FMC (Andy Butler and David Scott)	Add TUP along with SurDO2	Agree. Corrected.
86	13	Technip FMC (Andy Butler and David Scott)	Add Vaping	Agree. Corrected.
88	27	HVL/DU	(Last sentence: The bottom time limitations have been identified by bold horizontal lines in the present tables. "Maximum depth" should be interpreted as water depth when diving according to Norwegian Lavour Inspection Authority, but Equivalent Air Depth when diving	This has been adjusted in NORSOK U-100:2023 which in section 11.4.1 reads: *When using Nitrox, the maximum bottom time may be calculated from equivalent air depth (EAD).*

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			compliant with Norsok U-100 and U-103.) *See text below. Equivalent air depth is only mentioned in relation to the multiday break.* *Cited from NORSOK U-100:* 8.2.2 Surface oriented diving Diving procedures in accordance with NDTT [52] should be used, but the restrictions for maximum bottom time exposure limits given in Table 11, shall be adhered to.	
90	3	PTil	(Fifth bullet point: Omitted in-water decompression of 15 min and more) *Flowchart page 93 says 10 min?*	No. The flowchart on page 53 says more than 10 min. Since decompression time increases in steps of 5 min, the description in text is identical to the flowchart. However, to avoid any misunderstanding we have rephrased the text.
91		PTil	*Ref text on page 90. There are small differences that may cause uncertainty. Should the flowchart list 15 min or the text say 15 min?*	We have now used the same term in flowchart and main text description.
Deep Chamber Dives				
89	3	Phil Bryson	*(Third bullet point, overstriked word "surface")* to the surface?	Corrected – thank you!
Procedures in the Event of Omitted Decompression or Uncontrolled Ascent				
90	1	HVL/DU	(Second sentence: We advise all dive teams, professional as well as	We try to use the term "should" rather than "shall" due to the fact that acceptable safety

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			recreational, to bring a surface oxygen kit to any dive site.) *The word "shall" refer to an absolute requirement, though the text provide advice even for situations where oxygen is unavailable. Is "should" more correct? Consider "shall" for commercial diving (regulated by law) and "should" for recreational diving.*	can be met by other measures than those suggested by us in these tables. We are aware of the fact that there may be other places in the tables that call for adjustment of these terms, but with reference to oxygen availability we still consider "shall" to be the appropriate term – independent of diver category. We recognize that there may be situations where oxygen is unavailable and for this reason we have developed procedures for these situations. We have not made any text adjustments here.
90 91	3 5	HVL/DU	*The guidance from the Emergency Dispatch Service (AMK) recommends both cases described on page 90 and 91 to be accompanied to a medical hyperbaric facility for treatment. The advice seems to differ dependent on symptoms: Patients with CNS symptoms are adviced to be recompressed as soon as possible while patients with other symptoms should be given priority to examination to rule out any CNS symptom. Transport to a diving physician at the closest hyperbaric treatment facility is mentioned, but not treatment at site as adviced in the NDTT.* *The text in this facsimile refer to NDTT related to divers not*	The poster from Haukeland University Hospital doesn't detail the specific handling of patients with DCS breathing normally, awake, without other injuries and *in the immediate vicinity of a company-provided recompression chamber*. For such situations we clearly recommend recompression treatment at site. However, contact with AMK should be established as the first step and should not be delayed due to recompression. On the other hand: It is fully acceptable to start recompression therapy without additional approval if AMK has been alarmed and the patient is breathing normally, awake and not severely injured. We have slightly corrected the text to accommodate this.

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			experiencing symptoms. It thus seems that the advice on Page 90: "The diver develops symptoms of DCI. Recompress with Treatment Table 6 (TT 6) is not compliant with their guidance. Is it nevertheless acceptable to start treatment with TT6, then contact AMK in the event of a diving accident and it is a chamber on the dive site?	
Emergency Decompression				
96	7	Jürg Wendling	the inwater reco you describe is certainly ok for such desperate situations. in contrast the procedure chosen for remote expeditions is experimentally tested, needs a lot of preparations and certainly drills with all participants. and it is a in-water hyperbaric oxygen therapy (blatteau, edmonds, usn). not distinguishing these two approaches would possibly motivate keen divers (teckies?) to use the described air-recompression as an option.	However, in-water *recompression* is a treatment of an injured diver, while we have introduced an emergency *decompression* procedure.
Decompression Illness				
		Jean-Pierre Imber	The document includes a full medical book and set of treatment tables which could be considered as emergency procedures.	These tables are written for Norwegian diving – in-shore and off-shore. They share – similarly to USN Diving Manual, NOAA Diving Manual and the Swedish RMS Dyk –

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			Treatment of DCS is a medical issue. The proposed treatment will be in conflict with the responsibility of the company medical advisor. All diving companies have developed their own culture and procedures and it would be dangerous to change emergency response just by crossing the Norwegian sector border. Second, the treatments tables presented are very old fashioned when compared to the current practice and in particular include deep recompression on air or on nitrox that have been abandoned for long. It is suggested that these treatment procedures are presented in a separate document and definitively presented as optional.	instructions for handling omitted decompression and decompression sickness. This is written for divers and diver supervisors. Not all divers work for large offshore diving contractors. The majority of Norwegian divers work inshore for companies with far less resources to update emergency procedures. We will not remove the section of diving related illnesses, but we agree that diving contractors should elaborate company-specific procedures which should replace the ones provided by us. Many Norwegian diving contractors appreciate to share a common approach to the emergency procedures as provided in the NDTT. Secondly we really question the statement: *"Second, the treatments tables presented are very old fashioned when compared to the current practice and in particular include deep recompression on air or on nitrox that have been abandoned for long."* We have ***specifically*** in text as well as flow-charts and table text underscored that TT 6 is the table of choice for DCS. The other tables should be used on the discretion of a diving physician only. The single exception we have made is for *life-threatening symptoms*. We agree that the likelihood of surviving life-threatening symptoms in a diver

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				unresponsive to recompression to 18 msw is small, but we sincerely question whether the reviewer consider it inappropriate as a desperate manoeuvre to try further recompression in such a hopeless situation?
99	13	Jürg Wendling	Should not loss of consciousness be mentioned (sometimes the only and fugitive symptom). it is an air embolism, but you subsummize this under dcs when it is due to a pfo shunting.	We believe this has been mentioned (*In serious cases vision, consciousness, muscle strength….*)
	14	Jürg Wendling	the majority of our swiss dcs cases comes with tingeling/paraesthesia and sometimes numbness. these purely subjective symptoms can be neurological but quite often somatoform or peripherical (nicely described in the edmonds. would be good to be mentioned here in case a diving doctor would decide for a non-recompressive treatment despite "neurological" symptoms.	Paraesthesias may not necessarily represent a spinal injury. However, the readers of this publication will be *divers and diving supervisors*. The tables are not intended for physicians and should not replace textbooks in diving medicine. We have abbreviated the description of symptoms and our intention is to stimulate the diver to report *any* symptom that may be due to DCS. We would not like to soften the advice too much due to the audience of the table.