Best Available Technology

-hva er det egentlig?

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RILO 2022 - Øyvind Aaleskjær

BAT benyttes i miljøavtaler, ved fastsettelse av miljøkrav eller miljøstandarder.

Teknologi som gir minst belastninger på det ytre miljø, og at det kan monteres,

vedlikeholdes og driftes på en slik måte at utslipp og virkninger på miljøet blir minst mulig.

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Typiske BAT spørsmål

- ❑ Does your farm follow any emission reduction scheme?
- ❑ Do you have any water treatment before discharge to environment ?
- ❑ Do you employ any ‘solid’ / sludge capture/treatment process ?
- ❑ Do you employ any techniques/technologies that you consider to be novel or innovative?
- ❑ What life stages do you operate at your farm?
- ❑ What is the max fish density you operate at?
- ❑ Do you use fresh, brackish or seawater?
- ❑ How many (RAS or flow-through) units do you have?
- ❑ What is the farms area (m2)?
- ❑ Where do you take water from (Borehole, water reservoir, sea, etc.)?
- ❑ Do you apply temperature control on production water?
- ❑ What percentage of water is recirculated?
- ❑ How do you monitor the waste streams produced by your facility (i.e., water, sludge, mortalities, gases/smell)?
- ❑ What solid emissions does your facility produce?
- ❑ What method do you currently use for processing/discarding sludge?
- ❑ Do you treat your sludge?
- ❑ What method do you currently use for discarding mortalities?
- ❑ How is wastewater treated?
- ❑ Does your farm release any gas emissions? Are these measured or controlled?
- ❑ What environmental certification schemes do you comply with (BAP, GGAP, ISO14001, ASC, etc)
- ❑ What are your main concerns in relation to emissions mitigation?

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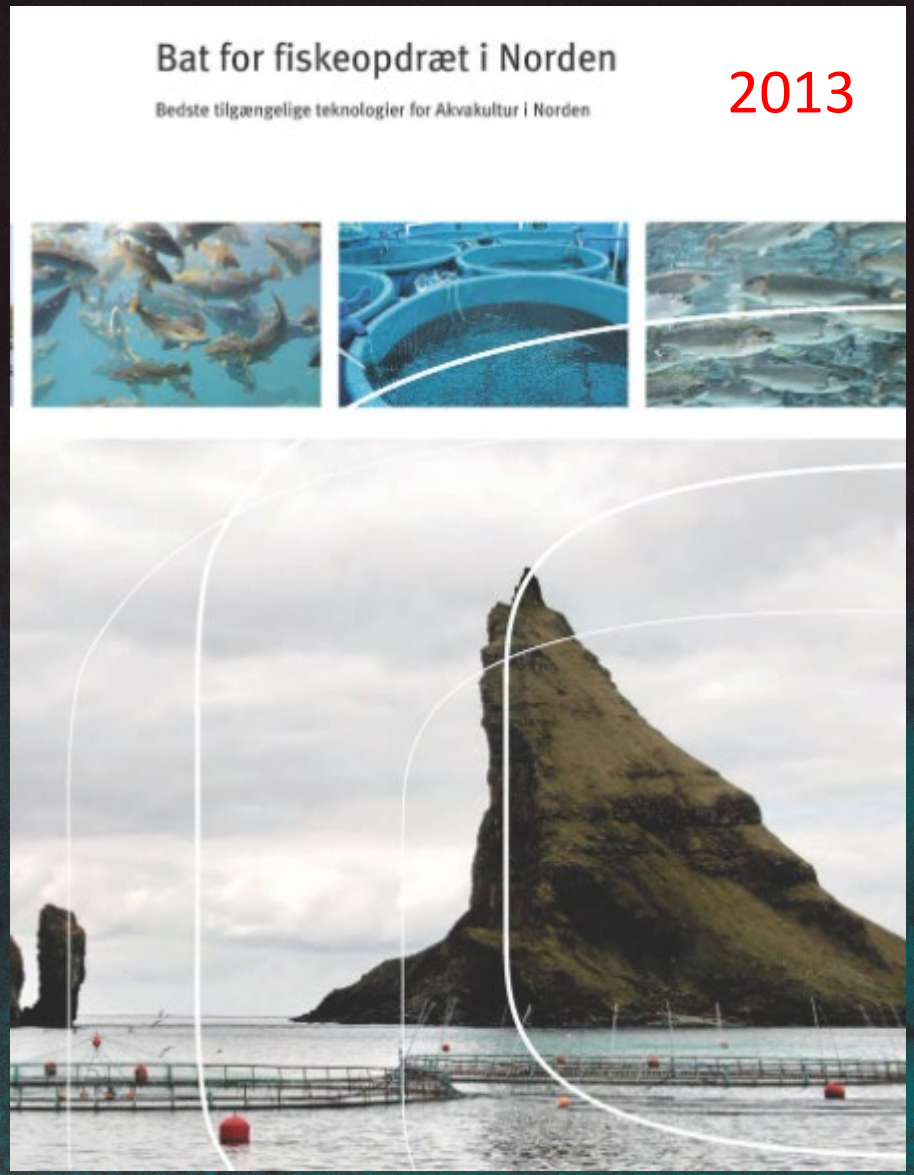
Bat for fiskeopdræt i Norden
Bedste tilgængelige teknologier for Akvakultur i Norden
2013


BAT in fish processing industry
Nordic perspective
2015

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2019

TEXTE
.../2019

Developing BAT/BEP with respect to pollution by nutrients and hazardous substances for sustainable aquaculture operations in the Baltic Sea region

Final report

German Environment Agency

Umwelt Bundesamt

2015

Velferdsindikatorer for oppdrettslaks:

Hvordan vurdere og dokumentere fiskevelferd

Redigert av Chris Noble, Jonatan Nilsson, Lars H. Stien, Martin H. Iversen, Jelena Kolarevic og Kristine Gismervik

Oversettelse av Hege Iversen Haugmo

Nofima

Et FHF prosjekt, ledet av Nofima i samarbeid med:

Havforskningsinstituttet · Veterinærinstituttet · NORD University · University of Stirling

FHF

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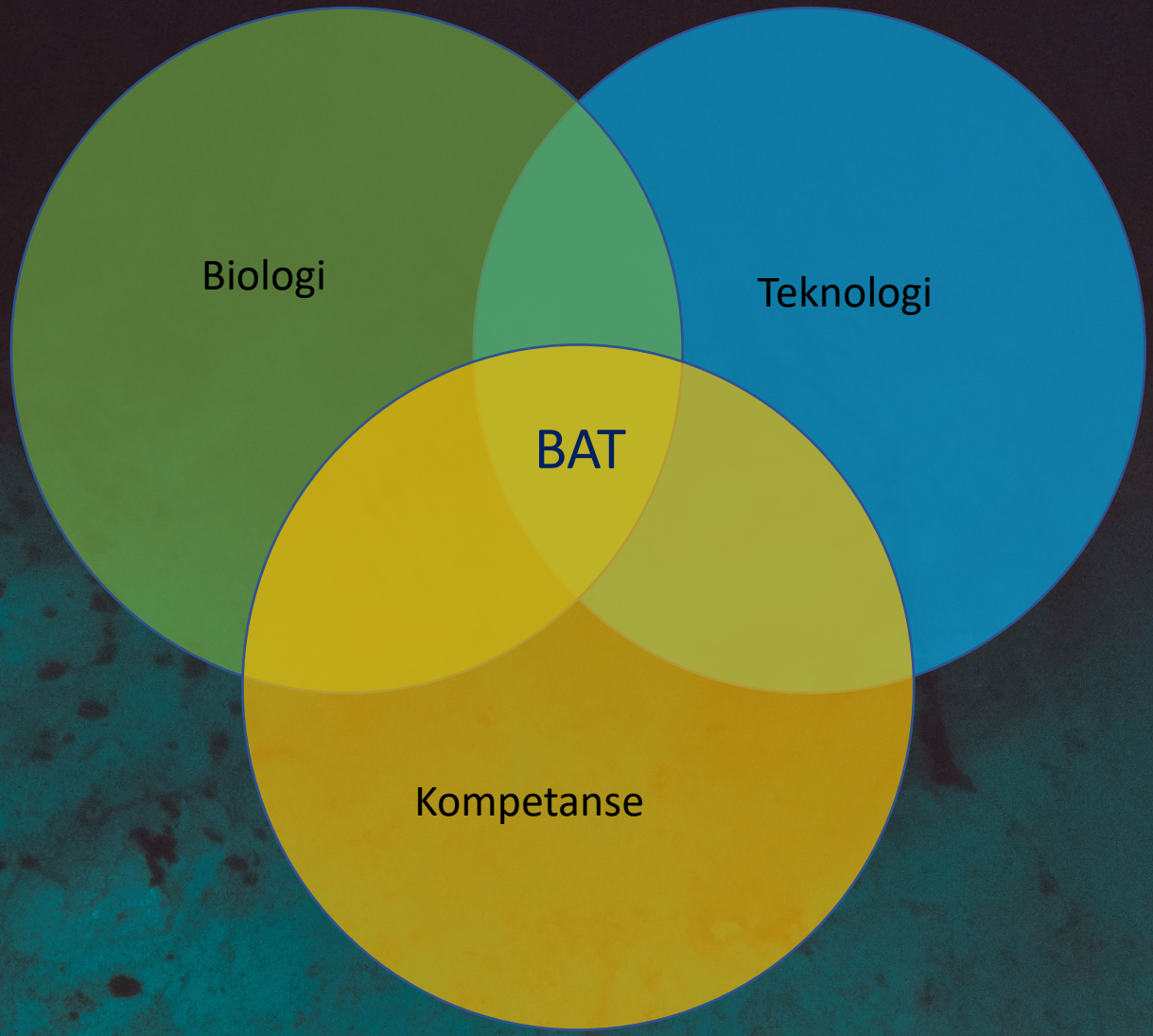
Huskeliste

- ❑ Forutsetninger
- ❑ Produksjonsplan
- ❑ Teknisk spesifikasjon
- ❑ Forståelse av tilbud
- ❑ Bestillerkompetanse
- ❑ Oppfølging i byggefasen
- ❑ Funksjonalitet



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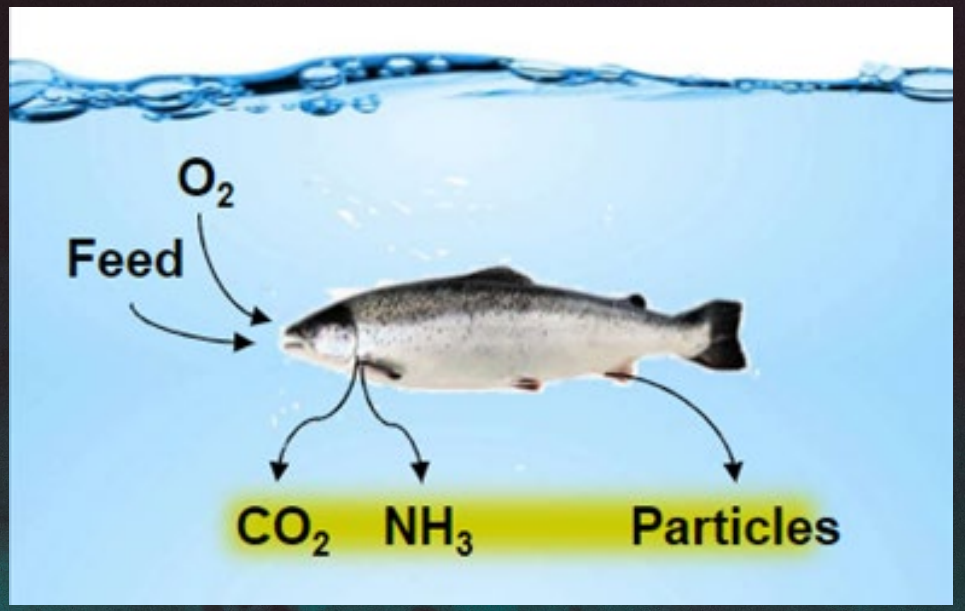

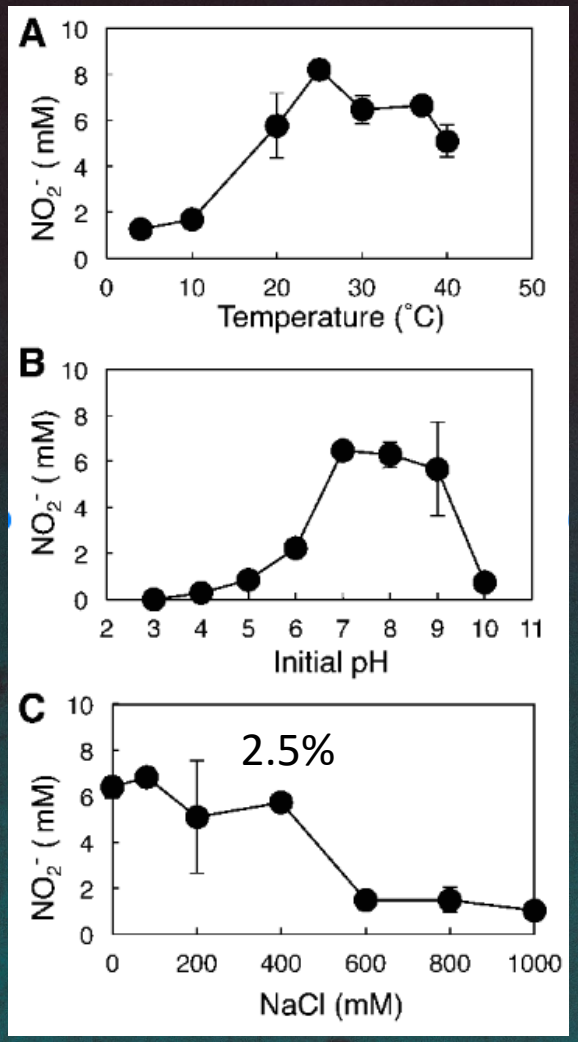

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KOMPETANSE

- Kurs
- Utdanning
- Erfaring

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MEKANISK FILTER

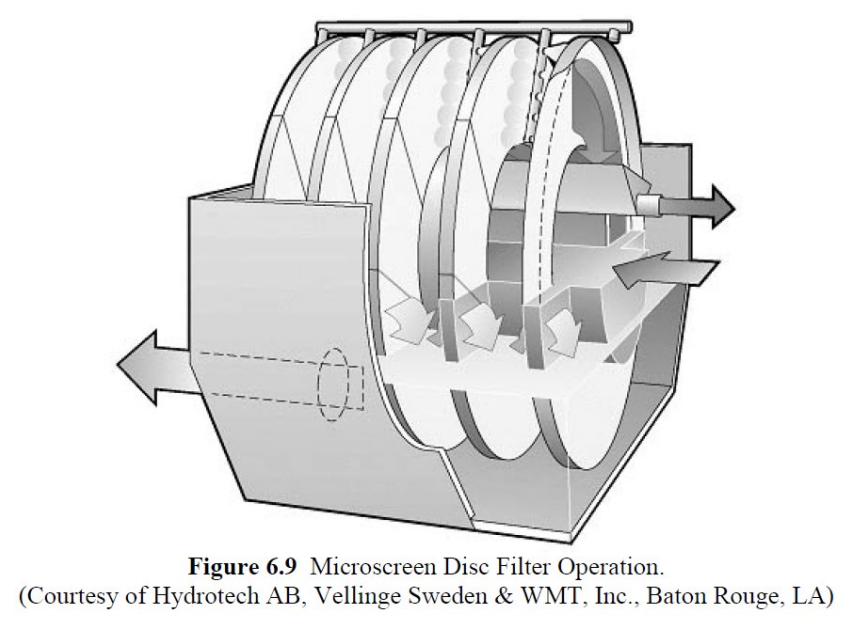

Figure 6.9 Microscreen Disc Filter Operation.
(Courtesy of Hydrotech AB, Vellinge Sweden & WMT, Inc., Baton Rouge, LA)

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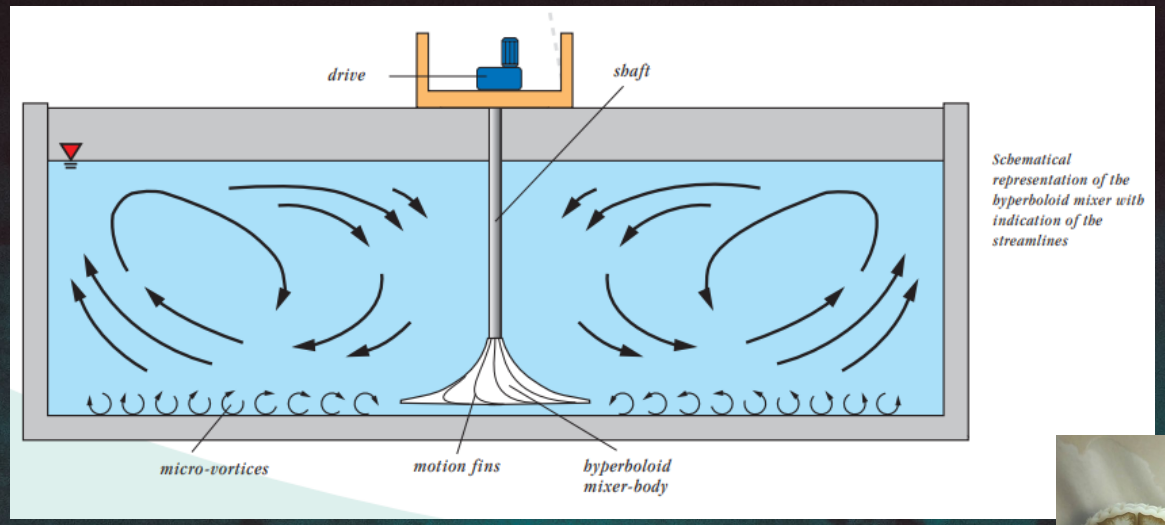
BIOFILTER



Schematical representation of the hyperboloid mixer with indication of the streamlines

- Optimal Nitrifikasjon @ 3-5 mg/L O2
- 80% O2 @ 14°C, ferskvann = 8.24 mg/L

- Omrøring med Luft: 6 m3/t/m3 (78% N, 21 % O2)

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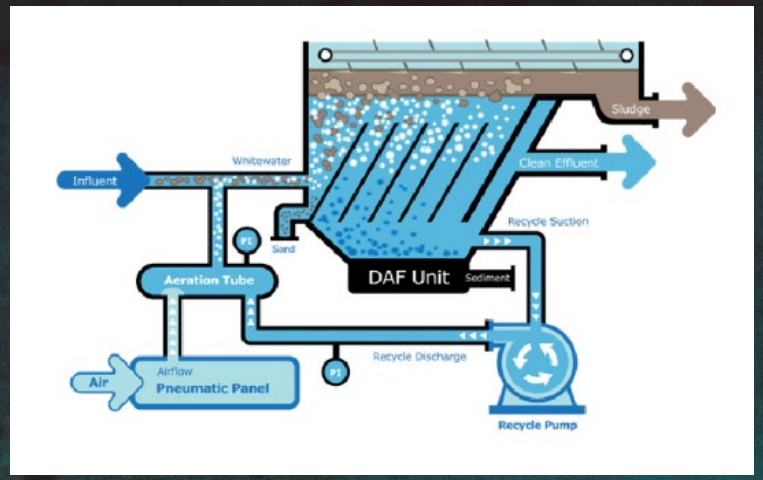
FLOTASJON



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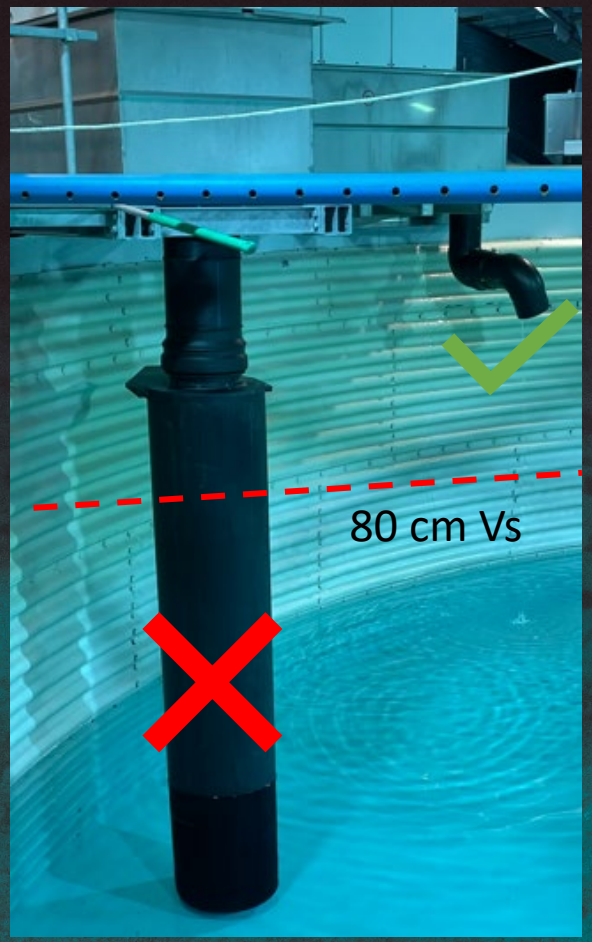
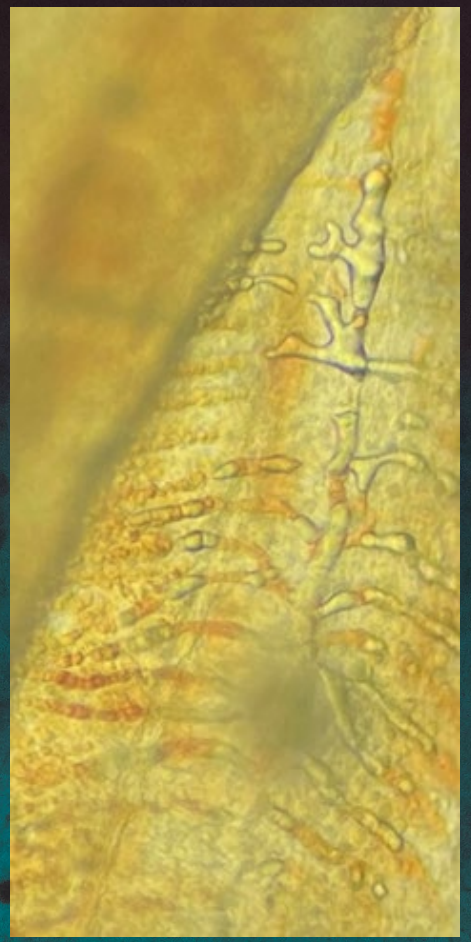
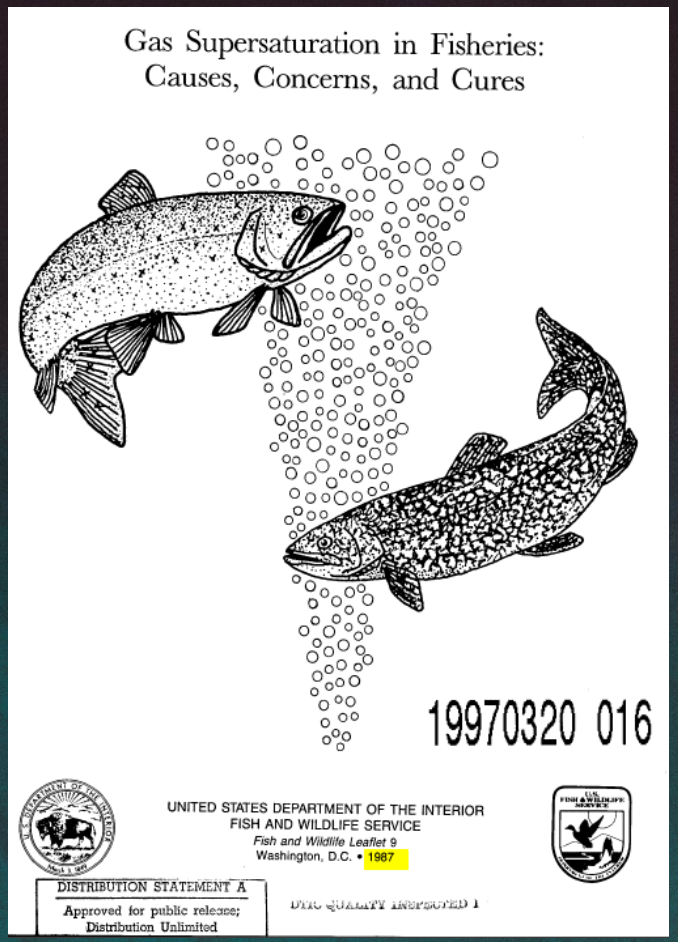
Lufting (CO_2 / N_2)






Gas Supersaturation in Fisheries:
Causes, Concerns, and Cures

19970320 016

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Fish and Wildlife Leaflet 9
Washington, D.C. • 1987

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

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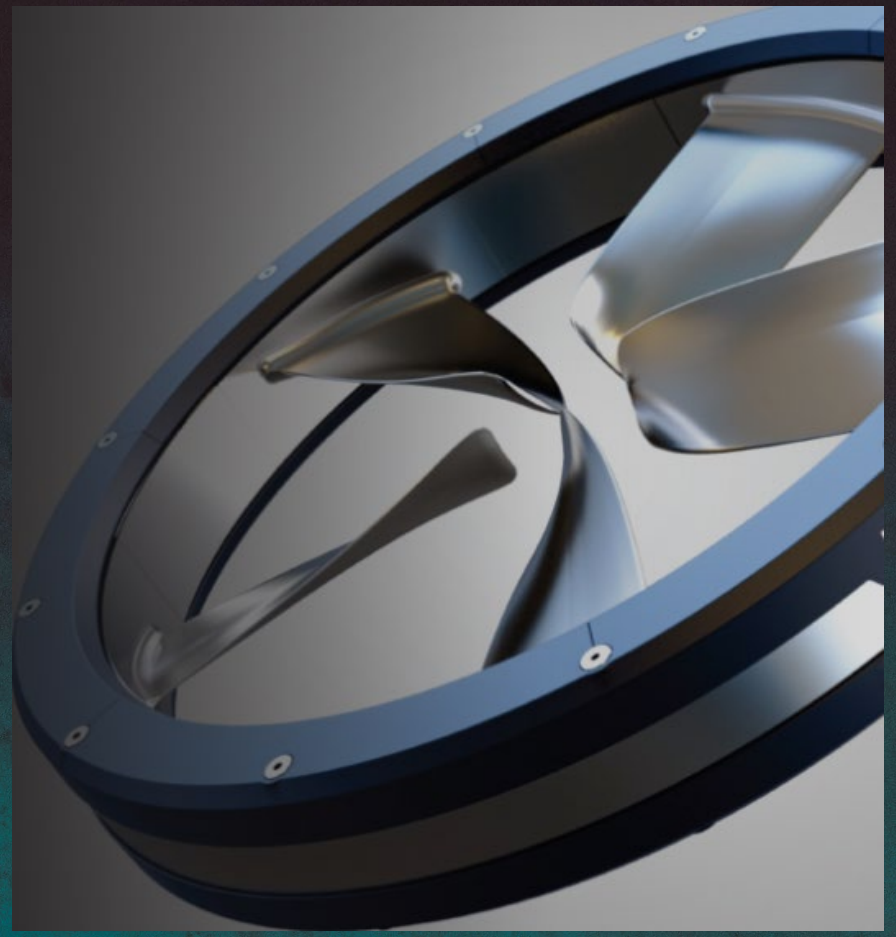
PUMPER

- Akselløs pumpe for store mengder vann
- Vannsmurte lager
- Vannmengde (m3 /h) : 15.000

  Dim (mm): Ø2000

  Material : Pumpe i rustfritt stål



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Standardisering?

- **Personekvivalent** (**pe)** = 1 person pr. døgn
  - 60 g oksygen
  - 1,6 g tot P
  - 12 g Nitrogen
  - 10 g salt
  - 130–180 l vann

Tabell 14.1. Definisjoner av rensekrav i den norske forurensningsforskriften (Lovdata,

Renseprosess	Maksimal konsentrasjon	Minste %-reduksjon
Primærrensing [1)]	BOD_5: 40 mg/l SS: 60 mg/l	BOD_5: 20 % SS: 50 %
Sekundærrensing [1, 2, 3)]	BOD_5: 25 mg/l COD: 125 mg/l	BOD_5: 70 % COD: 75 %
Tertiærrensing [4)]	Tot-P: ingen spesielle krav Tot-N: ingen spesielle krav	Tot-P: 90 % Tot-N: 70 %

OVERSIKT OVER RENSEMETODER OG RENSEEFFEKTER	SS %	BOF_5 %	ToT P %	Tot N %
Primærrensing				
Mekanisk FB S	50	20	15	10
Sekundærrensing				
Kjemisk FB S F S	90	75	85	30
Biologisk FB S BF	85	90	45	30
Tertiærrensing				
Biol/kjem. m/P-fjerning FB S BF F S	95	95	95	30
Biol/kjem. m/P+N-fjerning FB DN-BF N-BF DN-BF F S	95	95	95	80

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Standardisering?

10.000 T x 1.4 = 14.000T

10.000 T x 1.2 = 12.000T

Company:	XX		Department	XX		Date	09.08.2022
Site:	XX		Size	4500g		Vers.	0.2

Growth	%/d	0,49	Temp	°C	12
Tetthet	kg/m^3	43	Volume	m3	30000
Oxygen	kg O2/kg feed	0,35	Number of tanks	stk	1
CO2	CO2/O2	1,35	Retention time	min	90
TAN	% of feed	5,0	Q pr tank	l/min	333 333
			Q pr kar	m3/t	20 000
Total system flow	l/min	333 333	Feeding	kg/d	6321,0
Make up water pr. kg feed	l/kg/fôr	75937	CO2- prod	mg/min	2 074 078
Make up water	l/min	333 333	Q pr deptarment	m3/t	20 000
Resirc	%	0,000	TAN-prod	g/d	
Biofilter efficiency	Norm: 0,6	0,60	Nitrifik @ 14 °C	g/TAN/m2/d	
Efficiency CO2	Norm: 0,7	0,71	Temp. kor	g/m2/d	

Controlling PARAMETER		Out	In
TAN	mg N/l	0,08	0,02
CO2	mg CO2/l	7,28	1,06

Flow karlufter	m3/t	90
Rensegrad lufter	%	50
CO2 fjernet i lufter	mg/t	327 486
CO2 ut av kar med lufter	mg CO2/l	7,26

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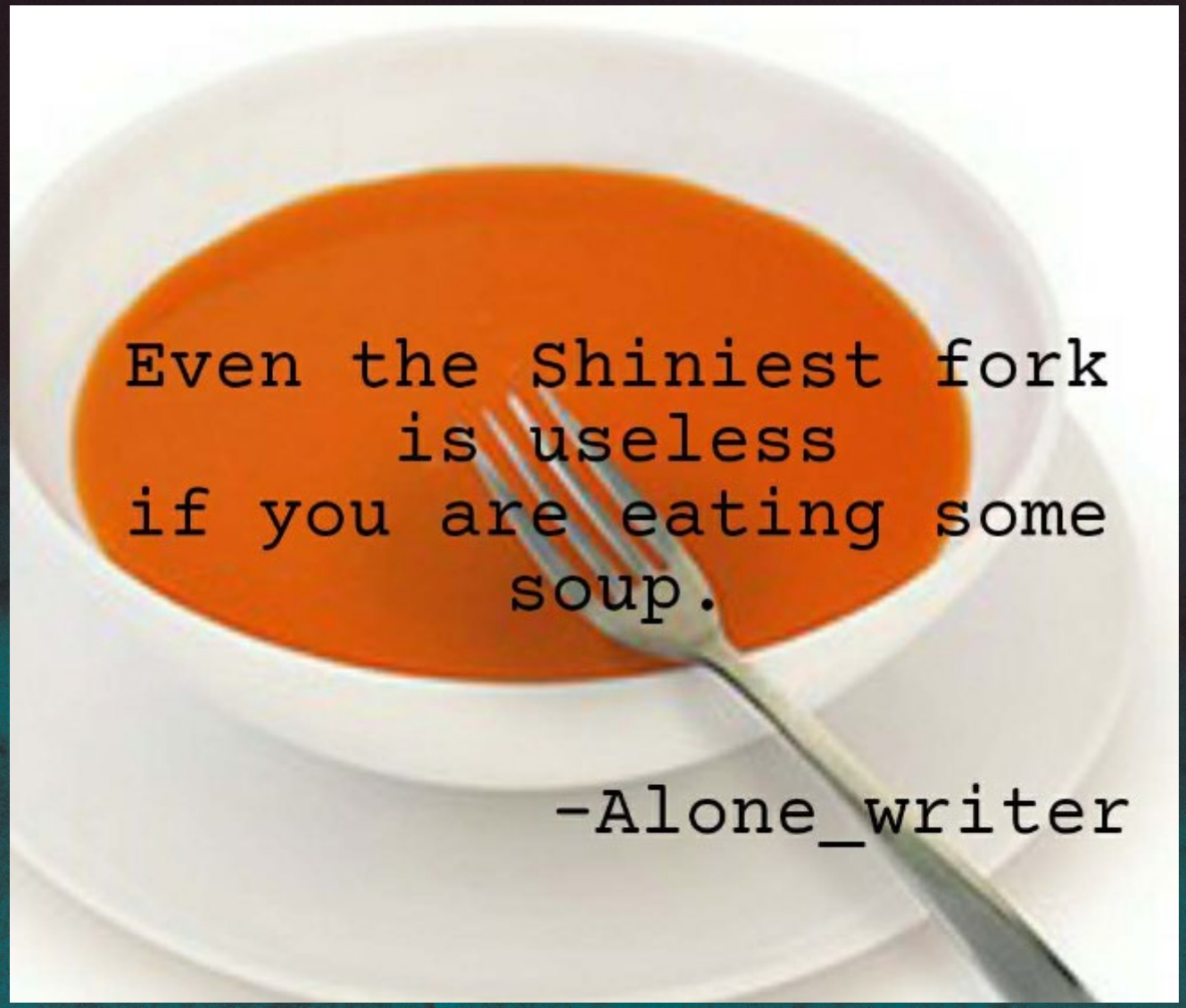
"One question arising from BAT implementation is which BAT should be chosen in any specific case"



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