

Legislation regarding environmental conditions for cultured fish

Sunndalsøra 27 February 2008

Bente Bergersen

Senior adviser

Section for Animal Welfare and Fish Health

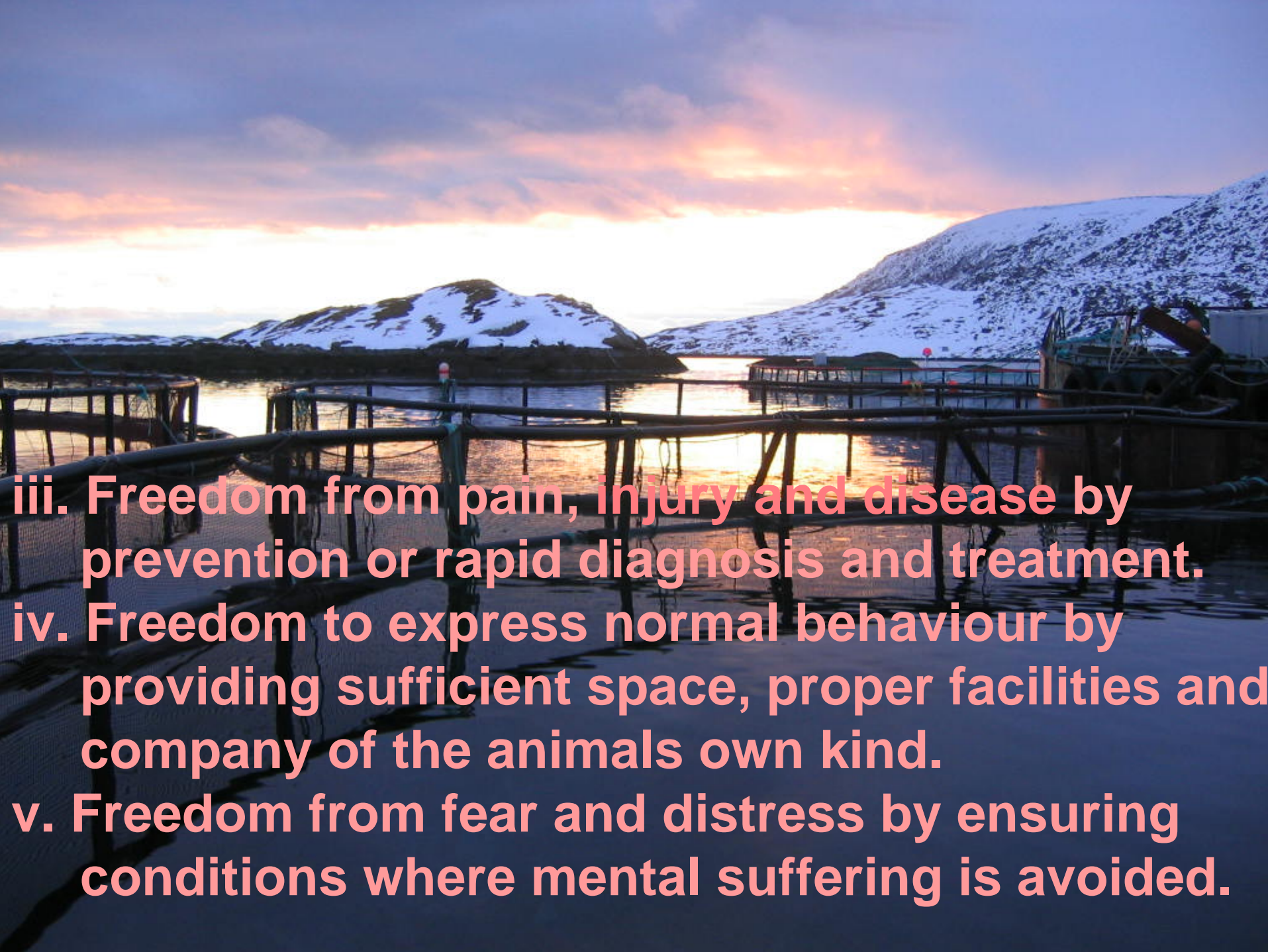
The Animal Welfare Act

§ 2

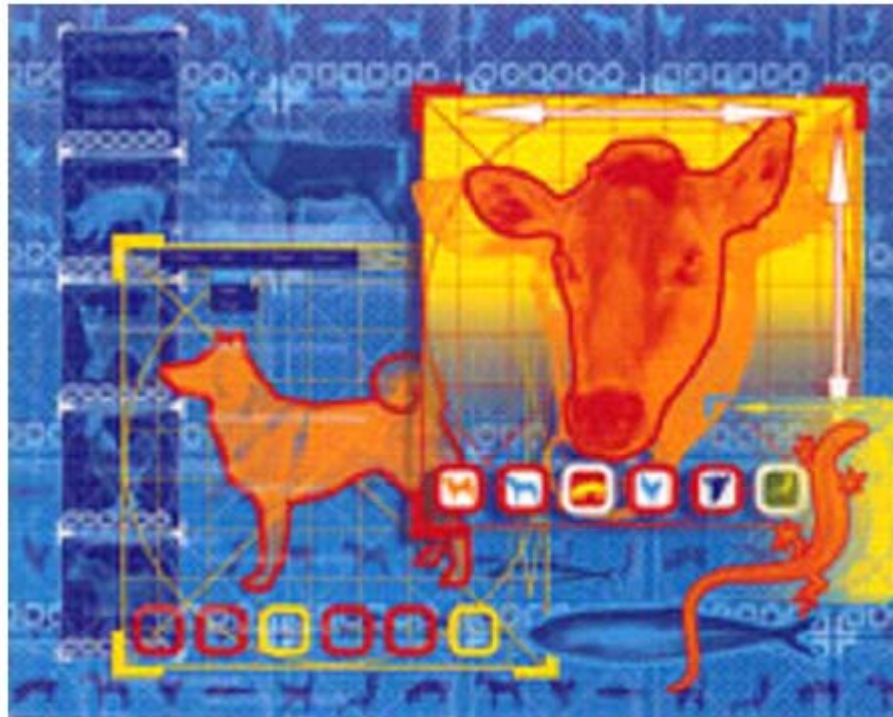
Animals shall be treated well, and consideration shall be given to the instinctive behaviour and natural needs of animals, so that there is no risk of causing them unnecessary suffering.



- i. Freedom from thirst, hunger and malnutrition by ready access to fresh water and a diet to maintain full health and vigour.
- ii. Freedom from discomfort by providing a suitable environment, including shelter and a comfortable resting area.

- 
- iii. Freedom from pain, injury and disease by prevention or rapid diagnosis and treatment.
- iv. Freedom to express normal behaviour by providing sufficient space, proper facilities and company of the animals own kind.
- v. Freedom from fear and distress by ensuring conditions where mental suffering is avoided.

Parliamentary Report no. 12 (2002-2003) Regarding Animal Husbandry and Animal Welfare



Ethical platform



- 3)
Animals shall be kept in environments which give them a good quality of life.
- 5)
Before new technical appliances are taken into use it must be proven probable that these appliances do not reduce animal welfare.
New operational methods must have as little negative impact on animals as possible.

The aquaculture industry

- There is a need for more knowledge concerning farmed fish species' general biology behavioural needs, welfare and welfare indicators.
- Fish in farms must be provided with an environment which is tailored to the various species' and developmental stages' needs concerning water quality, temperature, stocking density etc.
- Too high a proportion of deformities and other production diseases..

The aquaculture industry (continued)

Concerning fry and smolts it is specifically stated that:

Inadequate water quality is a general problem

Aquaculture Operation Regulations

- Entered into force on January 1st 2005
- Currently under revision



§ 19. *Water quality in general*

Fish shall have access to sufficient amounts of water of a certain quality so that the fish have good living conditions and are not in danger of undue suffering or injury being inflicted on them.

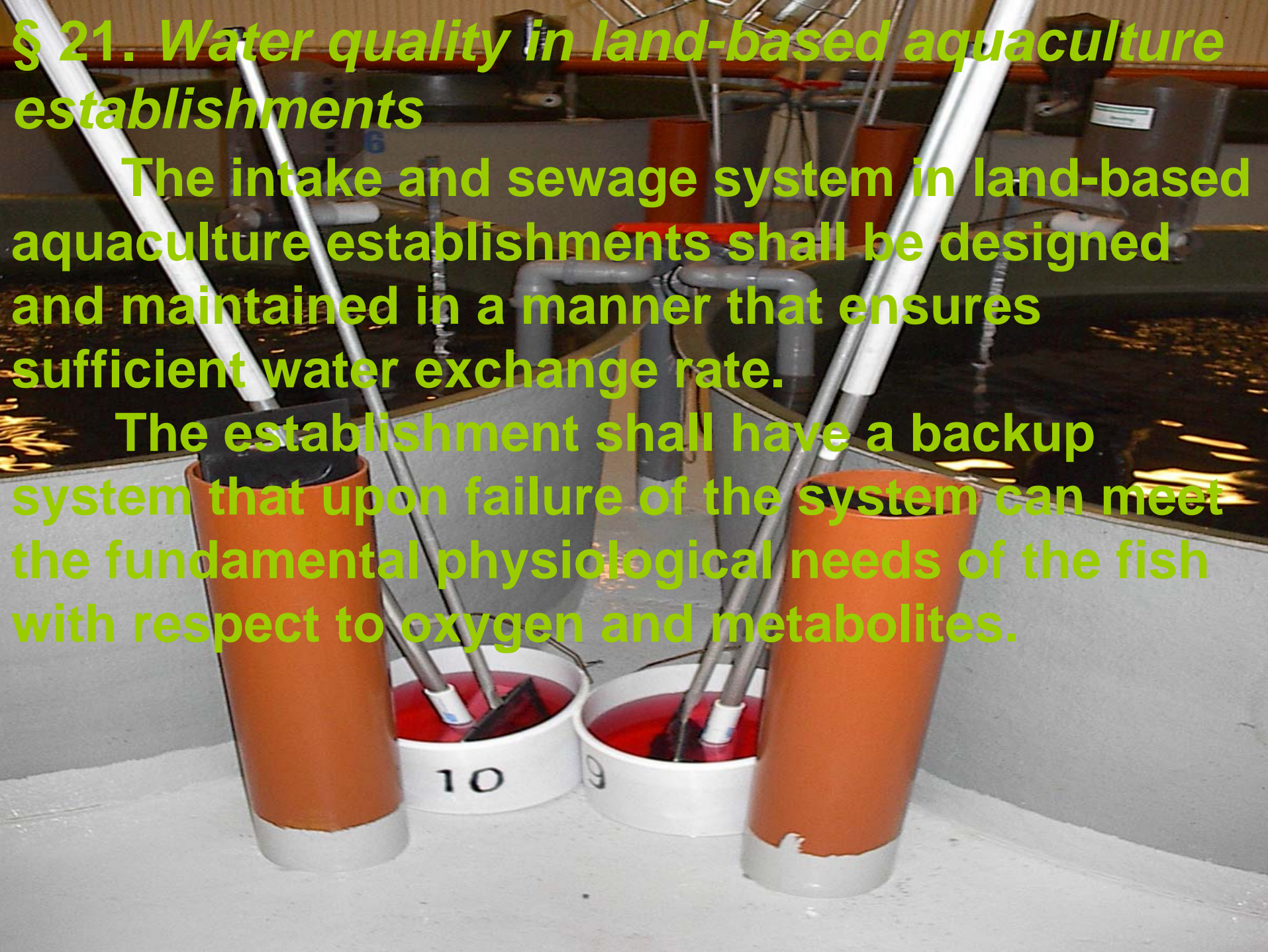
The water quality and the interaction of the various water parameters shall be monitored as needed. Effective measures shall be implemented if there is a danger of unnecessary suffering or injury.

The quantity of metabolic waste products in the water shall be within justifiable limits.

§ 21. *Water quality in land-based aquaculture establishments*

The intake and sewage system in land-based aquaculture establishments shall be designed and maintained in a manner that ensures sufficient water exchange rate.

The establishment shall have a backup system that upon failure of the system can meet the fundamental physiological needs of the fish with respect to oxygen and metabolites.



§ 18. *Alarm system*

Land-based aquaculture establishments shall have alarm systems that provide an alert in the event of power failure, low level of oxygen and other system failures of significance for the welfare of the fish so that steps can be taken as soon as possible.

§ 21. *Water quality in land-based aquaculture establishments (continued)*

Systematic measurements of O₂, pH, salinity and temperature of the facility shall be taken. The salinity measurement requirement does not apply when the water stems exclusively from a freshwater source. Measuring of pH does not apply when the water stems exclusively from the sea.

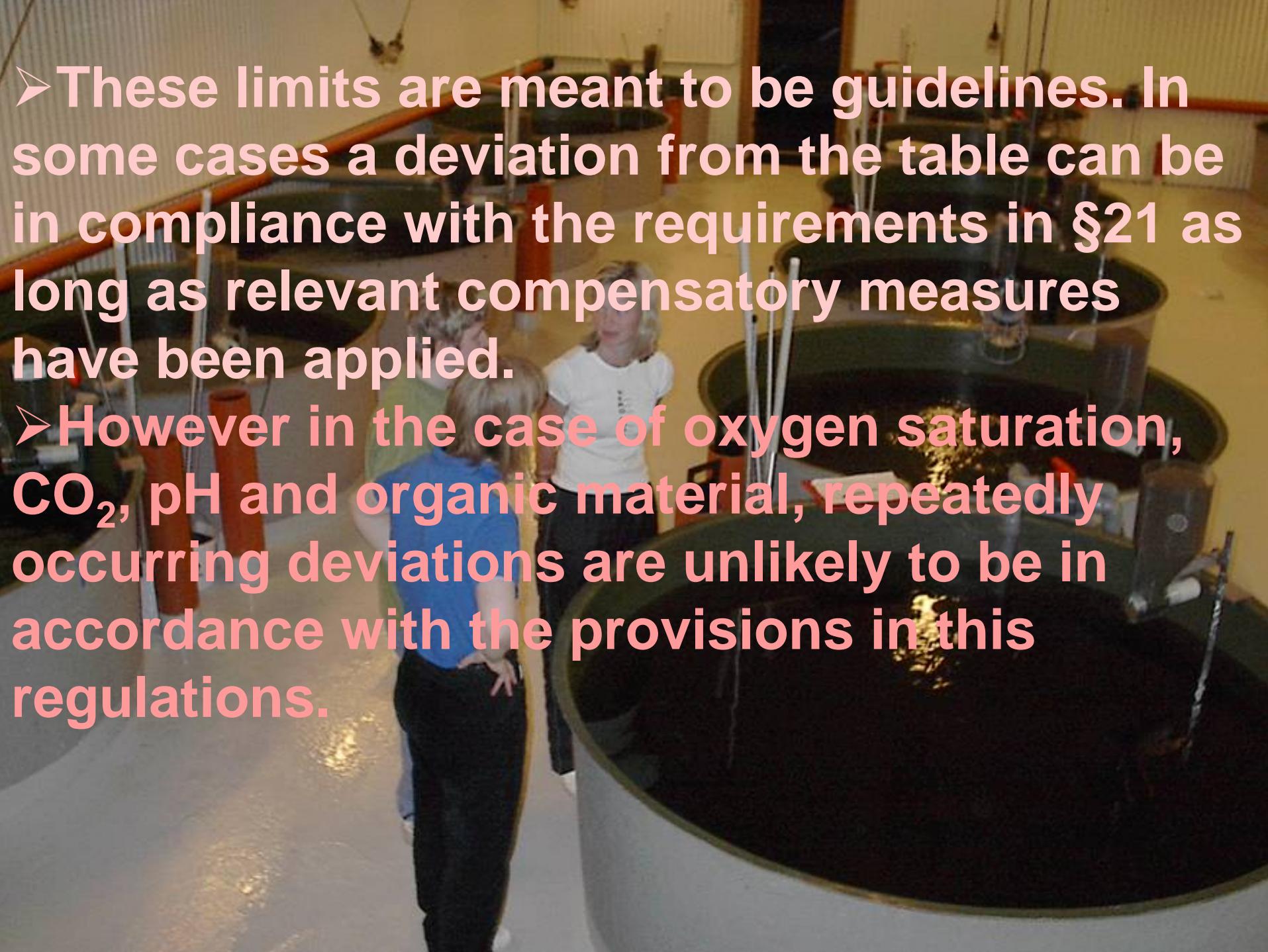
Comments on § 21:

- Systematic measurements shall be performed when deemed necessary which in the case of oxygen means daily in the effluent water from each tank and in the inlet water to the establishment/hygienically segregated unit.
- The water temperature shall be measured daily in the water supply and in heated water.
- The provision concerning systematic measurements is phrased in general terms, which allows for a differentiation depending on whether the units are intensively or extensively farmed as long as this is acceptable from a welfare point of view.

Relevant water quality parameters for salmon during the fresh water phase are:

- Quality of the water supply source as regards metals (aluminium and iron), pH, oxygen,
- Drop in oxygen level between inlet and exit water, carbon dioxide and ammonia and total organic material.
- The above mentioned parameters should be monitored in a representative number of tanks and with appropriate intervals.

Parameter	Limit
pH inlet water	6.2 – 6.8
O ₂ saturation in tank	Maximum 100%
O ₂ saturation (inlet)	between 90% and 120%
O ₂ saturation (exit)	> 80 %
CO ₂	<15 mg/l
Total organic material	<10 mg/l
Aluminium (labile)	<5 µg/l
Aluminium (gills)	<20 µg per gram gill
Nitrite (freshwater)	<0.1 mg/l
Nitrite (saltwater)	<0.5 mg/l
Total ammonia	<2 mg/l



➤ These limits are meant to be guidelines. In some cases a deviation from the table can be in compliance with the requirements in §21 as long as relevant compensatory measures have been applied.

➤ However in the case of oxygen saturation, CO_2 , pH and organic material, repeatedly occurring deviations are unlikely to be in accordance with the provisions in this regulations.

§ 17. *Methods and technical appliances*

Methods, technical appliances and equipment used for fish, including relocation equipment, pipe systems and automatic vaccination equipment, shall be suitable with respect to the welfare of the fish.

New methods and technical solutions shall be tested and found to be in order before they are put into service.

If operations depend on electricity to meet the needs of the fish in a proper manner, there shall be access to sufficient electricity and access to an emergency generator or emergency oxygen with the necessary capacity.