

SC/68A/E/02

---

# Euthanasia of large whales in the Netherlands

Niels van Elk



INTERNATIONAL  
WHALING COMMISSION

# Euthanasia of large stranded cetaceans in the Netherlands

Method for humane termination of suffering in large stranded cetaceans



Author: van Elk C.E.  
Date: 7<sup>th</sup> March 2019

## Introduction

In the Netherlands the course of action in case of the stranding of a large cetacean is under the authority of the Ministry of Agriculture, Nature and Food Quality and is documented in the “guideline beached large whales”[1]. In this guideline euthanasia is an option when the best interest of the animal is served by termination of suffering. Euthanasia has to be performed in a manner which puts animal welfare and public safety as top priorities but also reconciles the emotions of the general public.

A method for whales between 6 and 15 meters length has been devised based on scientific publications, guidelines developed in other countries and trials performed in the Netherlands on dead cows and a dead sperm whale. The largest whales which strand alive on the Dutch coast are historically less than 16 meters long (mostly humpback whales and sperm whales). This document gives a detailed description of the method, gives go and no go criteria for applying this method and finally outlines briefly what arguments were considered to be in favor of applying this specific method.

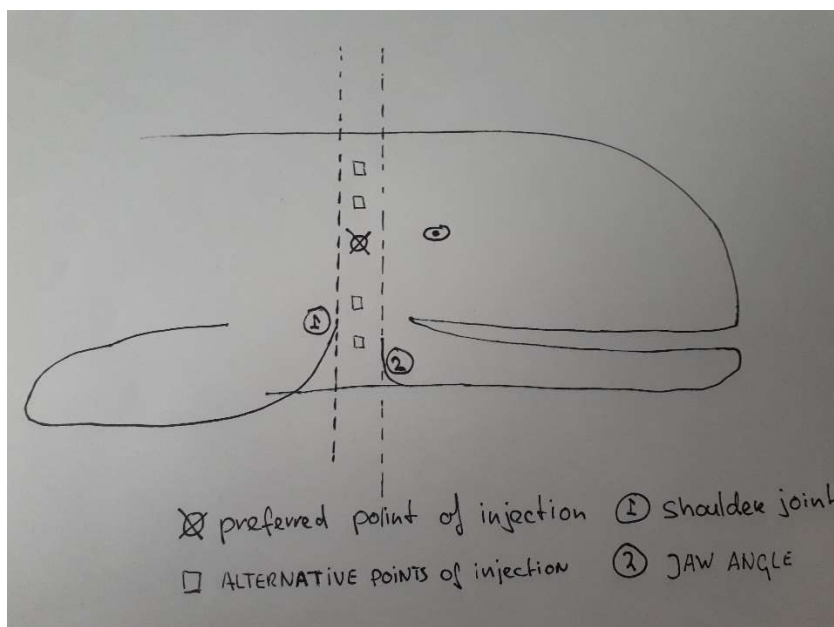
## Description of method

In summary: after general sedation and analgesia and local anaesthesia a hollow pointed needle with 30 grams of explosives in the tip is inserted into the thoracic cavity. The explosive tip of the needle is aimed at the heart and large blood vessels. The explosion in the thoracic cavity must ensure immediate death by two mechanisms:

1. The shock wave generated by the explosion destroys the brain [2]
2. The metal projectiles from the explosion destroy the heart and/or the large blood vessels (see pictures 4,5,6 and 7)

## General sedation and analgesia

Adequate analgesia and sedation is imperative in order to be able to put the hollow needle into the thoracic cavity. To this effect the animal is anaesthetized with medetomidine (10 mg/ 1000 kg Intra Muscular (I.M.)) and Zoletil (tiletamine and zolazepam) (1500 mg/ 1000 kg I.M.) [3, 4]. The weight of the animal is estimated using the whale scale app [5]. The intra muscular injection is given with a long 17 g needle (minimum length 30 cm) in the neck muscle of the animal. This muscle is approached laterally. The ideal point of injection is halfway between the dorso-ventral lines that run through the angle of the mandible and the shoulder joint in a line drawn straight cranio-caudally from the eye. If the ideal point cannot be accessed then a point as close as possible to the ideal point is chosen in the same dorso-ventral line of the ideal point (see figure 1).



**Figure 1 Location of intra muscular injection with general sedatives and analgesics.**

The full dose of medetomidine (10 mg/1000kg) is given in the first injection. Further injections with 50 ml Zoletil are given until the predetermined dose has been reached. Zoletil will be brought into

solution at a maximum concentration minimizing the volume needed for injection. After the introduction of these medications a 10-20 minute pause is taken to let these medications take their effect.

### Local anesthesia

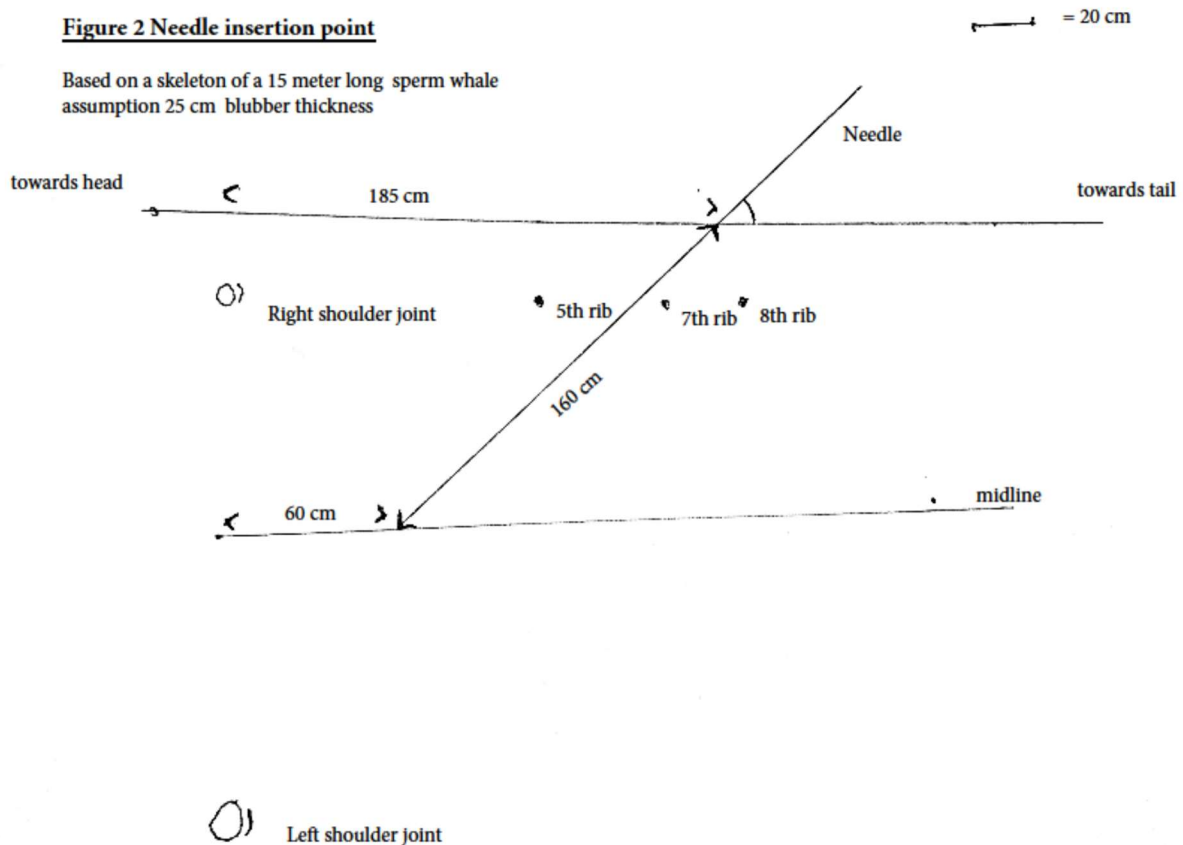
A local anesthetic (20 ml lidocaine 20 mg/ml) is applied subcutaneously on locations which are used to find a suitable inter-rib space providing access to the thoracic cavity. If a proper location has been found then a second depot (100 ml lidocaine 20 mg/ml) is administered underneath the blubber layer close to the pleura by placing a long custom made needle (17g 50 cm long) into the channel made by the probe. The Inter-rib access is found using a 3 or 4 mm diameter metal probe of 60 cm length. After the introduction of the lidocaine there is a 5 minute break to let the lidocaine take its effect. After the lidocaine has taken its effect a hole is drilled through the thoracic wall following the premade channel.

### Introduction of the hollow needle into the thoracic cavity

A point for introduction of the hollow needle is chosen with the aim to locate the explosive close to the heart, large blood vessels and in the vicinity of the foramen magnum. The insertion is in the caudal thorax because the caudal ribs have the largest intercostal spaces. The penetration of the abdomen and its viscera is avoided. Depending on the length of the animal the needle is inserted at a point in a straight line caudal to the shoulder joint: for an animal with a length of 8 meter the point is 110 cm caudal of the shoulder joint, for an animal with a length of 16 meter the point is 175 cm caudal of the shoulder joint. At an angle of 45 degrees to the skin in a caudal cranial direction the probe is inserted. If the channel is suitable for introduction of the needle between the ribs then using an 62 cm long auger bit of 20 mm diameter is used for gaining access to the thoracic cavity by drilling a hole. The hollow needle is then introduced to a depth of 110 cm (8 meter long animal) to 160 cm (15 meter long animal).

**Figure 2 Needle insertion point**

Based on a skeleton of a 15 meter long sperm whale  
assumption 25 cm blubber thickness



### Preparation and detonation of the hollow needle

The explosives used, together with the expertise to prepare the explosive needle, are provided by the Ministry of Defense. This capacity comes from the Dutch explosives clearance service (explosieven opruimingsdienst, EOD).

A team of two EOD operators support in the process of euthanasia by assembling the explosive needle and controlling the detonation of the explosives at the requested moment. The needle is inserted by the veterinarian.

The use of the limited amount of explosives requires minimal safety perimeter and the initiation of the explosion is controlled with a remote wired firing device. Therefore the procedure can be executed without large environmental impacts.

### Verification of death

Before and after detonation of the hollow needle an electrocardiogram is made of the animal. Using this method the stop of heartbeat can be established. If this method fails then criteria as set out in the report by the Virginia aquarium foundation scientific report 2012 No 6 are used [3]:

- Lack of jaw tone
- Absence of menace, palpebral and corneal reflexes
- Fixed and dilated pupils
- Absence of respiration over an extended period (this can be hard to assess in animals that can hold their breath for a prolonged period of time)
- Lack of response to painful stimulus
- No capillary refill time

## Go No Go criteria

Assuming the decision has been made to euthanize a whale then the procedure can go ahead only if the following criteria have been met:

1. Position and behavior of the animal allow safe operation
2. The area of operation is safely accessible
3. The animal is less than 15 meters long (maximum size of observed stranded whales in the Netherlands in the past)
4. The premedication has sufficient effect

Especially the latter point is critical. Sedation and pain killing must be sufficient to allow a hole to be drilled through the thoracic wall without unacceptable distress to the animal. The medications which are used are assumed to work based on observations on other species, including cetaceans. However for some species (e.g. sperm whales) no data are available. There is a small chance therefore the effects are not as predicted. Another point of concern is resorption from the injection site. Stranded whales may have a severely compromised circulation and this may interfere with resorption of administered intramuscular medications. Again the effect may differ from what is expected. Therefore if the whale shows an obvious reaction towards the drilling of the hole by behavior, breathing (increase in frequency) or an increase in heart frequency (doubling of heart rate) then the operation must be stopped. Behavioural reaction and breathing frequency can be monitored visually, heart rate monitoring is done using a portable ECG.

## Accountability of choices made

A large whale can be euthanized using chemicals, artillery or explosives[3, 4]. The use of artillery devices is an inappropriate method in the Netherlands as it does not reconcile strong public emotions associated that will be caused by inflicting gross trauma on a dying whale. The use of chemicals has two options, either an overdose of opioids I.M. (i.e. etorphine) or intra-cardial administration of KCl. The option of working with etorphine has the severe disadvantage that the substance is highly toxic for humans. Inadvertent contact with a drop of etorphine on the eye or mouth mucosa necessitates immediate administration of antidote to prevent death. The circumstances in which a whale has to be euthanized are not ideal for the careful handling of this substance. Whales moving or one may operate standing in shallow water in stormy weather are examples of less than ideal conditions. Furthermore it is uncertain how dangerous remains of etorphine at the injection site are for persons that have to handle the cadaver after the whale has been killed for example during autopsy. The use of KCl has the disadvantage that it has to be administered strictly intravenously. This has not been done in a large whale before and gaining access to the heart or large blood vessels can be problematic. Besides, the search for large blood vessels and the heart may take time and is also at least as compromising for the welfare as the introduction of the hollow pointed needle with explosives. Both methods need adequate sedation and analgesia to be permissible.

The choice for a small explosive is in the Dutch situation a suitable combination of effectiveness and appropriate reconciliation of public emotions, as whale strandings in the Netherlands always attract

a large crowd. The method makes little noise and no external damage is visible after the detonation. Effectiveness is assumed based on a study with similar sized explosives in similar sized animals (expected sizes of stranded large whales on the Dutch coast are animals below 50 ton) and on the trial of the method on a dead 50 ton sperm whale (see pictures 4, 5, 6 and 7).

The choice for medetomidine and Zoletil for premedication is based first on the demand to have a limited volume for injection (medetomidine and Zoletil can both be prepared in high concentrations) and second on the demand to be safe for handlers that assist with autopsy of the dead whale after euthanasia.

Medetomidine is an  $\alpha_2$  agonist and has strong sedating and analgesic properties. Duration of action is 60 to 120 minutes. Zoletil has two working components. Zolazepam is a sedative and tiletamine is a strong dissociative anaesthetic with good analgesic properties. Duration of action is 20 to 60 minutes. Dosages are based on experience with other species and have been set after consultation of the Pharmacy and department of Anesthesia of the Faculty of Veterinary Medicine of Utrecht University.

Selected pictures :



**Picture 1 and 2**

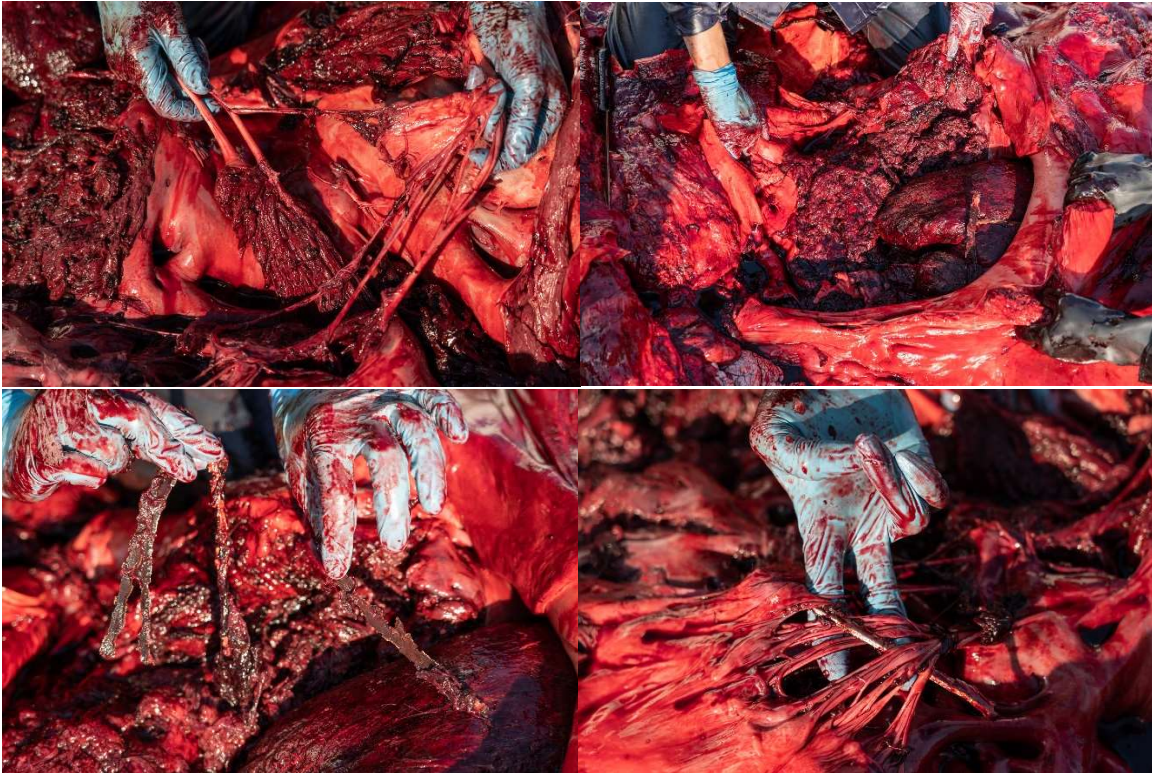
Probes (3 and 4 mm diameter 60 cm length) and auger bits (20, 24 and 28 mm length)



**Picture 3**

Hollow pointed needle (first prototype)





**Picture 4, 5, 6, and 7**

Damage to the heart after testing the method on a 47.000 kg dead sperm whale

1. *Leidraad Stranding Levende Grote Walvisachtigen*. 2017 22-12-2017; Available from: <https://www.rijksoverheid.nl/documenten/rapporten/2017/12/22/leidraad-stranding-levende-grote-walvisachtigen>.
2. Knudsen, S.K. and E.O. Oen, *Blast-induced neurotrauma in whales*. *Neurosci Res*, 2003. **46**(3): p. 377-86.
3. Barco, S.G., et al., *Collaborative Development of Recommendations for Euthanasia of Stranded Cetaceans*. , in *VAQF Scientific report*. 2012, Vancouver Aquarium Foundation: Virginia Beach, VA. p. 183.
4. IWC, *Report of the IWC Workshop on Euthanasia Protocols to Optimize Welfare Concerns for Stranded Cetaceans*. 2015, 22nd ASCOBANS Advisory Committee Meeting. p. 33.
5. Harms, C., *Whale Scale App*. 2019. <https://play.google.com/store/apps/details?id=edu.ncsu.whalescale>