

## Korte bijdragen

### **A case of seabird mortality in the Netherlands caused by spillage of nonylphenol and vegetable oils, winter 1988/89**

*Een geval van zeevogelsterfte in Nederland als gevolg van een lozing van nonylphenol en plantaardige olie, winter 1988/89*

From December 1988 to March 1989, thousands of seabirds, mainly Guillemots *Uria aalge* and Razorbills *Alca torda*, washed ashore in the Netherlands. The birds were covered with a sticky and oil-like substance. About 1500 sick birds were taken to specialized bird hospitals. Many of these birds showed signs of emaciation, aggressive behaviour, bloody stool and a leak plumage. In spite of intensive attendance, nearly all the birds died. Carcasses of 30 birds were submitted for pathological and toxicological examinations at the Central Veterinary Institute. Necropsy and histopathological examinations revealed hepatic degeneration and necrosis, while in many birds aspergillosis was found in the air sacs and lungs. Chemical analysis was carried out in samples from feathers and organs by gas liquid chromatography with mass selective detection (GC/MS) and by high performance liquid chromatography (HPLC) using ultraviolet detection. The results of the GC/MS and HPLC analysis are presented in detail in tables 1 and 2. The presence of nonylphenol was demonstrated in all feather samples (n=23), and in 22 out of 54 organ samples. Nonylphenol contents of feathers ranged from 10 to 80,000 mg/kg, with a mean value of 9,676 mg/kg. Chemical investigations at the TNO-institute (Delft) also revealed the presence of vegetable oils (such as palm-oil) on feathers.

Nonylphenol and vegetable oils are lipophylic and therefore adhere easily to feathers, affecting heat isolation and water repellancy of exposed birds. With respect to the toxicity of nonylphenol, literature data are scarce and only concern alkylphenols in general (see Zoun 1991). The observed lesions of the exposed birds, however, are in well agreement with these data, indicating that also the toxicity of nonylphenol has markedly contributed to the mortality. A relation with offshore activities, like spillage of drilling muds during oil and gas drilling operations, could not be established. Hence, it is suggested that in December 1988, nonylphenol and vegetable oils were discharged by a ship probably carrying raw materials for detergent and/or food industries.

*table 1. Results of gas liquid chromatography with mass selective detection (GC/MS) of samples of seabirds: presence of nonylphenol (mg/kg of sample) in feathers, liver, kidney, stomach-contents, stomach-wall, brain and/or intestinal-contents.*

*tabel 1. Resultaten van gaschromatografie/massaspectrometrie (GC/MS) van organen en veren van zeevogels: aanwezigheid van nonylphenol (mg/kg van monsters) in veren, lever, nieren, maaginhoud, maagwand, hersens en/of darminhoud.*

Species	CDI nr.	fea- thers	liver	kidney	stomach- contents	stomach- wall	intest. brain	contents
Eider	79512-1	28250	89	77				
Guillemot	79512-2			60				
Guillemot	79512-3		30	35				
Guillemot	79512-4		122	21				
Guillemot	79512-5		47	15				
Red-thr. D.	80180-1	2760	48	25		75		
Guillemot	80180-2	31360	n.d.	n.d.	2			
Guillemot	80180-3	1170	n.d.	n.d.	n.d.			
Guillemot	80181-2	2440						
Guillemot	80181-3	37800						
Guillemot	80181-4	18910						
Razorbill	80364-1	41630	47	14	295	n.d.	64	138
Guillemot	80364-2	15340	n.d.	n.d.		n.d.	3	n.d.
Guillemot	80364-3		n.d.	n.d.	n.d.		n.d.	n.d.
Guillemot	97422-1		n.d.	n.d.	n.d.			
Guillemot	97422-2		n.d.	n.d.	n.d.			
Guillemot	97422-3		n.d.	n.d.	n.d.			
Guillemot	97422-4		n.d.					
Guillemot	97422-5		n.d.					
Guillemot	97422-6		38	14	55			
Guillemot	97422-7		n.d.	n.d.	n.d.			
Red-thr. D.	97422-10		n.d.	n.d.	n.d.			
Eider	97422-11		n.d.					

This is a summary of a report, published in Dutch, on these investigations (Zoun 1991). The results of the pathological and toxicological investigations as well as the details of the employed methods of analysis will be submitted for publication in the 'Bulletin of Environmental Contamination and Toxicology' and the 'Journal of Chromatography'.

*Samenvatting Tussen december 1988 en maart 1989 spoelden duizenden zeevogels, vooral Zeekoeten *Uria aalge* en Alken *Alca torda*, op de Nederlandse kust aan. De dieren waren besmeurd met een plakkerige en olieachtige substantie, ze bleken in slechte conditie, het verenkleed lekte, ze gedroegen zich agressief en*

table 2. Results of high performance liquid chromatography (HPLC) of feathers of seabirds: presence of nonylphenol (mg/kg of sample).

tabel 2. Resultaten van 'high performance liquid chromatography (HPLC)' van zeevogelveren: aanwezigheid van nonylphenol (mg/kg van monsters)

Species	CDI nr.	nonylphenol in feathers	Species	CDI nr.	nonylphenol in feathers
Eider	79512-1	12000	Guillemot	80181-2	65
Guillemot	79512-2	9300	Guillemot	80181-3	30000
Guillemot	79512-3	2900	Guillemot	80181-4	2600
Guillemot	79512-4	15000	Razorbill	80364-1	80000
Guillemot	79512-5	7100	Guillemot	80364-2	2500
Razorbill	79512-6	100	Guillemot	97422-1	20
Razorbill	79512-7	8900	Guillemot	97422-2	850
Red-thr. Diver	80180-1	200	Guillemot	97422-3	100
Guillemot	80180-2	20000	Guillemot	97422-6	1900
Guillemot	80180-3	1900	Guillemot	97422-7	45
Razorbill	80180-4	26000	Red-thr. Diver	97422-10	10
Razorbill	80181-1	1060			

hadden een bloederige ontlasting. 30 kadavers werden voor pathologisch en toxicologisch onderzoek ontvangen in het Centraal Diergeneeskundig Instituut (CDI). De lever bleek in veel gevallen gedegeneerd en necrotisch, terwijl in veel gevallen aspergillose in luchtzakken en longen werd aangetroffen. Analytisch werd nonylphenol in het verenkleed aangetoond, in gehalten variërend van 10 tot 80.000 mg per kg veren (tabel 2). Het is aannemelijk dat de sterfte van de vogels toegeschreven moet worden aan de toxiciteit van nonylphenol, in combinatie met de vetonttrekkende eigenschappen van deze stof. De plantaardige oliën, die ook op de veren werden aangetroffen, hebben waarschijnlijk eveneens bijgedragen aan de sterfte. Enig verband met lozingen van boorafval bij olie- en gasboringen in het Nederlandse deel van de Noordzee en de Waddenzee kon niet worden aangetoond. Op grond van de beschikbare gegevens wordt verondersteld dat de nonylphenol alsmede enkele plantaardige oliën zijn geloosd door een schip. Deze bijdrage is een samenvatting van een uitvoerig, Nederlandstalig rapport (Zoun 1991).

Zoun, P.E.F. 1991. Onderzoek naar de oorzaak van de vogelsterfte langs de Nederlandse kust gedurende december 1988 en januari 1989. Centraal Diergeneeskundig Instituut, Report nr. H 121519: 1-55.

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