SNAP CODE: **091007**

SOURCE ACTIVITY TITLE: **OTHER WASTE TREATMENT**
Latrines

NOSE CODE: **109.07.24**

NFR CODE: **6 B 2**

1 ACTIVITIES INCLUDED

This chapter considers ammonia emissions from latrines which are storage tanks of human excreta, located under naturally ventilated wooden shelters.

2 CONTRIBUTION TO TOTAL EMISSIONS

In Poland, the contribution of this activity to total ammonia emissions is about 3%.

Table 1: Contribution to total emissions of the CORINAIR90 inventory (*28 countries*)

Source-activity	SNAP-code*	Contribution to total emissions [%]							
		SO_2	NO_x	NMVOC	CH_4	CO	CO_2	N_2O	NH_3
Latrines	091007	-	-	-	0	-	-	-	0.6

0 = emissions are reported, but the exact value is below the rounding limit (0.1 per cent)
- = no emissions are reported
* = SNAP90 code 090800

This activity is not believed to be a significant source of $PM_{2.5}$ (as of December 2006).

3 GENERAL

3.1 Description

A latrine is a simple "dry" toilet built outside the house, usually in a backyard. A storage tank under the latrine can be a hole dug in the ground, or a concrete reservoir. Capacity of the tank can vary between 1 m^3 and 2 m^3, depending on the family size. The time of storage can vary between a few months and "forever". Tanks are emptied by cesspool emptiers or contents are deposited on an animal manure heap. From time to time chlorinated lime is used for latrines disinfection.

Nitrogen content in human excreta depends on diet, health and physical activity of an individual. A moderately active person with a daily intake of about 300 g of carbohydrates, 100 g of fat and 100 g of proteins excretes about 16 g of nitrogen. Kidneys void 95% of nitrogen and the residual 5% is excreted mostly as N in faeces. A person on European diet voids 80 to 90% of nitrogen as urea (Harper et al, 1983).

Ammonia emissions derive mainly from the decomposition of urea and uric acid. Excreted urea is hydrolysed to NH_3 through the action of microbial urease. The rate of this hydrolysis depends on temperature, pH, amount of urease present and water content. The hydrolysis increases pH of collected urine and faeces to about 9. The decomposition of protein in faeces is a slow process, but during storage, 40 to 70% of total N is converted to the NH_4^+ form (ECETOC, 1994).

Table 2: Daily excretion of nitrogen in normal urine (pH 6.0)

Compound	Quantity [g]	N equivalent [g]
Nitrogen compounds (total)	25 - 35	10 - 14
Urea (50% of solid compounds depends on diet)	25 - 30	10 - 12
Creatinine	1.4 (1 - 1.8)	0.5
Ammonia	0.7 (0.3 - 1)	0.4
Uric acid	0.7 (0.5 - 0.8)	0.2
N in other compounds (e.g. amino acids)		0.5

Source: Harper et al, 1983

Nitrogen is emitted from latrines as NH_3 in a free evaporation process. Ammonia emission from latrines depends on quantity and form of nitrogen compounds in human excreta, as well as on weather conditions.

3.2 Controls

Reduction of ammonia emission from this type of source is possible by installation of water supply and sewage systems, which is possible in particular in towns.

4 SIMPLER METHODOLOGY

As there are no measurements concerning ammonia emission from latrines, only a simpler approach can be used.

5 DETAILED METHODOLOGY

6 RELEVANT ACTIVITY STATISTICS

It is assumed that tenants of urban flats and country houses with no water-flushed toilet have to use latrines outside the house. As it follows from Polish statistical data of 1992, 30% of country houses and 4% of urban flats had no water supply system and 48% of country houses and 14% of urban flats had no water-flushed toilets. The number of people in an average family in town or countryside living together in the same home is needed for estimation of total number of latrines users. Based on that, it was estimated that about 10 million Polish inhabitants (approximately 25% of the population) did not use water- flushed toilets. Changes of that total number during summer holidays is not accounted for.

7 POINT SOURCE CRITERIA

8 EMISSION FACTORS, QUALITY CODES AND REFERENCES

It is assumed that during storage of human excreta for one year about 30% of nitrogen is emitted in ammonia form in the free evaporation process. The basis for this assumption was similarity of latrines to open storage of animal manure in lagoons or ponds. Daily N releases per person is 12 gram and the annual N releases is about 4.4 kg, hence the estimated ammonia emission factor per person equals 1.6 kg NH_3 per year.

9 SPECIES PROFILES

10 UNCERTAINTY ESTIMATES

11 WEAKEST ASPECTS/PRIORITY AREAS FOR IMPROVEMENT IN CURRENT METHODOLOGY

In the simpler methodology only one emission factor is available. There is no distinction between children and adults nor between emission factors for summer and winter.

12 SPATIAL DISAGGREGATION CRITERIA FOR AREA SOURCES

National totals should be disaggregated on the basis of population, taking urban and rural differences in the number of latrines into account.

13 TEMPORAL DISAGGREGATION CRITERIA

14 ADDITIONAL COMMENTS

15 SUPPLEMENTARY DOCUMENTS

16 VERIFICATION PROCEDURES

17 REFERENCES

ECETOC, 1994. Ammonia Emissions to Air in Western Europe. Technical Report No. 62, ECETOC, Brussels.

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Klaassen G., 1991. Past and Future Emissions of Ammonia in Europe, SR 91-01, IIASA, Luxemburg.

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20 POINT OF ENQUIRY

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