

BRANDS TESTING 2011
SNUS, MOIST SNUFF, LOOSE LEAF AND PLUG
PRODUCTS PRODUCED BY
SWEDISH MATCH

Author: Susanne Back

R&A REPORT NO.: 2011/11

R&A REPORT

SUBJECT: Brands Testing
TITLE: Brands Testing 2011 Snus, Moist snuff, Loose leaf and Plug products produced by Swedish Match.
R&A REPORT NO.: R&A Report 2011/11
DATE: 2011-11-17
PROJECT LEADER: Susanne Back

AUTHOR: Susanne Back

PROJECT CO-WORKERS: Mai Trinh, Kristina Andersson, Britte Andersson-Vass, Ingegerd Beckman, Margareta Curvall, David Ericsson, Karin Eriksson, Björn Flodin, Ingrid Forsblom, Siv Fransson, Birgitta Grandin, Johan Lindholm, Fredrik Hodin, Lennart Johansson, Eva Norlén Moritz, Ann Odnevall Rörström, Ann Palmquist, Bihildis Peterson, Christina Poska

CO-OPERATIVE PARTNERS: R&D Chemical Analysis, Owensboro
Eurofins AB, Lidköping
KLAB, Gothenburg

CONTENTS	Page
Introduction.....	4
Results: Analytical data for snus and moist snuff 2011	4
Table 1. GOTHIA TEK® and Internal tolerance limits.....	5
Table 2A-2D. Products included in Brands Testing 2011	11
Table 3 Analytical data for snus and moist snuff produced by Swedish Match 2011	14
Table 4. Age.....	16
Additives: Ethanol	19
Additives: Glycerol	23
Additives: Propylene glycol.....	27
Additives: Sodium chloride	31
Alkaloids: Nicotine	35
Alkaloids: Free Nicotine	42
Alkaloids: Nor nicotine, anabasine and anatabine	50
Acrylamide.....	64
Agrochemicals	68
Ammonium compounds	81
Bacteria	85
Carbamide	89
Ethyl Carbamate.....	93
Metals: Arsenic	97
Metals: Cadmium	102
Metals: Chromium	107
Metals: Lead	111
Metals: Nickel	116
Metals: Potassium.....	120
Metals: Sodium	124
Mycotoxins: Aflatoxins and Ochratoxin.....	129
Nitrate	137
Nitrite	142
Nitrosamines: TSNA	147
Nitrosamines: NDMA	152
Nitrosamines: NSAR.....	156
Nitrosamines: Volatile Nitrosamines	158
Nitrosamines: N-nitrosoalkanolamines.....	160
pH.....	162
PAH: BaP, Sum of Carcinogenic PAHs and Other PAHs	166
Radioisotopes: Po-210, U-235 and U-238	177
Sugars: Glucose, Fructose and Sucrose + Maltose	179
Sugars: Sum sugar	189
Volatile Aldehydes: Formaldehyde and acetaldehyde	193
Water activity.....	200
Water content	204
Moisture	208
Unit Weight.....	212

INTRODUCTION

Brands Testing on snus products produced by Swedish Match has been performed annually since 1988. The snus is sampled from the distribution center in Solna, Sweden where it is stored cold (+4°C) and is usually between 2 and 6 weeks old. This is different than the Chemical Quality Control Program performed each quarter where the samples are collected directly from the production. The test parameters in Brands Testing are more flexible and usually more extensive than for the Chemical Quality Control Program. Since 1998, the annual Brands Testing has been extended to include selected moist snuff products produced by Swedish Match in Owensboro USA. This year, 2011, also the loose leaf and plug products produced by Swedish Match in Owensboro are included. Between 1998-2008, some snus and US moist snuff competitors were included. A number of competitors from Sweden and US were included also this year but the results will be reported in a separate report.

Some of the chemical analyses are only performed on selected brands, which represent different tobacco blends and processes utilized by Swedish Match. The 2011 Brands Testing comprises 45 snus brands, 24 moist snuff brands, 7 loose leaf brands and 6 plug products produced by Swedish Match (see Table 2). In 2010, there were 43 snus and 24 moist snuff products, from Swedish Match. In 2011, the following analytes were added; sodium, potassium and carbamide. Mercury and selenium were not analysed in Brands Testing 2011 (see Table 3). Eight selected snus samples were sent to Labstat in Canada for analysis of radio isotopes, the nitrosamino acid NSAR, nine volatile nitrosamines and two N-nitrosoalkanolamines.

RESULTS AND DISCUSSION

2011 Analytical Data for Snus and Moist Snuff

A summary of the analytical data obtained in the brands testing program is presented in Table 3 for each product category, snus and moist snuff, respectively. The mean values \pm 2 standard deviations are reported.

In 2001, Swedish Match introduced the concept **GOTHIA TEK**[®] which is a quality standard that includes limits for certain controversial compounds in snus. The limits are exclusively for snus. However, in 2002 the Swedish Match Scientific Advisory Committee (SMSAC) set 2001 Swedish Match Target values to be valid for all product categories. The **GOTHIA TEK**[®] limits for snus are the same between 2001-2011. The SM Target values for constituents are the same values as the 2001 **GOTHIA TEK**[®] values except for cadmium (**GOTHIA TEK**[®] limit: 1 ppm, SM Target value: 2 ppm).

As a complement, SMNE has set internal tolerance limits for some constituents and additives (see Table 1). The internal tolerance limits are based on dry weight.

TABLE 1

	Internal limits SMNE	GOTHIA TEK®
TSNA (ppm)	≤ 3	10
NDMA (ppm)	≤ 2.0	10
Nitrite (ppm)	≤ 4	7
BaP (ppb)	≤ 6	20
Arsenic (ppm)	≤ 0.4	0.5
Lead (ppm)	≤ 0.8	2.0
Cadmium (ppm)	≤ 0.8	1.0
Chromium (ppm)	≤ 2.0	3.0
Nickel (ppm)	≤ 4.0	4.5
Nitrate (%)	≤ 2.5	
PG as is (%)	≤ 4.0	
a _w	< 0.90	
Bacteria (log cfu/g)	≤ 4	
Aflatoxins (sum of B1,B2,G1,G2) ppb	≤ 1.7	
Ochratoxin (ppb)	≤ 15.0	
Ethyl carbamate (ppb)	≤ 70	
Ethanol (%)	≤ 3.6	
Acrylamide (ppb)	≤ 1000	

Internal limits and GOTHIA TEK® limits are given on dry weight.

The analytical methods used by R&D Chemical Analysis, Stockholm refer to the SMNE Quality Assurance system, KLS

All analytical data in this report are based on dry weight, calculated on the water content, except for bacteria, a_w, pH, agrochemicals and the radioisotopes. Propylene glycol, nicotine and free nicotine are reported on both dry weight and “as is” (wet weight).

The moisture content is measured as a complement and are not used for the calculation to dry weight.

Values below LOQ are set to 40 % of the LOQ in calculations of sums and averages.

The GOTHIA TEK® compounds

TSNA

The long term strategy to continuously reduce the levels of TSNA in snus products produced by Swedish Match has been successful. The TSNA levels in snus have been stable at a level below 3 ppm for the last 5 years. The 2011 TSNA levels were between 1.1 and 2.3 ppm, which is well below the GOTHIA TEK® limit for 2001 and the internal limit. The snus brands which have TSNA levels above 2 ppm also

have high nicotine levels. Moist snuff and plug from Swedish Match have higher levels as compared to snus (6.1-8.3 ppm and 1.5-12 ppm, respectively). Loose leaf products have low levels, between 1.3-2.1 ppm.

Nitrite

All snus products produced by Swedish Match tested in the Brands Testing have nitrite values below the **GOTHIA TEK**[®] limit of 7 ppm and the internal tolerance limit for SMNE. The snus products have values between <1 and 3 ppm and the moist snuff products between 3 and 16 ppm. The loose leaf products contain <1 - 1 ppm of nitrite and the plug products <1 ppm.

Approximately 5 % of nitrate is endogenously converted to nitrite, this additional contribution to the total nitrite content is significant. If the nitrite from the nitrate is taken into account, all snus, moist snuff and some of the loose leaf and plug products have levels of sodium nitrite well above the Acceptable Daily Intake, ADI.

NDMA

The volatile nitrosamine, NDMA, is included in the **GOTHIA TEK**[®] standard with a limit of 10 ppb. Snus and moist snuff from Swedish Match have values well below this limit. The internal limit for SMNE is 2.0 ppb. Four Snus products have values above the internal limit, Catch Eucalyptus PSWL, General PSWM, General Silver PSOL and Göteborgs Rapé No2 PSWL, the maximum value found is 3.7 ppb. Moist snuff, loose leaf and plug have all levels between <0.6 and 0.6 ppb. The level of NDMA was also analyzed by Labstat in Canada in eight snus products. No NDMA levels above their limit of detection (LOD) of 1.18 ppb was found.

Benzo(a)pyrene

The use of fire-cured tobacco is responsible for the levels of B(a)P in moist snuff products. Fire-cured tobacco has not been used in snus products produced by Swedish Match since 2001. The level of B(a)P in snus products 2011 is between <1 and 3 ppb. Moist snuff products produced by Swedish Match have higher levels (43 – 75 ppb) as fire-cured tobacco is included in the production recipe. Loose leaf and plug have B(a)P levels below the **GOTHIA TEK**[®] limit for B(a)P, 20 ppb, in all tested products except in Red Man Silver Blend which contains 21 ppb. The internal limit for SMNE is 6 ppb.

Arsenic, cadmium, chromium, lead and nickel

The following five metals have limits in the **GOTHIA TEK**[®] standard; arsenic (0.5 ppm), cadmium (1 ppm), chromium (3 ppm), lead (2 ppm), and nickel (4.5 ppm). The concentration of **cadmium**, is above the **GOTHIA TEK**[®] limit in one snus brand, Grovsnus Svart PSWL (1.1 ppm), six snus products have levels above the internal tolerance limit (0.8 ppm). Sixteen out of 24 tested moist snuff products have cadmium values above **GOTHIA TEK**[®] (1.1 – 1.3 ppm). All tested snus and moist snuff, loose leaf and plug brands have concentration of **arsenic, lead, chromium** and **nickel** below the **GOTHIA TEK**[®] limits and the snus products have levels below the internal tolerance limits.

Agrochemicals

Each of nineteen representative snus, eleven moist snuff, five loose leaf and five plug products were screened for 340 agrochemicals. Level of **indoxacarb** were found just above the GRL set in the SM GRL-list 2011 in one of the tested snus brands and **pendimethalin** in one. Levels above GRL of **λ-cyhalothrin** and **propiconazole** were found in ten and eleven tested moist snuff products, respectively. The loose leaf and plug products did not contain any agrochemicals above detection limit.(see Table 5.)

GMO

The following tobacco blends were tested for **GMO**, R1, R2, R10, R13, R15, R16, R18, R19 for snus, 0520, 1220, 1820, for moist snuff and RMO, JDB, RMGB, RMS, GS for loose leaf. No GMO were detected above 0.1 %.

Other compounds

- The **water content** ranges between 21.1 and 53.5 % in snus, between 48.1 and 53.8 % in moist snuff, between 19.2 and 27.0 % in loose leaf and between 16.0 and 20.8 % in plug products.
- **Moisture** ranges between 23.8 and 58.7 % in snus, between 51.9 and 55.7 % in moist snuff, between 23.5 and 27.7 % in loose leaf and between 16.9 and 21.9 % in plug products.
- The **water activity** is less than 0.90 in all snus, moist snuff, loose leaf and plug products. The water activity should be kept below 0.90 to prevent bacterial grow in smokeless tobacco.
- The **pH-value** in snus is between 7.0 and 8.9, between 7.6 and 8.2 in moist snuff, between 5.6 and 6.6 in loose leaf and between 5.1 and 5.9 in plug products.
- The total **nicotine** level *as is* in snus ranges from 0.60 to 1.5 % and between 0.13 to 1.3 % **free nicotine** *as is*. The total nicotine and free nicotine, *as is*, levels in moist snuff are 1.1 – 1.4 mg/g and 0.36 – 0.80 %, respectively, in loose leaf 0.30 – 1.2 % of nicotine *as is* and ≤ 0.01 % of free nicotine *as is* and in plug products 0.76 – 1.6 % nicotine *as is* and ≤ 0.01 % of free nicotine *as is*.
- **Propylene glycol** (PG) is added as a humectants to snus products. The Swedish Food Regulation has set a limit of maximum 4.0 % wet weight. This limit is exceeded in two of the snus products, Grovsnus Svart PSWL (4.1 %) and Röda Lacket PSWL (4.4 %). Loose leaf products contain 0.63 – 2.1 % PG and plug products 0.82 – 2.7 % of PG. **Glycerol** is added to all loose snus products except Probe Lös and to all loose leaf and plug products. The moist snuff products do not contain any PG or glycerol.
- **Sodium chloride** is added to snus and moist snuff as a taste enhancer and also as a preservative. The levels in snus are between 8.3 and 13.3 %, in moist snuff between 11.1 and 18.9 %, in loose leaf and plug products between 1.9 and 5.1 %.
- The concentrations of glucose, fructose and sucrose + maltose is measured individually but also given as the sum of **sugars** (measured as reducing sugars). The sugar content in snus is between 0.59 and 1.9 % and in moist snuff between 0.24 and 0.44 %. The sugar content in loose leaf and plug is between 16 and 38 % except in the loose leaf product Red Man Silver blend which contains only 0.33 % of sugar.
- Two **volatile aldehydes**, acetaldehyde and formaldehyde are measured in snus only. The levels 2009 - 2011 are higher than previous years, the method used by Eurofins is not validated and still needs some work before we can trust the results.
- The total amount of **ammonium** compounds, measured as ammonia, in most snus brands are between 1.1 and 2.5 mg/g. Some of the products which contain licorice have higher concentrations (2.6 – 4.4 mg/g), since ammonium chloride is added to these products. At the pH prevalent in snus produced in Sweden, ammonium ion is the dominant form, since the pKa-value is 9.25.

- The **bacterial count** is low in snus ($<2 - 3.9$ log cfu/g) because of the heat treatment process. All snus brands have levels below the internal tolerance limit for bacteria (SMNE). Moist snuff, loose leaf and plug have higher values (2.0 - 6.5 log cfu/g) because of the fermentation process.
- The **nitrate** content in snus and moist snuff is the same as previous years, between 1.1 and 1.7 % in snus and between 1.8 to 2.3 % in moist snuff. All snus brands have levels below the internal tolerance limit for nitrate (SMNE). The loose leaf products have lower nitrate values, between 0.6 and 0.9 % and plug products between 0.6 and 1.3 %.
- The **acrylamide** content in snus and moist snuff is in the same range as previous years, between 170 and 910 ppb in snus, between 200 and 620 ppb in moist snuff, between 290 and 1100 ppb in loose leaf and between 57 and 1200 ppb in plug products.
- No detectable amounts of **aflatoxins** were found in any snus, moist snuff, loose leaf or plug product. All of the tested snus, moist snuff and loose leaf products have levels of **ochratoxin** close to or just above the limit set by EU for cereals and dried wine fruits, at the same time, the TDI value is not exceeded for a normal user of snus, moist snuff or loose leaf products from Swedish Match. All snus, moist snuff and loose leaf brands have levels below the internal tolerance limits for ochratoxin in snus (15.0 ppb). Two out of six plug products have ochratoxin values above the Swedish Match internal limit. The maximum value 2011 was 48 ppb in Cup Plug.
- The internal tolerance level of **ethyl carbamate** in snus is 70 ppb. Seven snus, 2 moist snuff and 2 plug products have levels above the internal tolerance limit. The maximum value 2011 was 171 ppb in Catch Licorice PSOM.
- The level of **carbamide** in snus and moist snuff range between 140 to 428 ppb and between <20 to 249 ppb in loose leaf and plug. Carbamide and ethanol can form ethyl carbamate.
- The **ethanol** content does not exceed the limit set by Swedish food regulation in any product from Swedish Match. The level of ethanol ranges between 0.17 and 2.7 % in snus, between <0.04 and 1.2 % in moist snuff and between <0.04 and 0.32 in loose leaf and plug products.
- **Polycyclic aromatic hydrocarbons (PAHs)** are divided into carcinogenic PAHs and other PAHs. None of the snus products have measurable levels of carcinogenic PAHs. All moist snuff products have high levels of carcinogenic PAHs. The following carcinogenic PAHs are detected in moist snuff, loose leaf and plug products: B(a)A, B(a)P and chrysene in 2011.
EU has suggested four PAHs, B(a)A, B(a)P B(b)F and chrysene, to be indicators of PAH in food. Values for these four representatives are given in a separate table.
B(a)P and B(a)A have a positive correlation as well as B(a)P and chrysene. For B(a)P values above 5 ppb is the correlation coefficient 0.80 for B(a)P and B(a)A and 0.65 for B(a)P and chrysene.

- Eight snus products were tested for one **Nitrosamino acid (NSAR)** nine **volatile nitrosamines** and two **N-Nitrosoalkanolamines**. Measurable values were found for **NSAR** and one N-nitrosoalkanolamine (**NDELA**).
- The content of **sodium** is between 30 and 58 mg/g in snus, between 60 and 74 ppm in moist snuff and between 3 and 18 mg/g in loose leaf and plug products.
- Snus, loose leaf and plug products contain between 19 and 36 mg/g of **potassium**. Moist snuff contain 35-65 mg/g.
- The radioisotopes ^{210}Po , ^{235}U and ^{238}U were measured in eight snus products. Mainly ^{210}Po was found and at the same levels as in previous tests. The levels found in snus can be compared to 2 or 3 dental x-rays per year, single images, or one week of ambient radiation per year.
- The **age** of the tested snus products ranges from 1 to 10 weeks, the moist snuff products from 1 to 6 weeks, loose leaf from 4 to 16 weeks and plug products from 4 to 16 weeks (see Table 4).

TABLE 2A

Brand	Prod No.	Tobacco blend	Process	Category	Manufacturer
Snus					
Swedish Match:					
01 Original PSOL	4232	R2	Heat process	Snus (pouches)	SMNE
02 Strong PSOL	5645	R19	Heat process	Snus (pouches)	SMNE
Catch Collection PSWM, Chill	2860	R18	Heat process	Snus (pouches)	SMNE
Catch Dry Eucalyptus PSWM	865	R10	Heat process	Snus (pouches)	SMNE
Catch Dry Licorice PSWM	861	R10	Heat process	Snus (pouches)	SMNE
Catch Eucalyptus PSWL	889	R18	Heat process	Snus (pouches)	SMNE
Catch Licorice PSOM	888	R2	Heat process	Snus (pouches)	SMNE
Catch Licorice PSWL	887	R18	Heat process	Snus (pouches)	SMNE
Catch Pure Mint PSW Medium	847	R16	Heat process	Snus (pouches)	SMNE
Ettan Lös	804	R1	Heat process	Snus (loose)	SMNE
Ettan PSOL	875	R2	Heat process	Snus (pouches)	SMNE
Ettan PSWL	876	R18	Heat process	Snus (pouches)	SMNE
General Extra Sterk PSOL	8279	R19	Heat process	Snus (pouches)	SMNE
General Extra Sterk Lös	1235	R19	Heat process	Snus (loose)	SMNE
General Long PSOL	849	R2	Heat process	Snus (pouches)	SMNE
General Long Sterk PSOL	842	R19	Heat process	Snus (pouches)	SMNE
General Lös	852	R1+R13	Heat process	Snus (loose)	SMNE
General Onyx PSWL	892	R15	Heat process	Snus (pouches)	SMNE
General PSOL	880	R2	Heat process	Snus (pouches)	SMNE
General PSOM	879	R2	Heat process	Snus (pouches)	SMNE
General PSWL	881	R18	Heat process	Snus (pouches)	SMNE
General PSWM	869	R18	Heat process	Snus (pouches)	SMNE
General Silver PSOL	878	R2+R11	Heat process	Snus (pouches)	SMNE
General Smooth PSW Medium	848	R16	Heat process	Snus (pouches)	SMNE
General Sterk PSWL	8278	R15	Heat process	Snus (pouches)	SMNE
Göteborgs Prima Fint Lös	828	R1	Heat process	Snus (loose)	SMNE
Göteborgs Rapé Lös	823	R13	Heat process	Snus (loose)	SMNE
Göteborgs Rapé PSWL	874	R18	Heat process	Snus (pouches)	SMNE
Göteborgs Rapé PSWM	873	R18	Heat process	Snus (pouches)	SMNE
Göteborgs Rape No2 PSWL	893	R18	Heat process	Snus (pouches)	SMNE
Grov Lös	844	R13	Heat process	Snus (loose)	SMNE
Grov PSOL	885	R2	Heat process	Snus (pouches)	SMNE
Grov PSWL	884	R18	Heat process	Snus (pouches)	SMNE
Grovsnus Svart PSWL	898	R15	Heat process	Snus (pouches)	SMNE
Kronan Lös	802	R16	Heat process	Snus (loose)	SMNE
Kronan PSOL	872	R16	Heat process	Snus (pouches)	SMNE
Kronan PSWL	894	R18	Heat process	Snus (pouches)	SMNE
Nick (and Johnny) PSOL	895	R19	Heat process	Snus (pouches)	SMNE
Nick&Johnny Strong White PSWL	813	R15	Heat process	Snus (pouches)	SMNE

TABLE 2A CONT'D

Brand	Prod No.	Tobacco blend	Process	Category	Manufacturer
Probe Lös	831	R10	Heat process	Snus (loose)	SMNE
Probe PSOL	871	R10	Heat process	Snus (pouches)	SMNE
Röda Lacket Lös	808	R1	Heat process	Snus (loose)	SMNE
Röda Lacket PSWL	870	R18	Heat process	Snus (pouches)	SMNE
Tre Ankare PSWL	883	R18	Heat process	Snus (pouches)	SMNE
Tre Ankare PSWM	882	R18	Heat process	Snus (pouches)	SMNE

TABLE 2B

Brand	Id. No.	Tobacco blend	Process	Category	Manufacturer
Moist snuff Products					
Swedish Match:					
Longhorn FC Natural	T419	0520	Fermentation	Moist snuff (loose)	SMNA
Longhorn FC Wintergreen	T643	0520	Fermentation	Moist snuff (loose)	SMNA
Longhorn LC Mint	T454	1820	Fermentation	Moist snuff (loose)	SMNA
Longhorn LC Natural	T646	1820	Fermentation	Moist snuff (loose)	SMNA
Longhorn LC Straight	T420	1820	Fermentation	Moist snuff (loose)	SMNA
Longhorn LC Wintergreen	T421	1820	Fermentation	Moist snuff (loose)	SMNA
Longhorn Pouches Straight	T642	0520	Fermentation	Moist snuff (pouches)	SMNA
Longhorn Pouches Wintergreen	T641	0520	Fermentation	Moist snuff (pouches)	SMNA
Red Man FC Natural	T644	0520	Fermentation	Moist snuff (loose)	SMNA
Red Man LC Straight	T538	1820	Fermentation	Moist snuff (loose)	SMNA
Red Man LC Wintergreen	T539	1820	Fermentation	Moist snuff (loose)	SMNA
Renegades Wintergreen	T3	0520	Fermentation	Moist snuff (pouches)	SMNA
Timber Wolf FC Natural	T122	0520	Fermentation	Moist snuff (loose)	SMNA
Timber Wolf FC Wintergreen	T223	1820	Fermentation	Moist snuff (loose)	SMNA
Timber Wolf LC Apple	T452	1820	Fermentation	Moist snuff (loose)	SMNA
Timber Wolf LC Cool Wintergreen	T222	1820	Fermentation	Moist snuff (loose)	SMNA
Timber Wolf LC Mint	T645	1820	Fermentation	Moist snuff (loose)	SMNA
Timber Wolf LC Peach	T451	1820	Fermentation	Moist snuff (loose)	SMNA
Timber Wolf LC Straight	T221	1220	Fermentation	Moist snuff (loose)	SMNA
Timber Wolf LC Wintergreen	T206	1220	Fermentation	Moist snuff (loose)	SMNA
Timber Wolf Packs Mint	T639	0520	Fermentation	Moist snuff (pouches)	SMNA
Timber Wolf Packs Natural	T519	0520	Fermentation	Moist snuff (pouches)	SMNA
Timber Wolf Packs Peach	T640	0520	Fermentation	Moist snuff (pouches)	SMNA
Timber Wolf Packs Wintergreen	T486	0520	Fermentation	Moist snuff (pouches)	SMNA

TABLE 2C

Brand	Id No.	Tobacco blend	Process	Category	Manufacturer
Loose Leaf Products					
Swedish Match:					
Granger Select	T372	GS	not applicable	Loose Leaf	SMNA
J.D.'s Blend	T715	JDB	not applicable	Loose Leaf	SMNA
Red Man Golden Blend	T259	RMGB	not applicable	Loose Leaf	SMNA
Red Man Original	T258	RMO	not applicable	Loose Leaf	SMNA
Red Man Select	T716	RMS	not applicable	Loose Leaf	SMNA
Red Man Silver Blend	T690	RMS	not applicable	Loose Leaf	SMNA
Southern Pride	T260	GS	not applicable	Loose Leaf	SMNA

TABLE 2D

Brand	Id. No.	Tobacco blend	Process	Category	Manufacturer
Plug products					
Swedish Match:					
Apple Thick Plug	T717	Apple	not applicable	Plug	SMNA
Brown Mule Plug	T722	BMP	not applicable	Plug	SMNA
Cup Plug	T718	Cup	not applicable	Plug	SMNA
Days Work Plug	T720	DWP	not applicable	Plug	SMNA
Red Man Plug	T719	RMO	not applicable	Plug	SMNA
Tinsley Plug	T721	TP	not applicable	Plug	SMNA

Codes:

PSWM = Portion Snus White Mini
PSWL = Portion Snus White Large
PSOM = Portion Snus Original Mini
PSOL = Portion Snus Original Large

Lös = Loose Snus
Sterk = Strong
FC = Fine Cut
LC = Long Cut

TABLE 3. ANALYTICAL DATA FOR SNUS, MOIST SNUFF, LL AND PLUG PRODUCED BY SWEDISH MATCH 2011 (AVERAGE±2STDEV)

Swedish Match	Snus	Moist Snuff	Loose Leaf	Plug
	Average ± 2stdev			
Age [weeks]	3.6 ±3.2	2.7±2.2	9.4±7.6	9.7±8.5
Additives: Ethanol [wt%]	Max 2.66	Max 1.2	Max 0.28	Max 0.32
Additives: Glycerol [%]	Max 7.1	<0.2	Max 4.7	Max 3.4
Additives: Propylene glycol as is [%]	Max 4.4	<0.2	0.9±1.0	1.6±1.5
Additives: Sodium chloride [%]	10.7±3.0	15.8±3.8	3.6±0.8	3.8±2.1
Alkaloids: Nicotine [%]	1.6±0.8	2.6±0.3	0.77±0.77	1.3±0.8
Alkaloids: Nicotine as is[%]	0.92±0.54	1.28±0.14	0.59±0.65	1.09±0.65
Alkaloids: Free Nicotine [%]	1.2±0.87	1.05±0.41	0.006±0.009	0.005±0.005
Alkaloids: Free Nicotine as is [%]	0.66±0.48	0.52±0.21	0.005±0.007	0.004±0.004
Alkaloids: Nornicotine [ppm]	284±115	405±58	406±714	1047±1476
Alkaloids: Anabasin [ppm]	71±29	103±12	36±48	70±32
Alkaloids: Anatabine [ppm]	353±274	564±103	269±235	400±137
Acrylamide [ppb]	508±320	431±203	560±553	483±882
Ammonium compounds [mg/g]	2.2±1.7	-	-	-
Bacteria [log cfu/g]	2.4±0.9	5.7±1.6	4.9±0.8	5.4±1.2
Carbamide [ppb]	218±126	341±184	139±105	70.5±98
Ethyl Carbamate [ppb]	33.3±90.9	20.6±48.4	<30	34.2±69.2
Metals: Arsenic [ppm]	<0.10±0.12	<0.10	0.12±0.15	0.13±0.14
Metals: Cadmium [ppm]	0.51±0.34	1.1±0.3	0.66±0.21	0.66±0.44
Metals: Chromium [ppm]	0.69±0.51	0.86±0.49	0.69±0.52	1.3±0.72
Metals: Lead [ppm]	0.25±0.15	0.24±0.13	0.22±0.11	0.19±0.14
Metals: Nickel [ppm]	1.5±0.8	1.2±0.3	0.9±1.3	1.8±0.7
Metals: Sodium [mg/g]	45±13	68±7.8	9.3±1.6	11±9.9
Metals: Potassium [mg/g]	30±6	42±1.6	21±3.2	26±5.8
Mycotoxins: Aflatoxin B1,B2,G1,G2 [ppb]	< 0.84	< 0.84	< 0.84	< 0.84
Mycotoxins: Ochratoxin [ppb]	4.4±4.4	3.7±2.4	4.7±6.0	15.2±33.6
Nitrate [%]	1.4±0.4	2.1±0.2	0.69±0.24	0.88±0.50
Nitrite [ppm]	1.9±1.4	6.4±6.9	<1	<1
Nitrosamines: TSNA [ppm]	1.5±0.6	7.0±1.1	2.4±3.3	5.2±7.4
Nitrosamines: NDMA [ppb] (SM)	1.0±1.5	<0.6	<0.6	<0.6
Nitrosamines: NSAR [ppb]	14.6±15.3	-	-	-

TABLE 3. CONT'D

Swedish Match	Snus	Moist Snuff	Loose Leaf	Plug
	Average \pm 2stddev			
<i>Nitrosamines</i> : NDMA [ppb] (LABSTAT)	<1.2	-	-	-
<i>Nitrosamines</i> :NEMA [ppb]	<1.4	-	-	-
<i>Nitrosamines</i> :NDEA [ppb]	<4.7	-	-	-
<i>Nitrosamines</i> :NDiPA [ppb]	<0.58	-	-	-
<i>Nitrosamines</i> :NDPA [ppb]	<1.5	-	-	-
<i>Nitrosamines</i> :NDBA [ppb]	<2.1	-	-	-
<i>Nitrosamines</i> :NPIP [ppb]	<2.3	-	-	-
<i>Nitrosamines</i> :NPYR [ppb]	<1.7	-	-	-
<i>Nitrosamines</i> :NMOR [ppb]	<1.8	-	-	-
<i>Nitrosamines</i> :NDiPLA [ppb]	<0.64	-	-	-
<i>Nitrosamines</i> : NDELA [ppb]	30.1 \pm 11.5	-	-	-
pH	8.5 \pm 0.8	7.8 \pm 0.3	5.9 \pm 0.7	5.5 \pm 0.5
<i>PAH</i> : BaP [ppb] (SM)	<1 \pm 1.1	55 \pm 17	9.3 \pm 11.1	5.1 \pm 11.0
<i>PAH</i> : Carcinogenic PAHs [ppb]	<72	367 \pm 74	119 \pm 174	52 \pm 243
<i>PAH</i> : Other PAHs [ppb]	147 \pm 197	7612 \pm 1725	2629 \pm 3136	1297 \pm 3787
<i>PAH</i> : Sum of 3 PAHs * + BaP [ppb] (Eurofins)	Max<30+Max 3	Max430+Max75	Max190+Max21	Max303+Max16
<i>Radionuclides</i> : ²¹⁰ Po [Bq/kg]	Max 3	-	-	-
<i>Radionuclides</i> : ²³⁵ U [Bq/kg]	<2	-	-	-
<i>Radionuclides</i> : ²³⁸ U [Bq/kg]	Max 9	-	-	-
<i>Sugars</i> : Glucose [%]	0.28 \pm 0.27	<0.2 \pm 0.17	7.0 \pm 7.1	7.0 \pm 4.0
<i>Sugars</i> : Fructose [%]	0.71 \pm 0.50	<0.1	4.2 \pm 5.4	5.8 \pm 6.6
<i>Sugars</i> : Sucrose + Maltose [%]	<0.1	<0.1	17.6 \pm 19.6	11.7 \pm 14.6
<i>Sugars</i> : Sum sugar [%]	1.1 \pm 0.7	0.28 \pm 0.13	28.9 \pm 26.9	24.3 \pm 10.6
<i>Volatile aldehydes</i> : Formaldehyde [ppm]	19.3 \pm 12.2	13.9 \pm 2.3	2.8 \pm 0.9	7.2 \pm 5.1
<i>Volatile aldehydes</i> : Acetaldehyde [ppm]	35.7 \pm 16.2	28.5 \pm 20.2	5.5 \pm 1.1	7.5 \pm 2.8
Water activity	Max 0.89	Max 0.88	Max 0.75	Max 0.68 \pm
Water content [%]	44.1 \pm 13.1	50.2 \pm 2.2	24.2 \pm 5.1	18.3 \pm 4.2
Moisture [%]	50.4 \pm 14.8	54.2 \pm 2.3	26.1 \pm 2.7	19.3 \pm 3.7
Unit Weight [g]	0.83 \pm 0.44	1.5 \pm 0.41	-	-

*4 PAHs suggested by EU, B(a)A, B(b)F and Chrysene + BaP analyzed by Eurofins

TABLE 4 AGE OF THE PRODUCT AT TIME OF ANALYSIS

BRAND SNUS	Age [weeks]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	2	6							
02 Strong PSOL	1	4							
Catch Collection PSWM, Chill	5	17	10						
Catch Dry Eucalyptus PSWM	4	9	8	4	6	2	5	4	2
Catch Dry Licorice PSWM	4	9	9	6	7	6	5	5	4
Catch Eucalyptus PSWL	4	9	7	4	3	3	6	5	
Catch Licorice PSOM	4	9	7	3	3	3	4	2	3
Catch Licorice PSWL	3	11	6	3	5	4	4	3	3
Catch Pure Mint PSW Medium	5								
Ettan Lös	3	9	7	4	4	3	4	4	4
Ettan PSOL	3	9	7	4	5	3	4	5	6
Ettan PSWL	3	9	6	4	5				
General Extra Sterk PSOL	3	12	3						
General Extra Sterk Lös	4	4	9						
General Long PSOL	4								
General Long Sterk PSOL	1								
General Lös	2	11	7	3	3	3	5	3	4
General Onyx PSWL	2	2	8	5	8	8			
General PSOL	3	9	7	2	3	4	4	4	3
General PSOM	5	8	9	3	4	4	5	6	5
General PSWL	3	8	7	3	3	5	2	4	3
General PSWM	4	9	7	4	4	3			
General Silver PSOL	5	11	6	5	7	8	9	4	5
General Smooth PSW Medium	1								
General Sterk PSWL	1	5	3	1					
Göteborgs Prima Fint Lös	3	13	8	5	5	3	5	3	6
Göteborgs Rapé Lös	4	11	8	4	6	4	3	4	4
Göteborgs Rapé PSWL	3	8	7	3	3	4	4	6	4
Göteborgs Rapé PSWM	5	11	7	5	3	4			
Göteborgs Rape No2 PSWL	4	8	8	4	3				
Grov Lös	4	16	6	4	6	3	6	4	4
Grov PSOL	3	11	7	2	3	5	4	4	3
Grov PSWL	4	8	7	4	4	3	2	4	6
Grovsnus Svart PSWL	4	13	9						
Kronan Lös	4	12	6	5	4				
Kronan PSOL	4	8	6	3	4	2			
Kronan PSWL	3	8	6	3					
Nick (and Johnny) PSOL	10	17	6	6	14				

TABLE 4 CONT'D

BRAND <i>SNUS Cont'd</i>	Age [weeks]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	1								
Probe Lös	6	8	9	6	6	4	5	4	5
Probe PSOL	4	12	8	5	6	5	4	4	4
Röda Lacket Lös	5	12	7	4	4	3	3	4	4
Röda Lacket PSWL	2	14	8	5	5	4			
Tre Ankare PSWL	5	8	7	3	2	4	3	3	4
Tre Ankare PSWM	3	12	7	3	5	3	4	6	4
<i>MOIST SNUFF</i>									
Longhorn FC Natural	3	6							
Longhorn FC Wintergreen	3	9							
Longhorn LC Mint	6	7							
Longhorn LC Natural	2	7							
Longhorn LC Straight	3	6							
Longhorn LC Wintergreen	2	7							
Longhorn Pouches Straight	2	6							
Longhorn Pouches Wintergreen	3	8							
Red Man FC Natural	3	6							
Red Man LC Straight	2	7							
Red Man LC Wintergreen	2	6							
Renegades Wintergreen	2	7							
Timber Wolf FC Natural	3	6							
Timber Wolf FC Wintergreen	2	6							
Timber Wolf LC Apple	1	9							
Timber Wolf LC Cool Wintergreen	5	12							
Timber Wolf LC Mint	1	6							
Timber Wolf LC Peach	2	6							
Timber Wolf LC Straight	3	7							
Timber Wolf LC Wintergreen	3	6							
Timber Wolf Packs Mint	4	7							
Timber Wolf Packs Natural	3	6							
Timber Wolf Packs Peach	2	13							
Timber Wolf Packs Wintergreen	3	6							
<i>LOOSE LEAF</i>									
Granger Select	11								
J.D.'s Blend	7								
Red Man Golden Blend	9								
Red Man Original	11								
Red Man Select	16								

BRAND <i>LOOSE LEAF Cont'd</i>	Age [weeks]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	8								
Southern Pride	4								
<i>PLUG</i>									
Apple Thick Plug	11								
Brown Mule Plug	10								
Cup Plug	11								
Days Work Plug	4								
Red Man Plug	6								
Tinsley Plug	16								

ADDITIVES : Ethanol

Background:

- ❑ Ethanol is added to tobacco products either as a solvent or as a flavor component (rum, whiskey etc).
- ❑ The Swedish läkemedelsverket (MPA) is the authority responsible for, among others, the regulations of the highest alcohol content in foods. For foods other than alcoholic beverages, in addition to composition, alcohol shall be declared in weight percent if it is higher than 1.8 weight percent. The alcohol content is calculated on the product's total net weight.
Examples of foods containing alcohol:
 - *Figs in Cognac*
 - *Liqueur Pralines*
- ❑ Internal tolerance limit for ethanol: 3.6 % (dry weight)

Information of analyses:

Laboratory:	R&D Chemical Analysis Stockholm
Method:	GC-MS
Quantification limits:	0.04 %

BRAND	Ethanol [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
SNUS									
01 Original PSOL	0.43	0.29							
02 Strong PSOL	0.52	0.32							
Catch Collection PSWM, Chill	2.51	2.07							
Catch Dry Eucalyptus PSWM	0.06	0.06					0.07	0.17	0.06
Catch Dry Licorice PSWM	0.05	<0.04					0.14	0.19	0.45
Catch Eucalyptus PSWL	1.56	0.97					0.92	1.20	
Catch Licorice PSOM	0.56	0.33					0.26	0.55	0.48
Catch Licorice PSWL	0.64	0.81					0.63	1.05	1.09
Catch Pure Mint PSW Medium	1.21								
Ettan Lös	0.49	0.38					0.45	0.50	0.36
Ettan PSOL	0.28	0.37					0.31	0.44	0.37
Ettan PSWL	1.03	0.88							
General Extra Sterk Lös	0.67	0.24							
General Extra Sterk PSOL	0.75	0.45							
General Long PSOL	0.26								
General Long Sterk PSOL	0.51								
General Lös	0.43	0.24					0.37	0.37	0.29
General Onyx PSWL	1.5	1.79							
General PSOL	0.26	0.21					0.35	0.24	0.17
General PSOM	0.17	0.14					0.11	0.17	0.18
General PSWL	0.47	0.53					0.58	0.70	0.42
General PSWM	0.44	0.40							
General Silver PSOL	0.51	0.29					0.14	0.24	0.15
General Smooth PSW Medium	0.29								
General Sterk PSWL	0.99	0.85							
Göteborgs Prima Fint Lös	0.56	0.38					0.61	0.65	0.47
Göteborgs Rapé Lös	0.49	0.26					0.40	0.55	0.41
Göteborgs Rapé No2 PSWL	0.59	1.36							
Göteborgs Rapé PSWL	0.60	0.78					0.54	0.66	0.59
Göteborgs Rapé PSWM	1.28	0.49							
Grov Lös	0.57	0.48					0.85	0.86	0.57
Grov PSOL	0.62	0.40					0.33	0.49	0.42
Grov PSWL	0.82	2.29					0.46	0.89	0.63
Grovsnus Svart PSWL	2.39	1.55							
Kronan Lös	0.71	0.71							
Kronan PSOL	0.27	0.67							
Kronan PSWL	0.66	0.80							
Nick (and Johnny) PSOL	0.19	0.34							

BRAND <i>SNUS</i>	Ethanol [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	2.66								
Probe Lös	0.62	0.60					0.96	1.13	0.74
Probe PSOL	0.46	0.40					0.58	0.60	0.49
Röda Lacket Lös	0.51	0.37					0.45	0.65	0.50
Röda Lacket PSWL	2.38	1.06							
Tre Ankare PSWL	0.59	0.46					0.47	0.67	0.43
Tre Ankare PSWM	0.36	0.35					0.41	0.58	0.48
MOIST SNUFF									
Longhorn FC Natural	0.30	0.25					1.84	0.06	
Longhorn FC Wintergreen	0.34	0.27							
Longhorn LC Mint	0.50	0.62					0.37		
Longhorn LC Natural	0.22	0.32							
Longhorn LC Straight	0.67	0.66						0.52	
Longhorn LC Wintergreen	0.32	0.28					0.35	0.06	
Longhorn Pouches Straight	0.21	0.14							
Longhorn Pouches Wintergreen	0.10	0.13							
Red Man FC Natural	0.33	0.29							
Red Man LC Straight	0.41	0.37							
Red Man LC Wintergreen	0.29	0.23							
Renegades Wintergreen	0.11	0.11					0.17	0.09	0.06
Timber Wolf LC Apple	0.33	0.33					0.22		
Timber Wolf FC Natural	0.40	<0.04					0.25	0.26	0.35
Timber Wolf FC Wintergreen	0.19	0.21							
Timber Wolf LC Cool Wintergreen	0.30	0.28							
Timber Wolf LC Mint	0.38	0.31							
Timber Wolf LC Peach	1.2	0.92					1.20		
Timber Wolf LC Straight	0.42	0.36						0.04	0.43
Timber Wolf LC Wintergreen	<0.04	<0.04					0.20	<0.01	0.24
Timber Wolf Packs Mint	0.16	0.24							
Timber Wolf Packs Natural	0.13	0.14							
Timber Wolf Packs Peach	0.60	0.43							
Timber Wolf Packs Wintergreen	0.12	0.09							
LOOSE LEAF									
Granger Select	0.20								
J.D.'s Blend	0.08								
Red Man Golden Blend	0.12								
Red Man Original	0.28								
Red Man Select	0.20								

BRAND <i>LOOSE LEAF Cont'd</i>	Ethanol [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	0.24								
Southern Pride	0.19								
<i>PLUG</i>									
Apple Thick Plug	0.19								
Brown Mule Plug	0.19								
Cup Plug	<0.04								
Days Work Plug	0.32								
Red Man Plug	0.19								
Tinsley Plug	0.22								

ADDITIVES : Glycerol

Background:

- ❑ Glycerol is often added to smokeless tobacco products, in which it primarily acts as a humectant, but also as a preservative.
- ❑ Several authorities around the world request information about the concentration of glycerol in smokeless tobacco products.
- ❑ The highest permissible levels of glycerol in snus: quantum satis (Swedish Food Regulation, Sweden) and 10 % dry weight (German Tobacco Ordinance, Germany).

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm.

Method: 1999 – 2004: GC-FID KLS, ”Kvantitativ analys av mjukgörare ”
2005 – Present: HPLC-RID KLS, ”Kvantitativ HPLC/RID- analys
socker och mjukgörare ”

Quantification limits: 1999 – 2004: 0.2 %
2005 – Present: 0.2 %

BRAND SNUS	Glycerol [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	<0.2	<0.2							
02 Strong PSOL	<0.2	<0.2							
Catch Collection PSWM, Chill	<0.2	<0.2	<0.2						
Catch Dry Eucalyptus PSWM	<0.2	<0.2	<0.2	0.27	<0.2	<0.2	<0.2	<0.2	<0.2
Catch Dry Licorice PSWM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.5
Catch Eucalyptus PSWL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Catch Licorice PSOM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.5
Catch Licorice PSWL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3
Catch Pure Mint PSW Medium	<0.2								
Ettan Lös	5.9	5.7	5.5	5.7	5.1	6.1	5.9	6.1	5.7
Ettan PSOL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ettan PSWL	<0.2	<0.2	<0.2	<0.2	<0.2				
General Extra Sterk PSOL	<0.2	<0.2	<0.2						
General Extra Sterk Lös	5.8	5.6	5.4						
General Long PSOL	<0.2								
General Long Sterk PSOL	<0.2								
General Lös	5.9	5.6	5.6	5.7	5.1	6.1	5.8	6.2	6.1
General Onyx PSWL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			
General PSOL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
General PSOM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.5
General PSWL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	6.2
General PSWM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			
General Silver PSOL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
General Smooth PSW Medium	<0.2								
General Sterk PSWL	<0.2	<0.2	<0.2	<0.2					
Göteborgs Prima Fint Lös	5.1	5.4	5.0	5.5	5.3	6.5	6.7	7.3	7.0
Göteborgs Rapé Lös	6.6	6.8	6.0	7.1	6.8	7.1	7.2	7.5	7.0
Göteborgs Rapé PSWL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	6.5
Göteborgs Rapé PSWM	<0.2	<0.2	<0.2	<0.2	0.45	<0.2			
Göteborgs Rape No2 PSWL	<0.2	<0.2	<0.2	<0.2	<0.2				
Grov Lös	7.0	7.2	6.9	7.1	6.4	7.3	7.2	7.6	7.4
Grov PSOL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3
Grov PSWL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	6.7
Grovsnus Svart PSWL	<0.2	<0.2	<0.2						
Kronan Lös	7.1	6.7	6.2	7.1	6.9				
Kronan PSOL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			
Kronan PSWL	<0.2	<0.2	<0.2	<0.2					
Nick (and Johnny) PSOL	<0.2	<0.2	<0.2	<0.2	<0.2				

BRAND <i>SNUS Cont'd</i>	Glycerol [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	<0.2								
Probe Lös	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Probe PSOL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Röda Lacket Lös	5.5	5.4	5.3	5.4	4.7	5.8	5.5	5.7	5.6
Röda Lacket PSWL	<0.2	<0.2	<0.2						
Tre Ankare PSWL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Tre Ankare PSWM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.5
MOIST SNUFF									
Longhorn FC Natural	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Longhorn FC Wintergreen	<0.2	<0.2							
Longhorn LC Mint	<0.2	<0.2				<0.2	<0.2		
Longhorn LC Natural	<0.2	<0.2							
Longhorn LC Straight	<0.2	<0.2			<0.2			<0.2	
Longhorn LC Wintergreen	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	
Longhorn Pouches Straight	<0.2	<0.2							
Longhorn Pouches Wintergreen	<0.2	<0.2							
Red Man FC Natural	<0.2	<0.2		<0.2					
Red Man LC Straight	<0.2	<0.2		<0.2					
Red Man LC Wintergreen	<0.2	<0.2		<0.2					
Renegades Wintergreen	<0.2	<0.2			<0.2	<0.2	<0.2	<0.2	<0.2
Timber Wolf FC Natural	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Timber Wolf FC Wintergreen	<0.2	<0.2							
Timber Wolf LC Apple	<0.2	<0.2			<0.2		<0.2		
Timber Wolf LC Cool Wintergreen	<0.2	<0.2							
Timber Wolf LC Mint	<0.2	<0.2							
Timber Wolf LC Peach	<0.2	<0.2		<0.2		<0.2	<0.2		
Timber Wolf LC Straight	<0.2	<0.2						<0.2	<0.2
Timber Wolf LC Wintergreen	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Timber Wolf Packs Mint	<0.2	<0.2							
Timber Wolf Packs Natural	<0.2	<0.2		<0.2	<0.2				
Timber Wolf Packs Peach	<0.2	<0.2							
Timber Wolf Packs Wintergreen	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			
LOOSE LEAF									
Granger Select	4.7								
J.D.'s Blend	4.1								
Red Man Golden Blend	4.2								
Red Man Original	1.3								
Red Man Select	4.3								

BRAND <i>LOOSE LEAF Cont'd</i>	Glycerol [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	3.9								
Southern Pride	4.5								
<i>PLUG</i>									
Apple Thick Plug	1.3								
Brown Mule Plug	1.1								
Cup Plug	1.1								
Days Work Plug	2.8								
Red Man Plug	3.4								
Tinsley Plug	0.99								

ADDITIVES : Propylene glycol

Background:

- ❑ Propylene glycol is added to smokeless tobacco products, where it primarily acts as a humectants, but also as a preservative.
- ❑ Several authorities around the world request information about the concentration of propylene glycol in smokeless tobacco products.
- ❑ The highest permissible level of propylene glycol in SNUS 4 % wet weight (Swedish Food Regulation, Sweden).
- ❑ Internal tolerance limit, SMNE: 4.0 % as is
- ❑ Propylene glycol is permitted in “schnupftabak” (10 % based on dry weight) but not in “kautabak” in Germany (German Tobacco Ordinance). Snus is classified as kautabak in Germany.

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm.

Method: 1999 – 2004: GC-FID Kvantitativ analys av mjukgörare
2005 – Present: HPLC-RID KLS, ”Kvantitativ HPLC/RID-analys av socker och mjukgörare”

Quantification limits: 1999 – 2004: 0.2 %
2005 – Present: 0.2 %

BRAND SNUS	Propylene glycol [%]									
	2011 Wet wt	2011 Dry wt	2010 Dry	2009 Dry	2008 Dry	2007 Dry	2006 Dry	2005 Dry	2004 Dry	2003 Dry
01 Original PSOL	3.1	5.2	4.7							
02 Strong PSOL	2.8	4.7	4.8							
Catch Collection PSWM, Chill	3.7	6.6	6.5	7.2						
Catch Dry Eucalyptus PSWM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Catch Dry Licorice PSWM	<0.2	<0.2	<0.2	<0.2	<0.2	0.28	0.4	0.3	<0.2	<0.2
Catch Eucalyptus PSWL	3.5	6.4	6.0	6.3	6.5	6.0	5.6	6.2	6.5	
Catch Licorice PSOM	4.0	7.4	7.0	6.2	6.7	6.4	6.9	6.4	7.4	6.5
Catch Licorice PSWL	3.3	6.4	6.0	6.0	6.5	5.9	6.1	6.6	7.0	6.1
Catch Pure Mint PSW Medium	<0.2	<0.2								
Ettan Lös	3.4	7.4	6.8	6.6	6.9	6.3	7.3	7.2	7.7	7.0
Ettan PSOL	3.3	6.2	6.6	5.8	6.7	5.9	7.2	7.2	6.5	6.7
Ettan PSWL	3.4	6.4	6.1	6.3	6.4	6.2				
General Extra Sterk PSOL	3.3	5.5	5.4	5.0						
General Extra Sterk Lös	3.3	6.9	6.5	6.3						
General Long PSOL	3.1	5.2								
General Long Sterk PSOL	2.7	4.5								
General Lös	3.4	7.3	6.7	6.6	6.9	6.2	7.4	6.9	7.5	7.4
General Onyx PSWL	3.5	6.6	6.4	6.6	7.1	6.1	5.5			
General PSOL	3.2	5.9	6.1	5.7	6.8	6.1	5.9	7.1	7.9	5.8
General PSOM	3.9	6.9	6.5	6.1	7.2	6.7	6.7	5.9	7.2	6.0
General PSWL	3.3	6.1	5.8	6.0	6.3	6.0	6.1	6.4	6.6	5.9
General PSWM	3.4	6.0	5.6	5.8	6.2	5.8	5.8			
General Silver PSOL	3.2	5.4	5.5	5.8	6.2	5.7	7.1	7.1	8.6	6.5
General Smooth PSW Medium	<0.2	<0.2								
General Sterk PSWL	3.2	6.0	5.6	5.8	6.4					
Göteborgs Prima Fint Lös	3.8	7.1	6.9	6.7	7.1	6.9	6.9	7.2	7.8	7.4
Göteborgs Rapé Lös	3.5	6.9	6.9	6.2	7.2	6.9	7.3	7.4	7.6	7.0
Göteborgs Rapé PSWL	3.4	6.2	5.9	5.6	6.3	6.1	5.9	6.5	6.5	6.3
Göteborgs Rapé PSWM	3.3	6.2	5.9	5.8	6.1	6.9	6.2			
Göteborgs Rapé No2 PSWL	3.5	6.5	6.4	6.1	6.7	6.2				
Grov Lös	3.6	7.3	7.4	6.9	7.2	6.5	7.3	7.3	7.7	7.4
Grov PSOL	3.5	6.6	6.5	5.7	6.7	6.7	6.2	7.3	7.2	6.6
Grov PSWL	3.6	6.7	7.1	6.0	6.8	6.4	6.3	6.5	6.6	6.6
Grovsnus Svart PSWL	4.1	7.3	6.8	6.3						
Kronan Lös	3.6	7.5	6.9	6.6	7.5	7.1				
Kronan PSOL	3.2	5.6	5.7	5.4	6.5	6.0	6.6			
Kronan PSWL	3.4	6.2	6.2	5.8	6.2					
Nick (and Johnny) PSOL	3.0	4.9	4.8	4.7	6.1	5.2				

BRAND <i>SNUS Cont'd</i>	Propylene glycol [%]									
	2011 Wet wt	2011 Dry wt	2010 Dry	2009 Dry	2008 Dry	2007 Dry	2006 Dry	2005 Dry	2004 Dry	2003 Dry
Nick&Johnny Strong White PSWL	4.0	7.0								
Probe Lös	3.8	7.2	6.2	6.6	7.3	6.5	7.3	7.1	7.4	7.1
Probe PSOL	3.7	6.8	6.2	6.3	7.7	7.2	6.6	7.4	7.2	7.0
Röda Lacket Lös	3.9	7.8	7.3	7.0	7.6	6.8	7.8	7.6	8.1	7.7
Röda Lacket PSWL	4.4	8.0	7.0	6.9	7.2	7.0	7.0			
Tre Ankare PSWL	3.2	6.0	5.8	5.8	6.5	6.0	5.6	6.4	6.6	6.8
Tre Ankare PSWM	3.2	6.0	5.8	5.8	6.1	5.9	5.7	7.1	8.2	6.8
MOIST SNUFF										
Longhorn FC Natural	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	2.7	2.8	2.4	
Longhorn FC Wintergreen	<0.2	<0.2	<0.2							
Longhorn LC Mint	<0.2	<0.2	<0.2				<0.2	<0.2		
Longhorn LC Natural	<0.2	<0.2	<0.2							
Longhorn LC Straight	<0.2	<0.2	0.47			0.42			<0.2	
Longhorn LC Wintergreen	<0.2	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	
Longhorn Pouches Straight	<0.2	<0.2	<0.2							
Longhorn Pouches Wintergreen	<0.2	<0.2	<0.2							
Red Man FC Natural	<0.2	<0.2	<0.2		<0.2					
Red Man LC Straight	<0.2	<0.2	<0.2		<0.2					
Red Man LC Wintergreen	<0.2	<0.2	<0.2		<0.2					
Renegades Wintergreen	0.71	1.4	1.4			1.3	1.3	1.4	1.4	1.2
Timber Wolf FC Natural	<0.2	<0.2	<0.2		<0.2	2.9	2.9	2.9	2.7	2.6
Timber Wolf FC Wintergreen	<0.2	<0.2	<0.2							
Timber Wolf LC Apple	0.26	0.51	<0.2			0.42		0.5		
Timber Wolf LC Cool Wintergreen	<0.2	<0.2	<0.2							
Timber Wolf LC Mint	<0.2	<0.2	<0.2							
Timber Wolf LC Peach	<0.2	<0.2	<0.2		<0.2		<0.2	1.0		
Timber Wolf LC Straight	<0.2	<0.2	<0.2						<0.2	<0.2
Timber Wolf LC Wintergreen	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Timber Wolf Packs Mint	<0.2	<0.2	<0.2							
Timber Wolf Packs Natural	<0.2	<0.2	<0.2		<0.2	<0.2				
Timber Wolf Packs Peach	0.29	0.58	0.77							
Timber Wolf Packs Wintergreen	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			
LOOSE LEAF										
Granger Select	0.83	1.1								
J.D.'s Blend	0.72	0.96								
Red Man Golden Blend	0.63	0.83								
Red Man Original	2.1	2.5								
Red Man Select	0.66	0.91								

BRAND	Propylene glycol [%]									
	2011 Wet wt	2011 Dry wt	2010 Dry	2009 Dry	2008 Dry	2007 Dry	2006 Dry	2005 Dry	2004 Dry	2003 Dry
<i>LOOSE LEAF Cont'd</i>										
Red Man Silver Blend	0.88	1.2								
Southern Pride	0.71	0.96								
<i>PLUG</i>										
Apple Thick Plug	2.0	2.5								
Brown Mule Plug	2.1	2.5								
Cup Plug	2.7	3.2								
Days Work Plug	1.3	1.7								
Red Man Plug	0.82	1.0								
Tinsley Plug	0.87	1.0								

ADDITIVES : Sodium chloride

Background:

- ❑ Sodium chloride is added to snus produced in Sweden as a taste enhancer and preservative.
- ❑ Chloride ions are present naturally in tobacco and the concentration varies with for example cultivation, soil and fertilization rate.
- ❑ There are studies indicating that a high intake of sodium chloride might increase blood pressure.

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm.

Method: Chloride ions / Titrator KLS ”Bestämning av kloridjon”
(calculated as sodium chloride)

Quantification limits: 0.2 %

BRAND SNUS	Sodium chloride [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	10.7	8.8							
02 Strong PSOL	8.8	8.9							
Catch Collection PSWM, Chill	11.2	11.6	9.8						
Catch Dry Eucalyptus PSWM	10.6	10.6	10.9	11.0	10.4	10.6	10.7	11.2	11.6
Catch Dry Licorice PSWM	10.9	11.7	11.0	11.8	10.9	11.6	11.9	11.5	11.8
Catch Eucalyptus PSWL	12.4	12.5	11.9	12.6	12.5	12.9	11.7	14.1	
Catch Licorice PSOM	8.9	9.5	8.8	9.3	9.4	10.2	9.3	9.9	9.2
Catch Licorice PSWL	13.0	12.8	11.8	12.5	12.7	13.6	13.1	14.2	9.9
Catch Pure Mint PSW Medium	10.5								
Ettan Lös	13.0	12.6	12.5	12.9	12.4	13.3	13.2	13.5	13.3
Ettan PSOL	8.3	7.6	7.4	7.9	8.4	8.9	7.9	9.0	9.2
Ettan PSWL	11.9	11.8	10.7	12.1	12.1				
General Extra Sterk PSOL	9.2	10.6	8.7						
General Extra Sterk Lös	13.2	13.1	12.7						
General Long PSOL	8.5								
General Long Sterk PSOL	10.2								
General Lös	12.7	12.5	12.6	13.0	12.5	13.7	12.6	13.7	14.8
General Onyx PSWL	12.2	12.4	12.0	13.2	10.9	11.1			
General PSOL	8.5	8.8	8.7	9.0	8.9	9.4	9.0	9.6	9.5
General PSOM	8.3	8.3	7.4	9.2	9.5	10.1	9.3	11.7	9.6
General PSWL	11.6	11.8	10.8	11.7	12.4	12.3	12.1	13.0	9.8
General PSWM	11.2	11.6	10.9	11.9	12.5	12.1			
General Silver PSOL	8.7	8.6	9.2	9.2	8.8	9.4	7.5	10.0	10.8
General Smooth PSW Medium	10.3								
General Sterk PSWL	11.1	11.1	11.1	12.2					
Göteborgs Prima Fint Lös	11.4	11.4	11.0	11.9	12.3	11.4	11.5	11.8	12.2
Göteborgs Rapé Lös	12.1	12.4	12.2	13.3	13.2	13.7	13.8	13.7	13.9
Göteborgs Rapé PSWL	11.6	11.7	10.0	11.9	12.2	11.6	12.8	13.2	11.1
Göteborgs Rapé PSWM	11.8	11.4	10.1	12.4	12.1	12.0			
Göteborgs Rape´No2 PSWL	11.6	11.8	10.3	11.6	11.9				
Grov Lös	11.0	11.1	11.4	11.7	10.7	12.0	11.6	12.6	12.6
Grov PSOL	8.7	8.2	7.7	9.5	9.2	10.3	10.8	10.0	9.6
Grov PSWL	11.8	12.0	9.8	12.6	12.3	11.9	12.9	12.2	11.3
Grovsnus Svart PSWL	10.5	12.4	11.1						
Kronan Lös	11.9	11.9	11.7	12.9	12.6				
Kronan PSOL	9.3	9.4	9.2	10.0	8.9	10.3			
Kronan PSWL	11.6	11.9	10.6	12.8					
Nick (and Johnny) PSOL	9.2	9.9	9.2	9.9	9.4				

BRAND <i>SNUS Cont'd</i>	Sodium Chloride [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	9.6								
Probe Lös	13.3	13.1	13.2	14.2	12.5	13.7	13.7	14.5	14.2
Probe PSOL	9.1	9.2	8.5	9.5	8.9	9.6	9.7	10.4	10.5
Röda Lacket Lös	8.7	11.6	11.3	12.0	11.4	12.6	12.5	11.3	13.3
Röda Lacket PSWL	10.9	11.6	10.3	12.5	11.8	12.3			
Tre Ankare PSWL	11.2	12.0	10.9	11.4	12.3	12.3	12.9	12.9	13.3
Tre Ankare PSWM	11.5	11.4	11.2	11.0	12.4	12.0	9.0	10.7	9.1
MOIST SNUFF									
Longhorn FC Natural	18.9	19.6	19.9	19.9	19.1	19.5	19.3	19.1	
Longhorn FC Wintergreen	17.0	17.9							
Longhorn LC Mint	18.3	19.1				19.1	18.7		
Longhorn LC Natural	18.8	20.2							
Longhorn LC Straight	16.9	17.8			17.4			18.6	
Longhorn LC Wintergreen	16.3	16.7	16.9		16.9	16.9	17.5	15.6	
Longhorn Pouches Straight	14.0	15.0							
Longhorn Pouches Wintergreen	14.0	14.6							
Red Man FC Natural	16.6	17.6		18.2					
Red Man LC Straight	16.1	17.6		17.8					
Red Man LC Wintergreen	15.8	17.5		17.4					
Renegades Wintergreen	11.1	13.6			14.2	13.8	13.0	14.2	12.9
Timber Wolf FC Natural	16.0	17.0		16.5	17.0	17.0	16.8	18.0	16.9
Timber Wolf FC Wintergreen	14.8	16.1							
Timber Wolf LC Apple	15.7	17.5			16.3		16.0		
Timber Wolf LC Cool Wintergreen	17.2	16.6							
Timber Wolf LC Mint	17.8	19.3							
Timber Wolf LC Peach	15.7	16.8		16.9		16.5	15.2		
Timber Wolf LC Straight	15.3	16.4						17.0	15.4
Timber Wolf LC Wintergreen	17.0	16.5	16.5	15.0	15.9	15.9	16.8	17.2	15.8
Timber Wolf Packs Mint	13.4	14.7							
Timber Wolf Packs Natural	14.4	15.1		13.9	14.9				
Timber Wolf Packs Peach	13.0	14.2							
Timber Wolf Packs Wintergreen	14.3	14.2	14.8	13.1	15.4	14.1			
LOOSE LEAF									
Granger Select	3.4								
J.D.'s Blend	3.7								
Red Man Golden Blend	3.2								
Red Man Original	4.2								
Red Man Select	3.1								

BRAND	Sodium Chloride								
	[%]								
<i>LOOSE LEAF Cont'd</i>	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	3.9								
Southern Pride	3.4								
<i>PLUG</i>									
Apple Thick Plug	4.1								
Brown Mule Plug	4.1								
Cup Plug	4.1								
Days Work Plug	5.1								
Red Man Plug	3.6								
Tinsley Plug	1.9								

ALKALOIDS : Nicotine

Background:

- ❑ Several authorities around the world request information about the concentration of nicotine in smokeless tobacco products.
- ❑ The concentrations of nicotine are made available to snus consumers on the **GOTHIA TEK**[®] site (www.svensktsnus.se) and labelled as a percentage on the can.

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm.

Method: GC-FID KLS, "Kvantitativ analys av alkaloider"

Quantification limits: 0.02 %

BRAND SNUS	Nicotine [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	1.5	1.8							
02 Strong PSOL	2.6	2.5							
Catch Collection PSWM, Chill	1.4	1.3	1.4						
Catch Dry Eucalyptus PSWM	2.0	2.0	2.0	1.9	2.0	1.9	2.1	1.9	1.9
Catch Dry Licorice PSWM	1.8	2.0	2.0	1.9	2.0	2.0	2.1	2.0	1.9
Catch Eucalyptus PSWL	1.5	1.5	1.5	1.4	1.5	1.6	1.4	1.5	
Catch Licorice PSOM	1.2	1.5	1.4	1.3	1.5	1.4	1.3	1.4	1.5
Catch Licorice PSWL	1.4	1.5	1.5	1.3	1.5	1.5	1.5	1.5	1.5
Catch Pure Mint PSW Medium	1.6								
Ettan Lös	1.5	1.5	1.6	1.4	1.3	1.5	1.5	1.6	1.6
Ettan PSOL	1.5	1.5	1.4	1.4	1.4	1.5	1.6	1.5	1.7
Ettan PSWL	1.4	1.5	1.5	1.4	1.5				
General Extra Sterk PSOL	2.3	2.6	2.3						
General Extra Sterk Lös	2.5	2.5	2.4						
General Long PSOL	1.4								
General Long Sterk PSOL	2.5								
General Lös	1.6	1.5	1.5	1.4	1.5	1.6	1.6	1.6	1.6
General Onyx PSWL	2.3	2.5	2.3	2.1	1.9	1.7			
General PSOL	1.4	1.5	1.5	1.4	1.5	1.6	1.5	1.5	1.5
General PSOM	1.3	1.5	1.4	1.5	1.5	1.6	1.6	1.8	1.5
General PSWL	1.4	1.5	1.5	1.4	1.6	1.5	1.6	1.7	1.4
General PSWM	1.3	1.5	1.4	1.4	1.6	1.5			
General Silver PSOL	1.0	1.0	1.0	0.95	0.98	1.1	1.0	1.1	1.2
General Smooth PSW Medium	1.6								
General Sterk PSWL	2.3	2.3	2.0	2.2					
Göteborgs Prima Fint Lös	1.3	1.5	1.4	1.3	1.4	1.6	1.6	1.6	1.5
Göteborgs Rapé Lös	1.3	1.5	1.5	1.4	1.6	1.5	1.5	1.7	1.5
Göteborgs Rapé PSWL	1.4	1.5	1.5	1.4	1.6	1.5	1.6	1.6	1.4
Göteborgs Rapé PSWM	1.5	1.5	1.4	1.4	1.6	1.5			
Göteborgs Rape No2 PSWL	1.4	1.5	1.5	1.4	1.6				
Grov Lös	1.5	1.5	1.5	1.5	1.4	1.5	1.5	1.6	1.6
Grov PSOL	1.4	1.5	1.4	1.4	1.6	1.5	1.6	1.6	1.6
Grov PSWL	1.4	1.5	1.5	1.5	1.6	1.5	1.6	1.4	1.6
Grovsnus Svart PSWL	2.2	2.4	2.3						
Kronan Lös	1.5	1.5	1.4	1.4	1.6				
Kronan PSOL	1.4	1.5	1.3	1.4	1.4	1.5			
Kronan PSWL	1.4	1.5	1.4	1.4					
Nick (and Johnny) PSOL	2.0	2.2	2.3	2.1	1.8				

BRAND <i>SNUS Cont'd</i>	Nicotine [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	2.2								
Probe Lös	1.9	2.0	2.0	1.9	1.9	2.0	2.0	2.0	1.9
Probe PSOL	1.8	1.8	1.8	1.7	1.8	1.8	1.9	1.9	1.9
Röda Lacket Lös	1.3	1.5	1.4	1.3	1.2	1.2	1.4	1.4	1.6
Röda Lacket PSWL	1.4	1.5	1.4	1.5	1.5	1.5			
Tre Ankare PSWL	1.4	1.5	1.5	1.4	1.5	1.6	1.7	1.6	1.8
Tre Ankare PSWM	1.4	1.5	1.4	1.3	1.5	1.5	1.5	1.6	1.6
MOIST SNUFF									
Longhorn FC Natural	2.5	2.6	2.3	2.6	2.5	2.4	2.5	2.6	
Longhorn FC Wintergreen	2.7	3.0							
Longhorn LC Mint	2.7	2.8				2.9	2.8		
Longhorn LC Natural	2.4	2.8							
Longhorn LC Straight	2.7	3.0			2.8			3.1	
Longhorn LC Wintergreen	2.6	2.5	2.4		2.7	2.7	2.6	2.7	
Longhorn Pouches Straight	2.5	2.6							
Longhorn Pouches Wintergreen	2.4	2.2							
Red Man FC Natural	2.6	2.8		2.9					
Red Man LC Straight	2.6	2.6		2.9					
Red Man LC Wintergreen	2.6	3.0		2.8					
Renegades Wintergreen	2.4	2.3			2.5	2.5	2.5	3.0	2.9
Timber Wolf FC Natural	2.7	3.0		2.9	3.0	2.8	2.7	3.1	3.0
Timber Wolf FC Wintergreen	2.8	2.9							
Timber Wolf LC Apple	2.6	2.5			2.7		2.7		
Timber Wolf LC Cool Wintergreen	2.7	2.7							
Timber Wolf LC Mint	2.8	2.8							
Timber Wolf LC Peach	2.6	2.6		2.7		2.7	2.5		
Timber Wolf LC Straight	2.8	3.2						3.0	3.1
Timber Wolf LC Wintergreen	2.7	3.2	2.7	2.8	2.9	2.7	2.8	3.0	3.1
Timber Wolf Packs Mint	2.3	2.5							
Timber Wolf Packs Natural	2.5	2.8		2.3	2.5				
Timber Wolf Packs Peach	2.3	2.3							
Timber Wolf Packs Wintergreen	2.5	2.7	2.3	2.5	2.6	2.6			
LOOSE LEAF									
Granger Select	0.39								
J.D.'s Blend	0.5								
Red Man Golden Blend	0.95								
Red Man Original	1.5								
Red Man Select	0.81								

BRAND <i>LOOSE LEAF Cont'd</i>	Nicotine [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	0.45								
Southern Pride	0.76								
PLUG									
Apple Thick Plug	1.6								
Brown Mule Plug	1.1								
Cup Plug	2.0								
Days Work Plug	1.2								
Red Man Plug	0.95								
Tinsley Plug	1.2								

BRAND SNUS	Nicotine as is [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	0.90	1.05							
02 Strong PSOL	1.54	1.49							
Catch Collection PSWM, Chill	0.76	0.74	0.77						
Catch Dry Eucalyptus PSWM	1.54	1.57	1.54	1.45	1.57	1.49	1.61	1.46	1.48
Catch Dry Licorice PSWM	1.43	1.57	1.59	1.48	1.59	1.57	1.64	1.57	1.47
Catch Eucalyptus PSWL	0.82	0.79	0.81	0.74	0.83	0.83	0.76	0.75	
Catch Licorice PSOM	0.68	0.78	0.79	0.74	0.86	0.77	0.69	0.79	0.82
Catch Licorice PSWL	0.75	0.79	0.8	0.68	0.82	0.75	0.76	0.73	0.74
Catch Pure Mint PSW Medium	1.05								
Ettan Lös	0.71	0.73	0.79	0.67	0.68	0.72	0.73	0.76	0.8
Ettan PSOL	0.79	0.83	0.77	0.75	0.82	0.8	0.83	0.82	0.92
Ettan PSWL	0.75	0.80	0.82	0.73	0.78				
General Extra Sterk PSOL	1.42	1.51	1.32						
General Extra Sterk Lös	1.20	1.21	1.22						
General Long PSOL	0.84								
General Long Sterk PSOL	1.49								
General Lös	0.72	0.74	0.74	0.69	0.8	0.76	0.79	0.77	0.76
General Onyx PSWL	1.24	1.30	1.28	1.11	1.1	0.94			
General PSOL	0.79	0.86	0.82	0.75	0.85	0.9	0.81	0.77	0.81
General PSOM	0.71	0.82	0.77	0.77	0.77	0.86	0.87	0.87	0.84
General PSWL	0.76	0.83	0.80	0.72	0.82	0.76	0.79	0.83	0.76
General PSWM	0.74	0.79	0.77	0.73	0.82	0.76			
General Silver PSOL	0.60	0.6	0.54	0.51	0.57	0.56	0.51	0.55	0.63
General Smooth PSW Medium	1.04								
General Sterk PSWL	1.21	1.19	1.05	1.11					
Göteborgs Prima Fint Lös	0.67	0.77	0.73	0.64	0.70	0.80	0.78	0.76	0.73
Göteborgs Rapé Lös	0.67	0.74	0.75	0.67	0.76	0.71	0.71	0.8	0.73
Göteborgs Rapé PSWL	0.77	0.82	0.81	0.72	0.8	0.77	0.8	0.8	0.73
Göteborgs Rapé PSWM	0.77	0.82	0.76	0.73	0.82	0.77			
Göteborgs Rape´No2 PSWL	0.76	0.83	0.81	0.73	0.85				
Grov Lös	0.72	0.75	0.74	0.72	0.75	0.73	0.72	0.74	0.78
Grov PSOL	0.77	0.82	0.82	0.72	0.86	0.81	0.81	0.88	0.84
Grov PSWL	0.75	0.79	0.8	0.75	0.82	0.76	0.8	0.71	0.82
Grovsnus Svart PSWL	1.21	1.22	1.2						
Kronan Lös	0.74	0.75	0.7	0.65	0.76				
Kronan PSOL	0.80	0.87	0.73	0.78	0.80	0.81			
Kronan PSWL	0.74	0.82	0.74	0.73					
Nick (and Johnny) PSOL	1.24	1.32	1.38	1.16	1.06				

BRAND <i>SNUS Cont'd</i>	Nicotine as is [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	1.25								
Probe Lös	1.01	1.09	1.08	0.98	1.09	1.06	1.07	1.04	1.01
Probe PSOL	0.99	1.06	0.99	0.88	0.95	0.97	0.99	0.99	1.01
Röda Lacket Lös	0.68	0.76	0.76	0.68	0.65	0.6	0.71	0.71	0.8
Röda Lacket PSWL	0.77	0.81	0.73	0.78	0.79	0.76			
Tre Ankare PSWL	0.76	0.81	0.81	0.74	0.76	0.81	0.83	0.79	0.88
Tre Ankare PSWM	0.74	0.80	0.76	0.7	0.76	0.77	0.81	0.77	0.84
MOIST SNUFF									
Longhorn FC Natural	1.23	1.29	1.15	1.27	1.26	1.26	1.27	1.28	
Longhorn FC Wintergreen	1.34	1.48							
Longhorn LC Mint	1.33	1.36				1.4	1.35		
Longhorn LC Natural	1.21	1.36							
Longhorn LC Straight	1.35	1.46			1.38			1.49	
Longhorn LC Wintergreen	1.27	1.26	1.2		1.33	1.33	1.28	1.29	
Longhorn Pouches Straight	1.22	1.36							
Longhorn Pouches Wintergreen	1.25	1.13							
Red Man FC Natural	1.26	1.40		1.44					
Red Man LC Straight	1.31	1.30		1.38					
Red Man LC Wintergreen	1.27	1.46		1.33					
Renegades Wintergreen	1.24	1.22			1.44	1.36	1.18	1.36	1.48
Timber Wolf FC Natural	1.36	1.51		1.47	1.57	1.46	1.43	1.56	1.56
Timber Wolf FC Wintergreen	1.37	1.42							
Timber Wolf LC Apple	1.34	1.29			1.36		1.34		
Timber Wolf LC Cool Wintergreen	1.33	1.32							
Timber Wolf LC Mint	1.35	1.37							
Timber Wolf LC Peach	1.32	1.30		1.32		1.36	1.25		
Timber Wolf LC Straight	1.35	1.57						1.4	1.51
Timber Wolf LC Wintergreen	1.35	1.54	1.35	1.38	1.42	1.33	1.37	1.42	1.53
Timber Wolf Packs Mint	1.15	1.26							
Timber Wolf Packs Natural	1.14	1.32		1.08	1.22				
Timber Wolf Packs Peach	1.17	1.23							
Timber Wolf Packs Wintergreen	1.23	1.39	1.2	1.3	1.41	1.34			
LOOSE LEAF									
Granger Select	0.30								
J.D.'s Blend	0.37								
Red Man Golden Blend	0.71								
Red Man Original	1.23								
Red Man Select	0.59								

BRAND <i>LOOSE LEAF Cont'd</i>	Nicotine as is [mg/g]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	0.34								
Southern Pride	0.56								
PLUG									
Apple Thick Plug	1.29								
Brown Mule Plug	0.87								
Cup Plug	1.64								
Days Work Plug	0.93								
Red Man Plug	0.76								
Tinsley Plug	1.04								

ALKALOIDS : Free Nicotine

Background:

- ❑ Several authorities around the world request information about the concentration of free nicotine in smokeless tobacco products.
- ❑ The amount of free nicotine increases with increasing pH (see Figure 1.).
- ❑ The un-ionized (free) nicotine content is determined with the Henderson-Hasselbalch equation based on measured pH and nicotine content. Center of disease control (CDC) **Federal Register** / Vol. 74, No. 4 / Wednesday, January 7, 2009

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm.

Method: GC-FID KLS, "Kvantitativ analys av alkaloider"

Quantification limits: 0.02 %

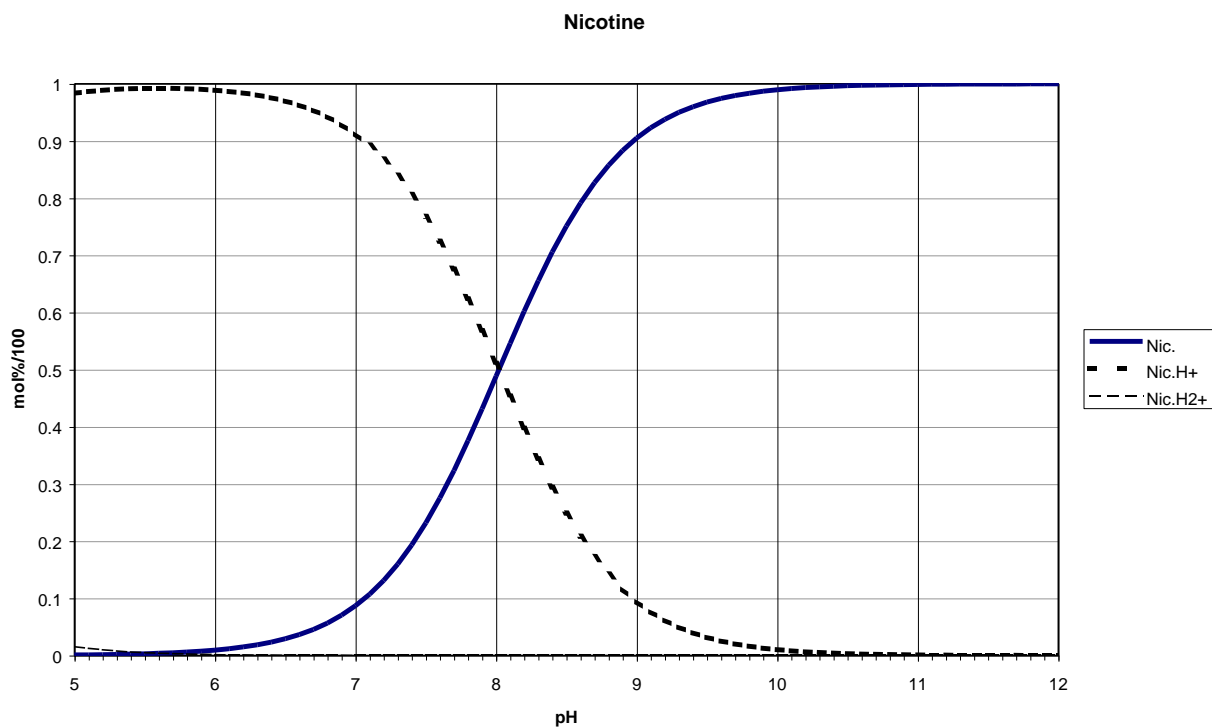
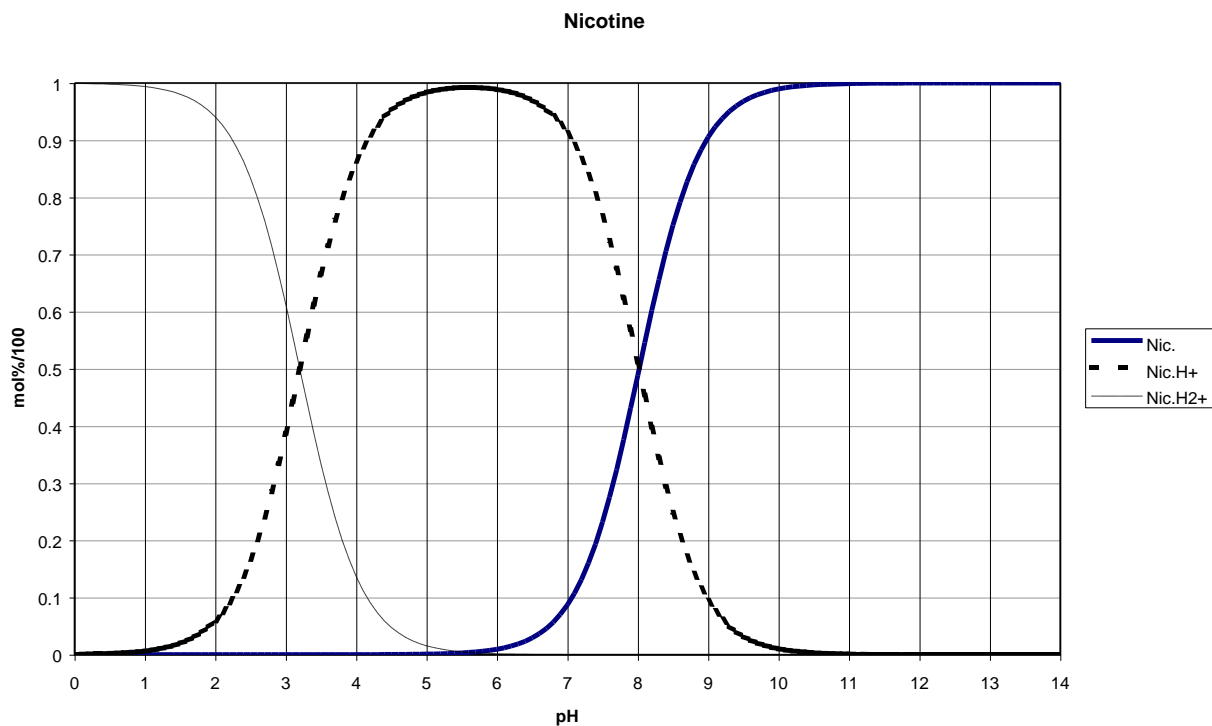


Figure 1. Amount of free nicotine at different pH

BRAND SNUS	Free Nicotine [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	1.2	1.4							
02 Strong PSOL	2.2	2.3							
Catch Collection PSWM, Chill	1.2	1.0	1.1						
Catch Dry Eucalyptus PSWM	0.17	0.32	0.39	0.30	0.39	0.30	0.68	0.44	0.44
Catch Dry Licorice PSWM	0.43	0.46	0.21	0.37	0.39	0.32	0.28	0.46	0.30
Catch Eucalyptus PSWL	1.3	1.1	1.1	1.1	1.1	1.2	1.1	1.2	
Catch Licorice PSOM	0.86	0.82	0.76	1.0	1.2	1.1	1.0	1.2	1.2
Catch Licorice PSWL	1.1	1.1	1.1	0.9	1.0	1.2	1.1	1.2	1.1
Catch Pure Mint PSW Medium	1.1								
Ettan Lös	1.3	0.98	1.1	1.1	0.92	1.0	0.90	1.2	1.2
Ettan PSOL	1.3	1.1	1.2	1.1	1.1	1.2	1.3	1.2	1.3
Ettan PSWL	1.2	1.1	1.2	1.0	1.1				
General Extra Sterk PSOL	1.7	1.7	1.8						
General Extra Sterk Lös	2.0	2.0	1.8						
General Long PSOL	1.1								
General Long Sterk PSOL	2.2								
General Lös	1.4	0.98	1.0	0.92	0.90	1.0	0.87	1.2	1.2
General Onyx PSWL	2.0	2.0	1.7	1.4	1.0	1.1			
General PSOL	1.1	0.73	1.0	1.1	1.1	1.2	1.1	1.1	1.1
General PSOM	1.0	0.73	0.76	1.1	1.0	1.3	1.2	1.5	1.0
General PSWL	1.2	0.98	1.2	1.1	1.2	1.2	1.3	1.4	1.2
General PSWM	1.0	1.1	1.1	1.1	1.2	1.2			
General Silver PSOL	0.29	0.32	0.38	0.22	0.27	0.41	0.38	0.47	0.45
General Smooth PSW Medium	0.95								
General Sterk PSWL	2.0	1.8	1.7	1.7					
Göteborgs Prima Fint Lös	1.0	0.73	0.8	1.0	0.84	0.87	1.0	1.2	1.1
Göteborgs Rapé Lös	1.1	0.98	1.0	1.0	1.0	1.0	1.0	1.3	1.1
Göteborgs Rapé PSWL	1.1	0.98	1.1	1.2	1.1	1.2	1.2	1.3	1.1
Göteborgs Rapé PSWM	1.1	1.1	1.0	0.92	1.2	1.2			
Göteborgs Rape No2 PSWL	1.1	1.1	1.1	1.0	1.1				
Grov Lös	1.3	0.98	1.1	1.0	0.8	1.1	1.0	1.2	1.2
Grov PSOL	1.0	0.73	0.8	1.0	1.2	1.1	1.3	1.3	1.1
Grov PSWL	1.2	1.1	1.1	1.2	1.3	1.2	1.3	1.2	1.2
Grovsnus Svart PSWL	1.8	1.9	1.9						
Kronan Lös	1.3	0.98	1.0	1.0	1.1				
Kronan PSOL	1.0	0.90	1.0	0.92	1.0	1.2			
Kronan PSWL	1.2	0.98	1.1	1.1					
Nick (and Johnny) PSOL	1.2	1.1	1.4	1.3	1.1				

BRAND <i>SNUS Cont'd</i>	Free Nicotine [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	1.8								
Probe Lös	1.0	0.86	1.2	1.0	0.93	0.75	0.75	0.86	0.82
Probe PSOL	0.54	1.5	0.68	0.73	0.58	0.78	0.82	0.82	0.82
Röda Lacket Lös	1.0	0.90	0.84	0.92	0.85	0.90	1.0	1.1	1.3
Röda Lacket PSWL	1.2	1.06	1.1	1.0	1.1	1.2			
Tre Ankare PSWL	1.2	1.1	1.1	1.1	1.2	1.3	1.3	1.4	1.4
Tre Ankare PSWM	1.1	1.1	1.1	0.92	1.1	1.2	1.1	1.4	1.3
MOIST SNUFF									
Longhorn FC Natural	1.0	1.3	1.0	1.3	1.2	1.2	1.1	0.72	
Longhorn FC Wintergreen	1.1	1.1							
Longhorn LC Mint	1.3	0.91				0.80	1.2		
Longhorn LC Natural	0.85	1.7							
Longhorn LC Straight	1.6	1.1			1.0			1.0	
Longhorn LC Wintergreen	1.2	1.1	0.90		1.2	1.0	1.1	0.87	
Longhorn Pouches Straight	1.1	1.3							
Longhorn Pouches Wintergreen	0.89	0.95							
Red Man FC Natural	0.94	1.4		1.2					
Red Man LC Straight	0.76	1.6		1.6					
Red Man LC Wintergreen	0.88	1.6		1.5					
Renegades Wintergreen	1.0	0.99			1.1	0.81	0.27	0.58	0.25
Timber Wolf FC Natural	1.3	1.5		1.4	1.5	1.4	1.0	1.2	0.97
Timber Wolf FC Wintergreen	1.2	1.4							
Timber Wolf LC Apple	0.94	0.48			0.63		0.43		
Timber Wolf LC Cool Wintergreen	1.0	1.5							
Timber Wolf LC Mint	1.0	1.2							
Timber Wolf LC Peach	1.0	0.98		0.74		0.43	0.40		
Timber Wolf LC Straight	1.3	1.4						1.13	1.00
Timber Wolf LC Wintergreen	1.1	1.6	1.0	1.4	1.4	1.2	1.0	1.1	0.85
Timber Wolf Packs Mint	0.73	1.1							
Timber Wolf Packs Natural	0.78	1.0		0.74	0.94				
Timber Wolf Packs Peach	1.1	0.53							
Timber Wolf Packs Wintergreen	0.89	1.2	0.86	1.2	1.1	0.98			
LOOSE LEAF									
Granger Select	0.002								
J.D.'s Blend	0.01								
Red Man Golden Blend	0.004								
Red Man Original	0.01								
Red Man Select	0.01								

BRAND <i>LOOSE LEAF Cont'd</i>	Free Nicotine [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	0.02								
Southern Pride	0.005								
<i>PLUG</i>									
Apple Thick Plug	0.004								
Brown Mule Plug	0.001								
Cup Plug	0.01								
Days Work Plug	0.004								
Red Man Plug	0.005								
Tinsley Plug	0.01								

BRAND SNUS	Free Nicotine <i>as is</i> [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	0.72	0.83							
02 Strong PSOL	1.3	1.4							
Catch Collection PSWM. Chill	0.63	0.58	0.61						
Catch Dry Eucalyptus PSWM	0.13	0.25	0.30	0.23	0.30	0.24	0.52	0.34	0.34
Catch Dry Licorice PSWM	0.34	0.36	0.17	0.29	0.31	0.25	0.22	0.36	0.24
Catch Eucalyptus PSWL	0.69	0.6	0.61	0.55	0.59	0.63	0.57	0.62	0
Catch Licorice PSOM	0.48	0.43	0.43	0.56	0.68	0.61	0.55	0.66	0.65
Catch Licorice PSWL	0.57	0.59	0.56	0.48	0.54	0.6	0.53	0.58	0.56
Catch Pure Mint PSW Medium	0.70								
Ettan Lös	0.60	0.48	0.56	0.51	0.48	0.47	0.44	0.57	0.6
Ettan PSOL	0.67	0.62	0.63	0.56	0.62	0.66	0.66	0.68	0.73
Ettan PSWL	0.64	0.56	0.65	0.51	0.55				
General Extra Sterk PSOL	1.1	0.99	1.0						
General Extra Sterk Lös	0.97	0.96	0.92						
General Long PSOL	0.66								
General Long Sterk PSOL	1.3								
General Lös	0.62	0.48	0.48	0.45	0.48	0.5	0.43	0.58	0.57
General Onyx PSWL	1.1	1.03	0.96	0.73	0.6	0.61			
General PSOL	0.64	0.42	0.54	0.57	0.6	0.68	0.61	0.57	0.57
General PSOM	0.54	0.4	0.42	0.54	0.51	0.68	0.65	0.72	0.55
General PSWL	0.64	0.54	0.63	0.54	0.61	0.63	0.63	0.68	0.63
General PSWM	0.58	0.55	0.58	0.54	0.62	0.63			
General Silver PSOL	0.17	0.19	0.2	0.12	0.16	0.21	0.19	0.24	0.24
General Smooth PSW Medium	0.61								
General Sterk PSWL	1.0	0.94	0.87	0.83					
Göteborgs Prima Fint Lös	0.52	0.38	0.4	0.48	0.42	0.44	0.47	0.57	0.52
Göteborgs Rapé Lös	0.56	0.48	0.49	0.47	0.5	0.47	0.47	0.6	0.51
Göteborgs Rapé PSWL	0.63	0.54	0.61	0.6	0.57	0.63	0.6	0.63	0.58
Göteborgs Rapé PSWM	0.58	0.58	0.54	0.48	0.62	0.64			
Göteborgs Rape No2 PSWL	0.60	0.62	0.57	0.51	0.6				
Grov Lös	0.61	0.49	0.52	0.47	0.45	0.52	0.47	0.56	0.59
Grov PSOL	0.53	0.40	0.49	0.51	0.64	0.61	0.64	0.7	0.59
Grov PSWL	0.62	0.59	0.6	0.59	0.65	0.63	0.63	0.59	0.61
Grovsnus Svart PSWL	1.0	0.97	0.99						
Kronan Lös	0.62	0.49	0.5	0.46	0.54				
Kronan PSOL	0.60	0.53	0.55	0.51	0.56	0.67			
Kronan PSWL	0.62	0.54	0.56	0.55					
Nick (and Johnny) PSOL	0.73	0.64	0.83	0.70	0.64				

BRAND <i>SNUS Cont'd</i>	Free Nicotine <i>as is</i> [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	1.0								
Probe Lös	0.53	0.47	0.65	0.54	0.53	0.4	0.4	0.45	0.43
Probe PSOL	0.30	0.88	0.37	0.38	0.31	0.42	0.43	0.43	0.44
Röda Lacket Lös	0.53	0.46	0.46	0.48	0.46	0.45	0.5	0.56	0.63
Röda Lacket PSWL	0.64	0.57	0.55	0.51	0.56	0.6			
Tre Ankare PSWL	0.62	0.61	0.61	0.55	0.6	0.64	0.62	0.68	0.7
Tre Ankare PSWM	0.57	0.57	0.57	0.5	0.57	0.61	0.61	0.66	0.67
MOIST SNUFF									
Longhorn FC Natural	0.51	0.63	0.49	0.62	0.61	0.61	0.55	0.35	
Longhorn FC Wintergreen	0.56	0.55							
Longhorn LC Mint	0.66	0.44				0.39	0.58		
Longhorn LC Natural	0.43	0.82							
Longhorn LC Straight	0.80	0.55			0.52			0.48	
Longhorn LC Wintergreen	0.58	0.54	0.45	0	0.57	0.5	0.55	0.42	
Longhorn Pouches Straight	0.56	0.66							
Longhorn Pouches Wintergreen	0.46	0.49							
Red Man FC Natural	0.45	0.68		0.62					
Red Man LC Straight	0.38	0.78		0.75					
Red Man LC Wintergreen	0.43	0.8		0.73					
Renegades Wintergreen	0.51	0.53			0.62	0.44	0.13	0.26	0.13
Timber Wolf FC Natural	0.66	0.74		0.72	0.76	0.71	0.54	0.59	0.5
Timber Wolf FC Wintergreen	0.61	0.69							
Timber Wolf LC Apple	0.48	0.25			0.32	0	0.22		
Timber Wolf LC Cool Wintergreen	0.51	0.72							
Timber Wolf LC Mint	0.49	0.59							
Timber Wolf LC Peach	0.50	0.49		0.36		0.22	0.2		
Timber Wolf LC Straight	0.61	0.68						0.53	0.49
Timber Wolf LC Wintergreen	0.54	0.75	0.51	0.67	0.69	0.58	0.52	0.53	0.42
Timber Wolf Packs Mint	0.37	0.55							
Timber Wolf Packs Natural	0.36	0.50		0.35	0.46				
Timber Wolf Packs Peach	0.54	0.28							
Timber Wolf Packs Wintergreen	0.43	0.60	0.45	0.63	0.61	0.50			
LOOSE LEAF									
Granger Select	0.001								
J.D.'s Blend	0.004								
Red Man Golden Blend	0.003								
Red Man Original	0.01								
Red Man Select	0.004								

BRAND <i>LOOSE LEAF Cont'd</i>	Free Nicotine <i>as is</i> [mg/g]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	0.01								
Southern Pride	0.003								
<i>PLUG</i>									
Apple Thick Plug	0.003								
Brown Mule Plug	0.001								
Cup Plug	0.004								
Days Work Plug	0.003								
Red Man Plug	0.004								
Tinsley Plug	0.01								

ALKALOIDS :Nornicotine. anabasine and anatabine

Background:

- ❑ Since nornicotine, anabasine and anatabine are all precursors of the tobacco-specific nitrosamines (TSNA), it is of great importance that these alkaloids occur in low concentrations. Mutations are frequent in tobacco and lead to converter plants. This will cause demethylation of nicotine and the formation of nornicotine. The ratio nornicotine/nicotine * 100 should be below 3 to classify dark tobacco seeds as free from converters. Burley tobacco is often more infected by converters and a ratio * 100 of 10-15 is accepted.
- ❑ Several authorities around the world request information about the concentration of alkaloids in smokeless tobacco products.
- ❑ A high nicotine concentration in tobacco is usually accompanied with a high nornicotine level.

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm.

Method: GC-FID KLS. "Kvantitativ analys av alkaloider"

Quantification limits: Nornicotine, anatabine: 50 ppm; Anabasine: 20 ppm

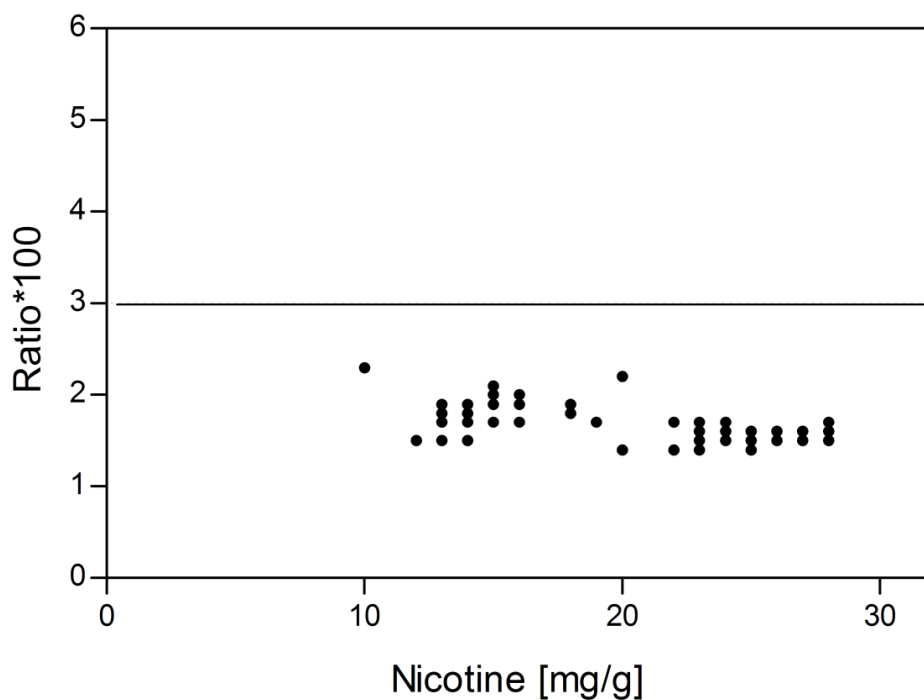


Figure 2. The ratio*100 versus nicotine for all snus and moist snuff brands included in the Brands Testing 2011.

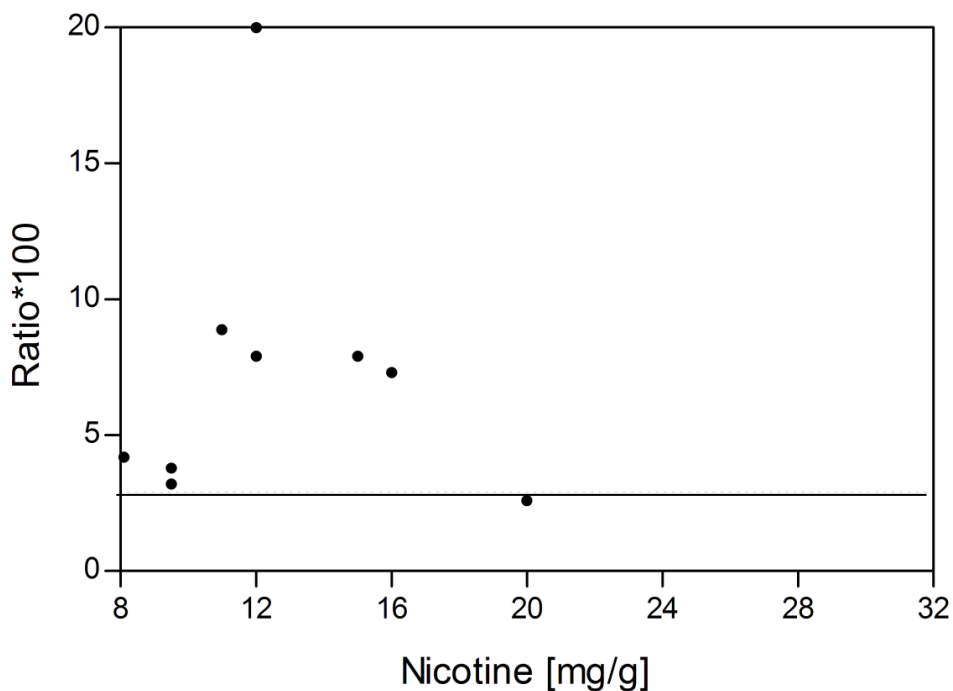


Figure 3. The ratio*100 versus nicotine for all loose leaf and plug products included in the Brands Testing 2011.

BRAND SNUS	Nornicotine [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	250	260							
02 Strong PSOL	390	350							
Catch Collection PSWM. Chill	240	220	320						
Catch Dry Eucalyptus PSWM	420	380	490	460	570	500	630	490	530
Catch Dry Licorice PSWM	350	380	530	490	530	520	680	520	530
Catch Eucalyptus PSWL	290	270	340	330	370	360	380	330	
Catch Licorice PSOM	190	240	310	260	280	290	370	300	320
Catch Licorice PSWL	260	290	370	300	350	310	450	360	330
Catch Pure Mint PSW Medium	280								
Ettan Lös	320	260	380	350	350	360	430	340	340
Ettan PSOL	280	240	290	300	330	310	380	320	310
Ettan PSWL	260	280	340	310	310				
General Extra Sterk PSOL	320	310	390						
General Extra Sterk Lös	410	350	480						
General Long PSOL	210								
General Long Sterk PSOL	360								
General Lös	320	260	380	370	400	380	460	360	370
General Onyx PSWL	400	370	450	410	400	360			
General PSOL	270	260	320	300	340	330	330	300	320
General PSOM	240	240	290	300	300	320	410	380	270
General PSWL	270	280	360	300	350	320	460	360	310
General PSWM	220	260	330	300	330	300			
General Silver PSOL	230	200	290	270	250	280	300	260	280
General Smooth PSW Medium	300								
General Sterk PSWL	340	330	390	420					
Göteborgs Prima Fint Lös	190	220	300	280	260	390	430	350	310
Göteborgs Rapé Lös	240	280	370	350	390	360	420	370	330
Göteborgs Rapé PSWL	250	270	350	310	350	320	470	350	290
Göteborgs Rapé PSWM	280	260	330	300	330	330			
Göteborgs Rape No2 PSWL	240	260	340	310	320				
Grov Lös	300	310	360	370	340	370	460	370	360
Grov PSOL	220	230	310	310	320	300	420	320	320
Grov PSWL	240	280	340	340	340	320	500	320	330
Grovsnus Svart PSWL	310	310	430						
Kronan Lös	290	250	330	340	360				
Kronan PSOL	250	250	290	300	270	300			
Kronan PSWL	260	290	310	360					
Nick (and Johnny) PSOL	280	320	400	360	320				

BRAND <i>SNUS Cont'd</i>	Nornicotine [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	380								
Probe Lös	330	290	370	390	370	420	520	410	370
Probe PSOL	330	270	360	370	380	380	490	390	390
Röda Lacket Lös	250	210	300	260	230	260	340	260	270
Röda Lacket PSWL	260	280	330	340	320	330			
Tre Ankare PSWL	240	280	340	320	310	330	480	340	380
Tre Ankare PSWM	240	270	330	290	340	330	370	330	300
MOIST SNUFF									
Longhorn FC Natural	380	390	340	380	340	530	530	530	
Longhorn FC Wintergreen	440	440							
Longhorn LC Mint	420	420				640	560		
Longhorn LC Natural	380	400							
Longhorn LC Straight	440	450			420			550	
Longhorn LC Wintergreen	390	360	340		370	560	530	540	
Longhorn Pouches Straight	410	390							
Longhorn Pouches Wintergreen	350	360							
Red Man FC Natural	400	410		560					
Red Man LC Straight	430	390		560					
Red Man LC Wintergreen	420	420		520					
Renegades Wintergreen	410	360			350	470	460	490	430
Timber Wolf FC Natural	420	450		390	380	550	460	470	430
Timber Wolf FC Wintergreen	420	420							
Timber Wolf LC Apple	410	390			400		560		
Timber Wolf LC Cool Wintergreen	410	400							
Timber Wolf LC Mint	460	430							
Timber Wolf LC Peach	400	380		530		540	500		
Timber Wolf LC Straight	440	460						550	470
Timber Wolf LC Wintergreen	420	450	360	520	400	540	510	480	450
Timber Wolf Packs Mint	360	370							
Timber Wolf Packs Natural	380	380		440	340				
Timber Wolf Packs Peach	350	330							
Timber Wolf Packs Wintergreen	380	370	300	430	350	440			
LOOSE LEAF									
Granger Select	180								
J.D.'s Blend	220								
Red Man Golden Blend	360								
Red Man Original	1200								
Red Man Select	340								

BRAND <i>LOOSE LEAF Cont'd</i>	Nornicotine [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	220								
Southern Pride	320								
<i>PLUG</i>									
Apple Thick Plug	1200								
Brown Mule Plug	940								
Cup Plug	500								
Days Work Plug	930								
Red Man Plug	310								
Tinsley Plug	2400								

BRAND SNUS	Anabasine [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	61	70							
02 Strong PSOL	100	94							
Catch Collection PSWM. Chill	65	56	43						
Catch Dry Eucalyptus PSWM	98	100	100	98	110	110	88	81	200
Catch Dry Licorice PSWM	75	80	100	86	79	180	100	82	77
Catch Eucalyptus PSWL	73	71	38	76	66	92	83	67	
Catch Licorice PSOM	50	76	44	77	72	74	68	65	78
Catch Licorice PSWL	60	63	85	63	87	82	81	71	79
Catch Pure Mint PSW Medium	98								
Ettan Lös	72	67	90	67	60	71	80	76	81
Ettan PSOL	68	64	79	66	70	74	82	70	83
Ettan PSWL	62	63	83	67	59				
General Extra Sterk PSOL	92	93	100						
General Extra Sterk Lös	100	94	120						
General Long PSOL	57								
General Long Sterk PSOL	100								
General Lös	70	66	97	77	67	77	87	75	86
General Onyx PSWL	92	90	110	93	76	80			
General PSOL	65	67	86	66	72	80	75	66	80
General PSOM	59	65	84	69	62	79	82	83	58
General PSWL	61	65	90	64	64	76	82	79	73
General PSWM	58	62	81	66	62	73			
General Silver PSOL	52	48	72	49	39	58	56	50	63
General Smooth PSW Medium	92								
General Sterk PSWL	87	88	110	93					
Göteborgs Prima Fint Lös	54	61	88	61	57	84	82	78	76
Göteborgs Rapé Lös	62	69	99	78	72	80	90	85	59
Göteborgs Rapé PSWL	61	68	87	67	66	77	88	75	57
Göteborgs Rapé PSWM	66	64	86	67	64	77			
Göteborgs Rape No2 PSWL	59	69	85	65	64				
Grov Lös	70	73	97	79	65	81	93	82	84
Grov PSOL	59	65	82	67	62	72	80	72	84
Grov PSWL	59	66	85	73	63	75	87	67	83
Grovsnus Svart PSWL	79	86	120						
Kronan Lös	80	86	110	93	89				
Kronan PSOL	73	89	99	87	82	91			
Kronan PSWL	60	69	81	99					
Nick (and Johnny) PSOL	77	89	110	85	68				

BRAND <i>SNUS Cont'd</i>	Anabasine [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	85								
Probe Lös	82	88	99	83	72	90	99	88	91
Probe PSOL	80	82	96	77	68	84	93	81	92
Röda Lacket Lös	62	60	88	59	50	59	75	66	77
Röda Lacket PSWL	60	69	85	72	58	77			
Tre Ankare PSWL	59	66	83	69	56	77	88	75	90
Tre Ankare PSWM	58	65	83	62	66	75	74	73	78
MOIST SNUFF									
Longhorn FC Natural	100	93	86	87	77	99	110	100	
Longhorn FC Wintergreen	110	120							
Longhorn LC Mint	110	100				130	130		
Longhorn LC Natural	97	110							
Longhorn LC Straight	110	120			95			120	
Longhorn LC Wintergreen	100	86	94		88	110	110	100	
Longhorn Pouches Straight	100	110							
Longhorn Pouches Wintergreen	95	79							
Red Man FC Natural	100	100		130					
Red Man LC Straight	100	95		140					
Red Man LC Wintergreen	100	120		140					
Renegades Wintergreen	100	83			82	110	110	120	130
Timber Wolf FC Natural	110	120		100	100	120	110	120	130
Timber Wolf FC Wintergreen	110	100							
Timber Wolf LC Apple	100	89			88		110		
Timber Wolf LC Cool Wintergreen	110	95							
Timber Wolf LC Mint	110	100							
Timber Wolf LC Peach	100	91		110		110	110		
Timber Wolf LC Straight	110	120						120	130
Timber Wolf LC Wintergreen	110	120	98	120	95	120	120	120	130
Timber Wolf Packs Mint	100	100							
Timber Wolf Packs Natural	100	110		100	88				
Timber Wolf Packs Peach	91	87							
Timber Wolf Packs Wintergreen	100	110	85	110	89	110			
LOOSE LEAF									
Granger Select	<20								
J.D.'s Blend	33								
Red Man Golden Blend	45								
Red Man Original	78								
Red Man Select	42								

BRAND <i>LOOSE LEAF Cont'd</i>	Anabasine [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	<20								
Southern Pride	41								
<i>PLUG</i>									
Apple Thick Plug	80								
Brown Mule Plug	66								
Cup Plug	76								
Days Work Plug	65								
Red Man Plug	43								
Tinsley Plug	89								

BRAND SNUS	Anatabine [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	290	250							
02 Strong PSOL	540	490							
Catch Collection PSWM. Chill	280	190	260						
Catch Dry Eucalyptus PSWM	450	530	440	410	480	490	650	500	450
Catch Dry Licorice PSWM	460	520	440	460	450	520	690	530	440
Catch Eucalyptus PSWL	300	250	280	260	340	340	370	330	
Catch Licorice PSOM	190	220	250	220	280	290	380	300	280
Catch Licorice PSWL	310	270	300	250	310	310	420	350	280
Catch Pure Mint PSW Medium	300								
Ettan Lös	310	240	320	280	340	330	430	330	290
Ettan PSOL	270	180	210	240	290	280	350	270	260
Ettan PSWL	330	260	280	240	280				
General Extra Sterk PSOL	540	410	410						
General Extra Sterk Lös	510	540	460						
General Long PSOL	230								
General Long Sterk PSOL	670								
General Lös	320	220	310	300	360	340	440	330	300
General Onyx PSWL	570	590	370	350	380	380			
General PSOL	270	240	260	270	320	320	350	300	270
General PSOM	220	210	220	240	280	310	410	380	220
General PSWL	350	260	300	250	310	310	450	370	280
General PSWM	260	240	260	230	300	290			
General Silver PSOL	230	190	220	210	220	260	290	260	240
General Smooth PSW Medium	350								
General Sterk PSWL	760	500	370	430					
Göteborgs Prima Fint Lös	220	200	240	210	250	330	440	330	240
Göteborgs Rapé Lös	280	240	300	260	330	340	450	370	260
Göteborgs Rapé PSWL	340	260	280	260	330	320	440	340	250
Göteborgs Rapé PSWM	270	240	260	220	310	320			
Göteborgs Rape No2 PSWL	300	280	290	260	300				
Grov Lös	290	250	290	290	300	350	440	360	300
Grov PSOL	240	200	240	250	300	290	420	320	280
Grov PSWL	290	270	280	260	310	310	470	310	280
Grovsnus Svart PSWL	560	450	360						
Kronan Lös	280	210	230	220	260				
Kronan PSOL	250	210	210	190	210	230			
Kronan PSWL	320	290	240	230					
Nick (and Johnny) PSOL	360	380	370	290	290				

BRAND <i>SNUS Cont'd</i>	Anatabine [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	740								
Probe Lös	340	400	330	350	350	440	550	430	330
Probe PSOL	330	340	300	300	350	370	480	400	340
Röda Lacket Lös	250	190	240	210	230	240	340	240	230
Röda Lacket PSWL	340	260	250	240	280	310			
Tre Ankare PSWL	300	260	270	260	290	320	460	350	330
Tre Ankare PSWM	290	230	260	230	310	320	340	310	250
MOIST SNUFF									
Longhorn FC Natural	520	540	340	450	410	690	640	600	
Longhorn FC Wintergreen	590	660							
Longhorn LC Mint	560	580				760	700		
Longhorn LC Natural	450	600							
Longhorn LC Straight	590	680			500			630	
Longhorn LC Wintergreen	500	450	340		440	730	620	630	
Longhorn Pouches Straight	630	560							
Longhorn Pouches Wintergreen	530	410							
Red Man FC Natural	530	560		620					
Red Man LC Straight	580	510		620					
Red Man LC Wintergreen	520	610		580					
Renegades Wintergreen	670	460			420	650	670	750	560
Timber Wolf FC Natural	580	720		500	490	750	590	670	510
Timber Wolf FC Wintergreen	540	560							
Timber Wolf LC Apple	570	510			470		690		
Timber Wolf LC Cool Wintergreen	650	430							
Timber Wolf LC Mint	640	550							
Timber Wolf LC Peach	550	490		590		760	600		
Timber Wolf LC Straight	600	690						730	540
Timber Wolf LC Wintergreen	550	660	370	620	470	710	670	610	520
Timber Wolf Packs Mint	510	530							
Timber Wolf Packs Natural	570	620		510	410				
Timber Wolf Packs Peach	530	390							
Timber Wolf Packs Wintergreen	580	590	310	530	410	680			
LOOSE LEAF									
Granger Select	150								
J.D.'s Blend	190								
Red Man Golden Blend	370								
Red Man Original	470								
Red Man Select	270								

BRAND <i>LOOSE LEAF Cont'd</i>	Anatabine [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	160								
Southern Pride	270								
<i>PLUG</i>									
Apple Thick Plug	460								
Brown Mule Plug	360								
Cup Plug	420								
Days Work Plug	360								
Red Man Plug	310								
Tinsley Plug	490								

BRAND SNUS	Nornicotine/Nicotine								
	Ratio * 100								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	1.7	1.5							
02 Strong PSOL	1.5	1.4							
Catch Collection PSWM. Chill	1.7	1.7	2.3						
Catch Dry Eucalyptus PSWM	2.2	1.9	2.5	2.5	2.8	2.6	3.1	2.6	2.8
Catch Dry Licorice PSWM	1.9	1.9	2.6	2.6	2.7	2.6	3.2	2.6	2.8
Catch Eucalyptus PSWL	1.9	1.9	2.3	2.4	2.5	2.2	2.6	2.3	
Catch Licorice PSOM	1.5	1.6	2.3	2.1	1.9	2.1	2.8	2.2	2.1
Catch Licorice PSWL	1.8	1.9	2.4	2.3	2.3	2.1	2.9	2.3	2.2
Catch Pure Mint PSW Medium	1.7								
Ettan Lös	2.1	1.7	2.4	2.4	2.7	2.4	2.9	2.2	2.1
Ettan PSOL	1.9	1.6	2.0	2.1	2.3	2.0	2.4	2.1	1.8
Ettan PSWL	1.9	1.9	2.3	2.2	2.1				
General Extra Sterk PSOL	1.4	1.2	1.7						
General Extra Sterk Lös	1.6	1.4	2.0						
General Long PSOL	1.5								
General Long Sterk PSOL	1.4								
General Lös	2.0	1.7	2.6	2.5	2.7	2.3	2.9	2.2	2.3
General Onyx PSWL	1.7	1.5	2.0	1.9	2.2	2.1			
General PSOL	1.9	1.7	2.2	2.1	2.2	2.0	2.3	2.0	2.1
General PSOM	1.9	1.7	2.1	2.1	2.0	2.0	2.5	2.1	1.8
General PSWL	1.9	1.8	2.4	2.2	2.2	2.1	2.9	2.2	2.3
General PSWM	1.7	1.8	2.3	2.2	2.1	2.0			
General Silver PSOL	2.3	2.0	2.8	2.8	2.5	2.6	3.0	2.5	2.5
General Smooth PSW Medium	1.9								
General Sterk PSWL	1.5	1.4	2.0	1.9					
Göteborgs Prima Fint Lös	1.5	1.5	2.2	2.1	1.9	2.4	2.7	2.1	2.1
Göteborgs Rapé Lös	1.8	1.9	2.5	2.5	2.4	2.4	2.7	2.2	2.2
Göteborgs Rapé PSWL	1.8	1.8	2.4	2.2	2.1	2.1	2.9	2.2	2.1
Göteborgs Rapé PSWM	1.9	1.8	2.3	2.2	2.1	2.1			
Göteborgs Rape No2 PSWL	1.7	1.7	2.3	2.2	2.1				
Grov Lös	2.0	2.0	2.5	2.5	2.4	2.4	3.0	2.2	2.2
Grov PSOL	1.5	1.6	2.1	2.2	2.0	2.0	2.7	2.0	1.9
Grov PSWL	1.7	1.8	2.3	2.3	2.2	2.2	3.0	2.2	2.1
Grovsnus Svart PSWL	1.4	1.3	1.9						
Kronan Lös	1.9	1.7	2.4	2.4	2.3				
Kronan PSOL	1.8	1.7	2.2	2.1	1.9	1.9			
Kronan PSWL	1.9	1.9	2.3	2.6					
Nick (and Johnny) PSOL	1.4	1.4	1.8	1.7	1.7				

BRAND <i>SNUS Cont'd</i>	Nornicotine/Nicotine								
	Ratio * 100								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	1.7								
Probe Lös	1.7	1.4	1.9	2.1	2.0	2.1	2.5	2.0	2.0
Probe PSOL	1.8	1.5	2.0	2.2	2.1	2.1	2.6	2.0	2.1
Röda Lacket Lös	1.9	1.4	2.1	2.1	1.9	2.1	2.4	1.8	1.7
Röda Lacket PSWL	1.9	1.8	2.3	2.3	2.1	2.2			
Tre Ankare PSWL	1.7	1.8	2.2	2.3	2.1	2.1	2.9	2.1	2.1
Tre Ankare PSWM	1.8	1.8	2.2	2.2	2.3	2.2	2.6	2.1	1.9
MOIST SNUFF									
Longhorn FC Natural	1.6	1.5	1.5	1.4	1.4	2.2	2.1	2.0	
Longhorn FC Wintergreen	1.6	1.5							
Longhorn LC Mint	1.6	1.5				2.2	2.0		
Longhorn LC Natural	1.6	1.5							
Longhorn LC Straight	1.6	1.5			1.5			1.8	
Longhorn LC Wintergreen	1.5	1.4	1.4		1.4	2.1	2.1	2.0	
Longhorn Pouches Straight	1.6	1.5							
Longhorn Pouches Wintergreen	1.5	1.6							
Red Man FC Natural	1.5	1.4		1.9					
Red Man LC Straight	1.6	1.5		1.9					
Red Man LC Wintergreen	1.6	1.4		1.9					
Renegades Wintergreen	1.7	1.6			1.4	1.9	1.9	1.7	1.5
Timber Wolf FC Natural	1.6	1.5		1.4	1.3	1.9	1.7	1.5	1.4
Timber Wolf FC Wintergreen	1.5	1.4							
Timber Wolf LC Apple	1.6	1.5			1.5		2.1		
Timber Wolf LC Cool Wintergreen	1.5	1.5							
Timber Wolf LC Mint	1.7	1.5							
Timber Wolf LC Peach	1.6	1.5		2.0		2.0	2.0		
Timber Wolf LC Straight	1.6	1.5						1.9	1.5
Timber Wolf LC Wintergreen	1.5	1.4	1.3	1.9	1.4	2.0	1.8	1.6	1.5
Timber Wolf Packs Mint	1.6	1.4							
Timber Wolf Packs Natural	1.5	1.4		1.9	1.3				
Timber Wolf Packs Peach	1.5	1.4							
Timber Wolf Packs Wintergreen	1.6	1.4	1.3	1.8	1.4	1.7			
LOOSE LEAF									
Granger Select	4.7								
J.D.'s Blend	4.4								
Red Man Golden Blend	3.8								
Red Man Original	7.9								
Red Man Select	4.2								

BRAND <i>LOOSE LEAF Cont'd</i>	Nornicotine/Nicotine Ratio * 100								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	4.8								
Southern Pride	4.2								
PLUG									
Apple Thick Plug	7.3								
Brown Mule Plug	8.9								
Cup Plug	2.6								
Days Work Plug	7.9								
Red Man Plug	3.2								
Tinsley Plug	20								

Acrylamide

Background:

- ❑ Acrylamide is sometimes found in high amounts in cooked or processed food, the exact chemical mechanism(s) for acrylamide formation in heated foods is not known.
- ❑ Exposure to acrylamide leads to DNA damage and at high doses neurological and reproductive effects have been observed in animal models.
- ❑ Acrylamide is classified as "probably carcinogenic to humans". Group 2A (IARC)

Information of analyses:

Laboratory:	2002 - 2004: Eurofins. Lidköping. Sweden 2005 - Present: R&D Chemical Analysis. Stockholm
Method:	LC-MS/MS
Quantification limits:	2002 – 2004: 50 ppb 2005 - Present: 10 ppb

BRAND SNUS	Acrylamide [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	630	580							
02 Strong PSOL	680	730							
Catch Collection PSWM. Chill	460	280	160						
Catch Dry Eucalyptus PSWM	910	210	170	360	540	530	310	230	330
Catch Dry Licorice PSWM	360	180	340	140	490	630	510	220	190
Catch Eucalyptus PSWL	560	370	240	400	500	320	280	240	
Catch Licorice PSOM	630	410	300	280	780	610	340	390	370
Catch Licorice PSWL	640	400	210	220	570	530	300	350	340
Catch Pure Mint PSW Medium	320								
Ettan Lös	800	350	310	540	720	470	480	360	360
Ettan PSOL	570	380	420	380	380	280	180	150	160
Ettan PSWL	330	350	170	370	500				
General Extra Sterk PSOL	570	620	430						
General Extra Sterk Lös	800	530	290						
General Long PSOL	380								
General Long Sterk PSOL	500								
General Lös	700	320	280	620	520	400	380	330	340
General Onyx PSWL	390	670	260	530	670	520			
General PSOL	510	320	310	670	740	440	420	410	310
General PSOM	570	260	300	230	720	540	330	430	290
General PSWL	400	390	300	530	520	450	410	390	330
General PSWM	290	380	230	320	420	470			
General Silver PSOL	630	260	400	500	510	460	580	360	400
General Smooth PSW Medium	170								
General Sterk PSWL	440	630	370	830					
Göteborgs Prima Fint Lös	480	360	280	530	530	470	380	270	270
Göteborgs Rapé Lös	480	370	230	710	540	540	470	340	330
Göteborgs Rapé PSWL	430	430	230	280	870	490	330	340	310
Göteborgs Rapé PSWM	420	290	210	400	740	300			
Göteborgs Rape´No2 PSWL	370	380	260	490	520				
Grov Lös	710	370	310	670	740	550	370	370	330
Grov PSOL	440	400	280	380	550	510	350	420	360
Grov PSWL	390	360	230	500	760	460	410	360	240
Grovsnus Svart PSWL	440	350	340						
Kronan Lös	530	380	210	550	570				
Kronan PSOL	420	340	240	390	570	490			
Kronan PSWL	400	340	240	240					
Nick (and Johnny) PSOL	380	350	190	370	760				

BRAND <i>SNUS Cont'd</i>	Acrylamide [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	490								
Probe Lös	810	530	330	370	490	720	660	360	260
Probe PSOL	650	250	220	360	460	450	350	210	210
Röda Lacket Lös	700	350	210	500	790	550	460	480	460
Röda Lacket PSWL	400	280	210	370	530	500			
Tre Ankare PSWL	370	390	230	560	490	450	330	280	370
Tre Ankare PSWM	310	230	240	360	330	460	400	460	340
MOIST SNUFF									
Longhorn FC Natural	460	310			780	530	470		
Longhorn FC Wintergreen	270	350							
Longhorn LC Mint	390	330				550	550		
Longhorn LC Natural	480	290							
Longhorn LC Straight	470	370			790				
Longhorn LC Wintergreen	380	330			790	590	450		
Longhorn Pouches Straight	430	370							
Longhorn Pouches Wintergreen	430	240							
Red Man FC Natural	430	290							
Red Man LC Straight	200	330							
Red Man LC Wintergreen	480	410							
Renegades Wintergreen	270	280			790	510	700		350
Timber Wolf FC Natural	290	250			1200	770	710		330
Timber Wolf FC Wintergreen	520	320							
Timber Wolf LC Apple	450	350			550		530		
Timber Wolf LC Cool Wintergreen	340	280							
Timber Wolf LC Mint	460	330							
Timber Wolf LC Peach	510	350				610	450		
Timber Wolf LC Straight	560	430							430
Timber Wolf LC Wintergreen	460	430			910	770	640		410
Timber Wolf Packs Mint	490	240							
Timber Wolf Packs Natural	570	410			700				
Timber Wolf Packs Peach	620	300							
Timber Wolf Packs Wintergreen	390	370			700	590			
LOOSE LEAF									
Granger Select	390								
J.D.'s Blend	730								
Red Man Golden Blend	560								
Red Man Original	420								
Red Man Select	290								

BRAND <i>LOOSE LEAF Cont'd</i>	Acrylamide [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	430								
Southern Pride	1100								
PLUG									
Apple Thick Plug	370								
Brown Mule Plug	57								
Cup Plug	820								
Days Work Plug	1200								
Red Man Plug	320								
Tinsley Plug	130								

Agrochemicals

Background:

- ❑ Agrochemicals are used in agricultural production to destroy or control weeds, insects, fungi and other pests. Some agrochemicals remain on the tobacco as residues. If the agrochemicals are applied improperly, they can be a significant health risks to consumers.
- ❑ The Swedish Match Agrochemical policy includes two lists of guidance residue levels (GRLs) for agrochemicals that are known to be used on tobacco. One list for raw tobacco, Loose Leaf and Plug and one more stringent list for Snus and Moist Snuff. The GRLs listed are equal to or lower than any current regulatory limits.
- ❑ ADI (Acceptable Daily Intake) values are set by WHO for several agrochemicals.

Information of analyses:

Laboratory: Eurofins AB, Lidköping, Sweden

Method: SLV 001.022.008 and 111
GC with various detectors and LC/MS/MS

Quantification limits: 0.005-1 ppm

Number of agrochemicals: about 340 including metabolites

TABLE 5. FREQUENCY OF FOUND AGROCHEMICAL IN THE TESTED TOBACCO PRODUCTS.

Agrochemical	Snus (in total 19)		Moist snuf (in total 11)		Loose leaf (in total 5)		Plug (in total 5)	
	Frequency	Freq. > GRL	Frequency	Freq. > GRL	Frequency	Freq. > GRL	Frequency	Freq. > GRL
Acetamiprid	15							
Azoxystrobin	17		11		5		4	
Bitertanol			5		5		4	
Butralin	19		11		5		5	
Carbendazim	12		3		5		4	
Chlorpyrifos					3		1	
Cypermethrin	7		2		1		1	
Difenoconazole					3		1	
Dimetomorf	6		5		5		4	
EBDC					1			
Endosulfan-alpha	7				1			
Etion	13							
Etofenprox	1							
Fenamiphos-Sulfone	3							
Flumetralin	10		11		5		4	
Hexaconazole					1	No GRL		
Imidacloprid	8				5		3	
Indoxacarb	7	1						
Iprovalicarb					4			
Isoprocarb					1		1	
Maleic Hydrazide			1		2		1	
λ -Cyhalothrin			10	10				
Metalaxyl	18		11		5		1	
Methomyl					4			
Orthophenylphenol			11	No GRL				
Oxamyl-oxime	1							
Pendimethalin	19	1	11		5		4	
Piperonylbutoxide							4	
Propconazole			11	11	2		1	
Spinosad			8				1	
Tebucanazole					4			
Thiodicarb					3			
Triadimefon					1			
Triadimenol					2			

BRAND SNUS	Agrochemicals [µg/g]		
		2011	GRL SNUS
Ettan Lös	Acetamiprid	0.014	0.5
	Azoxystrobin	0.01	1
	Butralin	0.16	1
	Endosulfan-alpha	0.017	0.2
	Etion	0.024	0.05
	Flumetralin	0.013	1
	Imidacloprid	0.017	1
	Indoxacarb	0.22	0.2
	Metalaxyl	0.029	0.2
	Pendimethalin	0.036	0.1
02 Strong PSOL	Acetamiprid	0.027	0.5
	Azoxystrobin	0.023	1
	Butralin	0.11	1
	Dimetomorf	0.063	1
	Etion	0.012	0.05
	Fenamiphos-Sulfone	0.012	0.05
	Flumetralin	0.044	1
	Imidacloprid	0.016	1
	Indoxacarb	0.018	0.2
	Metalaxyl	0.12	0.2
	Pendimethalin	0.17	0.1
Catch Dry Euclayptus PSWM	Azoxystrobin	0.025	1
	Butralin	0.19	1
	Carbendazim	0.018	0.5
	Metalaxyl	0.05	0.2
	Oxamyl-oxime	0.035	0.5
	Pendimethalin	0.037	0.1
Catch Eucalyptus PSWL	Acetamiprid	0.037	0.5
	Azoxystrobin	0.037	1
	Butralin	0.065	1
	Carbaryl	0.012	0.2
	Carbendazim	0.019	0.5
	Cypermethrin	0.31	0.5
	Flumetralin	0.012	1
	Metalaxyl	0.048	0.2
	Pendimethalin	0.016	0.1
Catch Pure Mint PSW Medium	Acetamiprid	0.02	0.5
	Azoxystrobin	0.028	1
	Butralin	0.032	1
	Carbendazim	0.024	0.5
	Cypermethrin	0.43	0.5
	Endosulfan-alpha	0.015	0.2

BRAND SNUS	Agrochemicals [µg/g]		
		2011	GRL SNUS
Cont'd Catch Pure Mint PSW Medium	Etion	0.02	0.05
	Imidacloprid	0.014	1
	Indoxacarb	0.015	0.2
	Pendimethalin	0.021	0.1
Ettan PSOL	Acetamiprid	0.017	0.5
	Azoxystrobin	0.021	1
	Butralin	0.061	1
	Carbendazim	0.017	0.5
	Cypermethrin	0.22	0.5
	Dimetomorf	0.013	1
	Imidacloprid	0.012	1
	Metalaxyl	0.037	0.2
	Pendimethalin	0.035	0.1
General Extra Sterk Lös	Acetamiprid	0.02	0.5
	Azoxystrobin	0.022	1
	Butralin	0.072	1
	Carbaryl	0.016	0.2
	Cypermethrin	0.19	0.5
	Dimetomorf	0.036	1
	Fenamiphos-Sulfone	0.011	0.05
	Metalaxyl	0.12	0.2
	Pendimethalin	0.02	0.1
General Lös	Acetamiprid	0.015	0.5
	Azoxystrobin	0.012	1
	Butralin	0.13	1
	Carbendazim	0.021	0.5
	Dimetomorf	0.013	1
	Endosulfan-alpha	0.015	0.2
	Etion	0.01	0.05
	Flumetralin	0.029	1
	Imidacloprid	0.016	1
	Indoxacarb	0.11	0.2
	Metalaxyl	0.03	0.2
	Pendimethalin	0.039	0.1
General Onyx PSWL	Acetamiprid	0.055	0.5
	Azoxystrobin	0.017	1
	Butralin	0.15	1
	Carbendazim	0.019	0.5
	Dimetomorf	0.034	1
	Etion	0.013	0.05
	Fenamiphos-Sulfone	0.014	0.05
	Flumetralin	0.024	1

BRAND SNUS	Agrochemicals [µg/g]		
		2011	GRL SNUS
General Onyx PSQL Cont'd	Imidacloprid	0.014	1
	Metalaxyl	0.095	0.2
	Pendimethalin	0.075	0.1
General PSOL	Acetamiprid	0.019	0.5
	Azoxystrobin	0.031	1
	Butralin	0.11	1
	Carbendazim	0.019	0.5
	Endosulfan-alpha	0.014	0.2
	Etion	0.011	0.05
	Flumetralin	0.023	1
	Metalaxyl	0.042	0.2
	Pendimethalin	0.043	0.1
General PSOM	Acetamiprid	0.016	0.5
	Azoxystrobin	0.029	1
	Butralin	0.09	1
	Etion	0.011	0.05
	Flumetralin	0.015	1
	Metalaxyl	0.043	0.2
	Pendimethalin	0.037	0.1
General Silver PSOL	Acetamiprid	0.015	0.5
	Azoxystrobin	0.024	1
	Butralin	0.069	1
	Carbendazim	0.023	0.5
	Cypermethrin	0.23	0.5
	Endosulfan-alpha	0.012	0.2
	Etion	0.01	0.05
	Metalaxyl	0.03	0.2
	Pendimethalin	0.035	0.1
GroV Lös	Acetamiprid	0.012	0.5
	Butralin	0.081	1
	Carbendazim	0.022	0.5
	Cypermethrin	0.32	0.5
	Dimetomorf	0.015	1
	Etion	0.017	0.05
	Etufenprox	0.013	0.5
	Flumetralin	0.026	1
	Imidacloprid	0.013	1
	Indoxacarb	0.097	0.2
	Metalaxyl	0.027	0.2
	Pendimethalin	0.032	0.1
Göteborgs Rapé PSWM	Acetamiprid	0.051	0.5
	Azoxystrobin	0.032	1

BRAND SNUS	Agrochemicals [µg/g]		
		2011	GRL SNUS
Göteborgs Rapé PSWM Cont'd	Butralin	0.068	1
	Carbendazim	0.015	0.5
	Cypermethrin	0.25	0.5
	Etion	0.013	0.05
	Flumetralin	0.024	1
	Imidacloprid	0.016	1
	Metalaxyl	0.05	0.2
	Pendimethalin	0.023	0.1
Kronan Lös	Acetamiprid	0.012	0.5
	Azoxystrobin	0.016	1
	Butralin	0.047	1
	Carbendazim	0.012	0.5
	Etion	0.018	0.05
	Indoxacarb	0.019	0.2
	Metalaxyl	0.012	0.2
	Pendimethalin	0.025	0.1
Kronan PSOL	Acetamiprid	0.016	0.5
	Azoxystrobin	0.024	1
	Butralin	0.042	1
	Carbendazim	0.014	0.5
	Endosulfan-alpha	0.011	0.2
	Etion	0.02	0.05
	Metalaxyl	0.011	0.2
	Pendimethalin	0.022	0.1
Probe Lös	Azoxystrobin	0.016	1
	Butralin	0.17	1
	Metalaxyl	0.05	0.2
	Pendimethalin	0.028	0.1
Probe PSOL	Azoxystrobin	0.012	1
	Butralin	0.15	1
	Metalaxyl	0.037	0.2
	Pendimethalin	0.023	0.1
Röda Lacket Lös	Acetamiprid	0.014	0.5
	Butralin	0.15	1
	Endosulfan-alpha	0.019	0.2
	Etion	0.013	0.05
	Flumetralin	0.044	1
	Indoxacarb	0.079	0.2
	Metalaxyl	0.028	0.2
	Pendimethalin	0.03	0.1

BRAND <i>MOIST SNUFF</i>	Agrochemicals [µg/g]		
		2011	GRL SNUS
Timber Wolf Packs WG	Azoxystrobin	0.19	1
	Bitertanol	0.027	0.5
	Butralin	0.17	1
	Flumetralin	0.098	1
	Metalaxyl	0.050	0.2
	Pendimethalin	0.026	0.1
	Propiconazole	0.20	0.1
	Orthophenylphenol	0.15	-
Timber Wolf Packs Natural	Azoxystrobin	0.26	1
	Bitertanol	0.046	0.5
	Butralin	0.17	1
	λ-Cyhalothrin	0.12	0.1
	Flumetralin	0.11	1
	Metalaxyl	0.057	0.2
	Pendimethaline	0.032	0.1
	Propiconazole	0.16	0.1
Longhorn Pouches Straight	Orthophenylphenol	0.18	-
	Azoxystrobin	0.45	1
	Bitertanol	0.016	0.5
	Butralin	0.22	1
	λ-Cyhalothrin	0.15	0.1
	Flumetralin	0.11	1
	Metalaxyl	0.071	0.2
	Pendimethaline	0.023	0.1
	Propiconazole	0.25	0.1
	Spinosad	0.022	0.5
Timber Wolf FC Natural	Orthophenylphenol	0.19	-
	Azoxystrobin	0.42	1
	Bitertanol	0.024	0.5
	Butralin	0.25	1
	λ-Cyhalothrin	0.13	0.1
	Flumetralin	0.11	1
	Metalaxyl	0.091	0.2
	Pendimethaline	0.022	0.1
	Propiconazole	0.35	0.1
	Spinosad	0.034	0.5
Longhorn FC WG	Orthophenylphenol	0.25	-
	Azoxystrobin	0.40	1
	Bitertanol	0.012	0.5
	Butralin	0.23	1
	λ-Cyhalothrin	0.15	0.1

BRAND <i>MOIST SNUFF</i>	Agrochemicals [µg/g]		
		2011	GRL SNUS
Longhorn FC WG Cont'd	Flumetralin	0.11	1
	Metalaxyl	0.073	0.2
	Pendimethaline	0.024	0.1
	Propiconazole	0.30	0.1
	Spinosad	0.035	0.5
	Orthophenylphenol	0.18	-
Timber Wolf LC WG	Azoxystrobin	0.53	1
	Butralin	0.22	1
	Carbendazim	0.022	0.5
	λ-Cyhalothrin	0.16	0.1
	Flumetralin	0.086	1
	Metalaxyl	0.078	0.2
	Pendimethaline	0.024	0.1
	Propiconazole	0.22	0.1
	Spinosad	0.022	0.5
	Orthophenylphenol	0.27	-
Timber Wolf LC Straight	Azoxystrobin	1.1	1
	Butralin	0.32	1
	Carbendazim	0.014	0.5
	λ-Cyhalothrin	0.27	0.1
	Cypermethrin	0.19	0.5
	Dimetomorf	0.014	1
	Flumetralin	0.12	1
	Metalaxyl	0.096	0.2
	Pendimethalin	0.021	0.1
	Propiconazole	0.17	0.1
	Spinosad	0.013	0.5
	Orthophenylphenol	0.28	-
Longhorn LC Straight	Azoxystrobin	0.52	1
	Butralin	0.23	1
	λ-Cyhalothrin	0.14	0.1
	Dimetomorf	0.013	1
	Flumetralin	0.11	1
	Metalaxyl	0.093	0.2
	Pendimethalin	0.032	0.1
	Propiconazole	0.36	0.1
	Spinosad	0.022	0.5
	Orthophenylphenol	0.18	-
Red Man LC WG	Azoxystrobin	0.44	1
	Butralin	0.22	1
	Carbendazim	0.010	0.5
	λ-Cyhalothrin	0.16	0.1

BRAND <i>MOIST SNUFF</i>	Agrochemicals [µg/g]		
		2011	GRL SNUS
Red Man LC WG Cont'd	Dimetomorf	0.014	1
	Flumetralin	0.11	1
	Metalaxyl	0.084	0.2
	Pendimethalin	0.029	0.1
	Propiconazole	0.31	0.1
	Spinosad	0.018	0.5
	Orthophenyphenol	0.33	-
Longhorn LC Natural	Azoxystrobin	0.32	1
	Butralin	0.23	1
	λ-Cyhalothrin	0.11	0.1
	Cypermethrin	0.12	0.5
	Dimetomorf	0.011	1
	Flumetralin	0.12	1
	Metalaxyl	0.070	0.2
	Pendimethalin	0.043	0.1
	Propiconazole	0.19	0.1
	Orthophenyphenol	0.20	-
Timber Wolf FC WG	Azoxystrobin	0.56	1
	Butralin	0.21	1
	λ-Cyhalothrin	0.19	0.1
	Dimetomorf	0.011	1
	Flumetralin	0.10	1
	Maleic Hydrazide	1.4	8
	Metalaxyl	0.084	0.2
	Pendimethalin	0.032	0.1
	Propiconazole	0.22	0.1
	Spinosad	0.011	0.5
	Orthophenyphenol	0.15	-

BRAND <i>LOOSE LEAF</i>	Agrochemicals [µg/g]		
		2011	GRL TOBACCO
Red Man Original	Azoxystrobin	0.39	5
	Bitertanol	0.032	2.5
	Butralin	0.067	5
	Carbendazim	0.24	2
	Cypermethrin	0.13	1
	Difenoconazole	0.19	2
	Dimetomorf	0.32	2
	Endosulfan-alpha	0.02	1
	Flumetraline	0.68	5
	Hexaconazole	0.042	No GRL
	Imidacloprid	0.028	5
	Maleinhydrazid	4	20
	Metalaxyl	0.028	1
	Pendimethalin	0.059	0.5
	Propiconazole	0.049	0.5
	Tebuconazole	0.18	5
	Triadimefon	0.013	1
	Triadimenol	0.1	
J.D.'s Blend	Azoxystrobin	0.19	5
	Bitertanol	0.36	2.5
	Butralin	0.15	5
	Carbendazim	0.68	2
	Chlorpyrifos	0.013	0.5
	Dimetomorf	0.095	2
	Flumetraline	0.019	5
	Imidacloprid	0.023	5
	Iprovalicarb	0.21	1
	Metalaxyl	0.097	1
	Methomyl	0.018	1
	Thiodicarb	0.021	1
	Pendimethalin	0.17	0.5
	Tebuconazole	0.48	5
Red Man Golden Blend	Azoxystrobin	0.48	5
	Bitertanol	0.22	2.5
	Butralin	0.12	5
	Carbendazim	0.71	2
	Difenoconazole	0.27	2
	Dimetomorf	0.2	2
	Dithiocarbamates as CS2	0.34	5
	Flumetraline	0.52	5
	Imidacloprid	0.032	5

BRAND LOOSE LEAF	Agrochemicals [µg/g]		
		2011	GRL TOBACCO
Red Man Golden Blend Cont'd	Iprovalicarb	0.089	1
	Maleinhydrazid	4.2	20
	Metalaxyl	0.039	1
	Methomyl	0.024	1
	Thiodicarb	0.019	
	Pendimethalin	0.045	0.5
	Propiconazole	0.064	0.5
	Tebuconazole	0.3	5
	Triadimenol	0.07	1
Red Man Select	Azoxystrobin	0.21	5
	Bitertanol	0.35	2.5
	Butralin	0.023	5
	Carbendazim	1	2
	Chlorpyrifos	0.011	0.5
	Difenoconazole	0.014	2
	Dimetomorf	0.094	2
	Flumetraline	0.018	5
	Imidacloprid	0.022	5
	Iprovalicarb	0.11	1
	Isoprocarb	0.031	0.1
	Metalaxyl	0.067	1
	Methomyl	0.029	1
	Thiodicarb	0.017	
	Pendimethalin	0.018	0.5
	Tebuconazole	0.32	5
Granger Select	Azoxystrobin	0.055	5
	Bitertanol	0.03	2.5
	Butralin	0.22	5
	Carbendazim	0.16	2
	Chlorpyrifos	0.013	0.5
	Dimetomorf	0.33	2
	Flumetraline	0.058	5
	Imidacloprid	0.024	5
	Iprovalicarb	0.21	1
	Metalaxyl	0.095	1
	Methomyl	0.01	1
	Pendimethalin	0.18	0.5

BRAND PLUG	Agrochemicals [µg/g]		
		2011	GRL TOBAC CO
Apple Thick Plug	Azoxystrobin	0.014	5
	Bitertanol	0.029	2.5
	Butralin	0.17	5
	Carbendazim	0.014	2
	Cypermethrin	0.2	1
	Dimetomorf	0.26	2
	Flumetraline	0.039	5
	Imidacloprid	0.022	5
	Pendimethalin	0.015	0.5
	Piperonylbutoxide	0.011	3
	Spinosad	0.011	2
Cup Plug	Azoxystrobin	0.13	5
	Bitertanol	0.015	2.5
	Butralin	0.43	5
	Flumetraline	0.058	5
	Metalaxyl	0.024	1
	Piperonylbutoxide	0.019	3
	Propiconazole	0.098	0.5
Days Work Plug	Bitertanol	0.011	2.5
	Butralin	0.037	5
	Carbendazim	0.019	2
	Chlorpyrifos	0.01	0.5
	Dimetomorf	0.54	2
	Flumetraline	0.14	5
	Imidacloprid	0.011	5
	Maleinhydrazid	1.7	20
	Pendimethalin	0.017	0.5
	Piperonylbutoxide	0.013	3
Tinsley Plug	Azoxystrobin	0.017	5
	Butralin	0.056	5
	Carbendazim	0.036	2
	Dimetomorf	0.011	2
	Pendimethalin	0.029	0.5
Brown Mule Plug	Azoxystrobin	0.017	5
	Bitertanol	0.013	2.5
	Butralin	0.025	5
	Carbendazim	0.095	2
	Difenoconazole	0.018	2
	Dimetomorf	0.015	2
	Flumetraline	0.032	5
	Imidacloprid	0.016	5

BRAND PLUG	Agrochemicals		
	[µg/g]	2011	GRL TOBAC CO
Brown Mule Plug Cont'd	Pendimethalin	0.016	0.5
	Piperonylbutoxide	0.015	3

Ammonium compounds

Background:

- ❑ Ammonium compounds as ingredients in tobacco products are debated in the United States and in the EU.
- ❑ Several authorities around the world request information about the concentration of ammonia in smokeless tobacco products.

Information of analyses:

Laboratory:	2002-2008: R&D Chemical Analysis. Stockholm. 2010: Eurofins. Lidköping
Method:	2002-2008: FS4 Measured and calculated as NH ₃ (Intradoc 002340) 2010: TRAACS
Quantification limits:	2002-2008: 0.1 mg/g 2010: 0.1 mg/g

BRAND SNUS	Ammonium compounds [mg/g]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	1.6	1.4							
02 Strong PSOL	2.5	2.5							
Catch Collection PSWM. Chill	2.0	2.0							
Catch Dry Eucalyptus PSWM	1.7	1.8		1.7	1.8	1.5	1.6	1.7	2.1
Catch Dry Licorice PSWM	3.2	3.7		4.2	3.5	3.2	5.1	4.1	4.3
Catch Eucalyptus PSWL	2.5	1.8		1.7	2.3	2.2	2.5	2.6	
Catch Licorice PSOM	3.7	3.9		4.5	4.6	4.7	5.1	5.5	5.5
Catch Licorice PSWL	4.4	5.2		5.6	5.2	6.6	6.3	6.0	5.8
Catch Pure Mint PSW Medium	1.7								
Ettan Lös	1.8	1.3		1.8	2.0	2.0	3.6	2.3	2.7
Ettan PSOL	1.1	0.6		1.4	1.4	1.6	1.7	1.5	1.9
Ettan PSWL	2.1	2.4		1.6	2.6				
General Extra Sterk Lös	3.4	2.6							
General Extra Sterk PSOL	2.9	4.1							
General Long PSOL	1.7								
General Long Sterk PSOL	2.2								
General Lös	1.8	1.2		1.9	1.8	2.2	2.0	3.0	3.0
General Onyx Portion Large	4.8	5.8		4.5	3.2	4.6			
General PSOL	1.6	1.4		1.6	1.8	2.2	2.1	2.6	2.5
General PSOM	1.5	1.5		2.3	2.3	2.4	2.1	3.2	2.5
General PSWL	2.0	2.2		2.3	2.7	2.6	1.8	3.0	2.7
General PSWM	2.0	2.0		1.7	2.5	2.4			
General Silver PSOL	1.1	1.0		1.0	1.2	1.2	1.1	1.1	1.7
General Smooth PSW Medium	1.5								
General Sterk PSWL	2.6	3.0		2.8					
Göteborg Rapé No 2 PSWL	1.4	2.4		3.5	2.7				
Göteborgs Prima Fint Lös	1.5	1.6		2.8	2.2	2.3	2.2	2.2	2.1
Göteborgs Rapé Lös	2.2	1.3		2.9	2.3	4.1	2.7	2.3	2.8
Göteborgs Rapé PSWL	2.3	2.4		3.2	2.9	2.8	2.2	2.6	2.4
Göteborgs Rapé PSWM	2.1	1.8		3.1	2.6	2.5			
Grov Lös	1.6	1.2		1.9	1.7	2.5	2.0	2.8	2.6
Grov PSOL	1.6	1.4		1.4	2.4	3.0	2.2	2.4	2.4
Grov PSWL	1.9	2.3		2.7	2.4	2.5	2.5	2.4	2.7
Grovsnus Svart PSWL	2.8	3.3							
Kronan Lös	1.5	1.4		1.7	1.9				
Kronan PSOL	1.4	1.3		1.3	1.2	1.6			
Kronan PSWL	2.1	2.2		1.8					
Nick (and Johnny) PSOL	3.5	3.7		3.4	3.9				

BRAND	Ammonium compounds [mg/g]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
SNUS Cont'd									
Nick&Johnny Strong White PSWL	3.5								
Probe Lös	1.5	1.4		2.1	2.2	1.7	1.8	2.1	2.2
Probe PSOL	1.4	1.5		1.8	1.6	1.6	1.1	1.4	1.8
Röda Lacket Lös	1.6	1.3		1.7	2.1	2.4	3.3	2.5	2.8
Röda Lacket PSWL	2.2	2.3		2.0	2.5	2.5			
Tre Ankare PSWL	2.2	2.4		2.4	2.3	2.3	2.6	2.5	3.1
Tre Ankare PSWM	2.0	1.8		2.0	2.4	2.5	2.7	2.6	2.6
MOIST SNUFF									
Longhorn FC Natural		5.2		5.9	4.5	4.9	6.4	5.0	
Longhorn FC Wintergreen		6.3							
Longhorn LC Mint		5.7				6.3	5.3		
Longhorn LC Natural		4.0							
Longhorn LC Straight		5.1			5.8				
Longhorn LC Wintergreen		5.9			5.5	8.2	8.2	6.1	
Longhorn Pouches Straight		3.9							
Longhorn Pouches Wintergreen		3.9							
Red Man FC Natural		5.4		6.1					
Red Man LC Straight		5.6		6.5					
Red Man LC Wintergreen		5.1		9.6					
Renegades Wintergreen		3.9			3.9	4.0	5.7	4.1	4.4
Timber Wolf FC Natural		5.6		6.4	6.9	7.0	9.3	7.2	6.3
Timber Wolf FC Wintergreen		5.5							
Timber Wolf LC Apple		5.0			6.3		7.0		
Timber Wolf LC Cool Wintergreen		6.3							
Timber Wolf LC Mint		5.4							
Timber Wolf LC Peach		4.6		7.5		5.3	6.4		
Timber Wolf LC Straight		5.1						7.4	7.3
Timber Wolf LC Wintergreen		5.5		6.9	9.6	7.9	10.6	9.1	8.0
Timber Wolf Packs Mint		4.2							
Timber Wolf Packs Natural		4.4		4.4	3.4				
Timber Wolf Packs Peach		2.9							
Timber Wolf Packs Wintergreen		3.7		4.4	4.2	4.4			
LOOSE LEAF									
Granger Select									
J.D.'s Blend									
Red Man Golden Blend									
Red Man Original									
Red Man Select									

	Ammonium compounds								
	[mg/g]								
BRAND <i>LOOSE LEAF Cont'd</i>	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend									
Southern Pride									
<i>PLUG</i>									
Apple Thick Plug									
Brown Mule Plug									
Cup Plug									
Days Work Plug									
Red Man Plug									
Tinsley Plug									

Bacteria

Background:

- ❑ A large number of microbes is naturally occurring on cured raw tobacco (up to 10^7 cfu/g), which is used for production of smokeless tobacco products. Bacterial activities may contribute to the formation of nitrite (and thus TSNA) and may also contribute to deterioration of the product.
- ❑ Swedish snus products are regulated in the Swedish Food Regulation and the number of bacteria in the final product has to be under control.
- ❑ The heat treatment of raw tobacco and hygienic handling of the heat-treated tobacco during manufacturing of snus reduces the number of bacteria in the final product.
- ❑ The most frequently found microorganism in the final products is *Bacillus spp.* which is a spore forming bacteria. The spores are dormant in the smokeless tobacco products and do not grow if the water activity value is below 0.90 in the products.
- ❑ Internal tolerance limit. SMNE: 4 log cfu/g

Information of analyses:

Laboratory: KLAB, Gothenburg.

Method: Determination of bacteria count by measuring colony forming units, cfu. ”Bestämning av totalantalet bakterier i tobak och tobaksprodukter”

Quantification limits: log cfu/g wet product: 2

BRAND SNUS	Bacteria [log cfu/g]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	2.9	3.1							
02 Strong PSOL	3.0	3.6							
Catch Collection PSWM. Chill	<2.0	2.0	2.0						
Catch Dry Eucalyptus PSWM	<2.0	2.0	2.0	2.4	2.0	<2	2.8	2.5	2.4
Catch Dry Licorice PSWM	2.0	2.7	<2.0	3.7	2.2	2.0	2.2	2.0	2.3
Catch Eucalyptus PSWL	2.5	2.3	2.0	2.2	2.2	2.0	2.5	3.3	
Catch Licorice PSOM	2.0	3.9	3.1	2.2	2.7	2.5	3.8	3.4	3.6
Catch Licorice PSWL	2.5	2.4	2.3	2.0	2.0	2.3	2.0	2.2	3.7
Catch Pure Mint PSW Medium	3.3								
Ettan Lös	<2.0	2.0	2.5	2.0	2.0	2.4	<2	2.7	2.3
Ettan PSOL	2.0	<2.0	<2.0	2.0	<2	<2	2.0	2.5	2.0
Ettan PSWL	<2.0	2.6	3.0	2.7	3.4				
General Extra Sterk PSOL	3.3	2.2	3.5						
General Extra Sterk Lös	<2.0	2.2	2.0						
General Long PSOL	2.2								
General Long Sterk PSOL	2.2								
General Lös	<2.0	<2.0	2.0	2.5	2.7	2.4	2.2	3.3	2.5
General Onyx PSWL	2.7	2.2	2.0	<2.0	<2	2.8			
General PSOL	2.0	2.9	3.5	2.2	2.8	2.6	2.9	2.9	3.6
General PSOM	<2.0	3.0	2.8	2.9	2.3	3.4	4.2	3.2	2.8
General PSWL	2.0	2.2	2.0	2.0	2.5	2.4	2.0	2.7	2.2
General PSWM	2.8	2.3	3.0	<2.0	<2	2.9			
General Silver PSOL	2.4	<2.0	<2.0	2.0	2.0	2.0	<2	2.0	3.0
General Smooth PSW Medium	3.9								
General Sterk PSWL	2.9	2.2	2.0	2.0					
Göteborgs Prima Fint Lös	3.2	2.9	2.6	2.7	3.0	2.7	3.1	3.0	2.7
Göteborgs Rapé Lös	2.0	<2.0	2.3	2.0	2.5	2.3	2.3	2.6	2.6
Göteborgs Rapé PSWL	2.0	2.0	2.5	2.0	2.0	2.2	2.3	2.5	2.8
Göteborgs Rapé PSWM	2.6	2.6	2.7	2.7	2.0	2.0			
Göteborgs Rape No2 PSWL	2.5	2.6	3.5	2.0	2.0				
Grov Lös	2.0	<2.0	2.0	2.0	2.0	2.2	2.0	2.2	2.8
Grov PSOL	2.8	3.1	2.9	3.5	3.2	<2	3.8	2.6	2.9
Grov PSWL	2.3	2.0	2.9	2.0	2.3	2.8	2.5	2.6	2.0
Grovsnus Svart PSWL	2.2	2.9	2.0						
Kronan Lös	2.0	<2.0	<2.0	2.0	2.3				
Kronan PSOL	2.7	2.5	3.8	2.5	2.8	3.2			
Kronan PSWL	2.0	2.4	2.7	<2.0					
Nick (and Johnny) PSOL	2.8	3.2	3.0	3.5	<2				

BRAND <i>SNUS Cont'd</i>	Bacteria [log cfu/g]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	2.0								
Probe Lös	<2.0	2.0	2.0	<2.0	2.0	<2	2.2	2.0	<2
Probe PSOL	<2.0	2.0	2.0	2.2	2.2	2.0	2.7	2.0	<2
Röda Lacket Lös	2.8	3.0	2.7	3.2	2.2	2.7	2.8	3.4	2.9
Röda Lacket PSWL	<2.0	3.1	2.0	2.0	2.6	2.2			
Tre Ankare PSWL	2.0	2.2	2.0	<2.0	2.4	<2	2.0	2.2	3.6
Tre Ankare PSWM	2.2	2.3	2.0	2.0	2.9	2.4	3.5	2.8	2.7
MOIST SNUFF									
Longhorn FC Natural	5.8	5.9	6.5	5.5	5.2	5.8	5.8	4.9	
Longhorn FC Wintergreen	5.9	6.0							
Longhorn LC Mint	5.8	5.8				5.4	5.6		
Longhorn LC Natural	6.0	5.7							
Longhorn LC Straight	5.6	5.7			5.4			5.2	
Longhorn LC Wintergreen	5.5	5.7	5.1		5.2	5.5	5.6	5.2	
Longhorn Pouches Straight	6.1	5.7							
Longhorn Pouches Wintergreen	5.6	6.4							
Red Man FC Natural	5.7	5.9		5.4					
Red Man LC Straight	5.6	5.8		5.2					
Red Man LC Wintergreen	5.9	6.1		5.0					
Renegades Wintergreen	6.1	5.8			4.8	5.6	5.4	4.7	5.5
Timber Wolf FC Natural	2.0	5.9		5.7	5.0	5.6	5.6	4.9	5.6
Timber Wolf FC Wintergreen	5.8	5.9							
Timber Wolf LC Apple	5.8	5.7			5.3		5.8		
Timber Wolf LC Cool Wintergreen	5.7	5.6							
Timber Wolf LC Mint	6.5	5.6							
Timber Wolf LC Peach	5.7	5.8		5.2		5.3	5.8		
Timber Wolf LC Straight	5.9	5.7						4.7	5.6
Timber Wolf LC Wintergreen	5.8	5.6	5.8	5.1	4.6	5.5	5.7	5.0	5.3
Timber Wolf Packs Mint	5.7	5.7							
Timber Wolf Packs Natural	6.0	5.9		4.9	5.1				
Timber Wolf Packs Peach	5.5	5.7							
Timber Wolf Packs Wintergreen	6.0	6.4	6.2	5.2	5.4	5.1			
LOOSE LEAF									
Granger Select	5.0								
J.D.'s Blend	4.9								
Red Man Golden Blend	5.3								
Red Man Original	5.3								
Red Man Select	4.3								

BRAND <i>LOOSE LEAF Cont'd</i>	Bacteria [log cfu/g]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	5.0								
Southern Pride	4.4								
PLUG									
Apple Thick Plug	5.5								
Brown Mule Plug	5.7								
Cup Plug	4.4								
Days Work Plug	5.7								
Red Man Plug	6.1								
Tinsley Plug	5.0								

Carbamide

Background:

- ❑ Carbamide also known as urea.
- ❑ The amino acid arginine can degrade to urea by yeast fermentation. Urea can then broke down to isocyanate which reacts with ethanol to form ethyl carbamide. Urea is naturally occurring in cured tobacco.

Information of analyses:

Laboratory: R&D CA. Stockholm

Method: UPLC-MS-MS

Quantification limits: 20 ppb

Uncertainty: Not Validated

BRAND SNUS	Carbamide [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	170								
02 Strong PSOL	165								
Catch Collection PSWM. Chill	303								
Catch Dry Eucalyptus PSWM	149								
Catch Dry Licorice PSWM	140								
Catch Eucalyptus PSWL	249								
Catch Licorice PSOM	235								
Catch Licorice PSWL	224								
Catch Pure Mint PSW Medium	161								
Ettan Lös	161								
Ettan PSOL	287								
Ettan PSWL	243								
General Extra Sterk PSOL	232								
General Extra Sterk Lös	296								
General Long PSOL	227								
General Long Sterk PSOL	166								
General Lös	161								
General Onyx PSWL	310								
General PSOL	215								
General PSOM	244								
General PSWL	194								
General PSWM	297								
General Silver PSOL	152								
General Smooth PSW Medium	120								
General Sterk PSWL	199								
Göteborgs Prima Fint Lös	134								
Göteborgs Rapé Lös	165								
Göteborgs Rapé PSWL	187								
Göteborgs Rapé PSWM	297								
Göteborgs Rape´No2 PSWL	262								
Grov Lös	177								
Grov PSOL	198								
Grov PSWL	269								
Grovsnus Svart PSWL	338								
Kronan Lös	190								
Kronan PSOL	184								
Kronan PSWL	226								
Nick (and Johnny) PSOL	428								

BRAND <i>SNUS Cont'd</i>	Carbamide [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	159								
Probe Lös	234								
Probe PSOL	213								
Röda Lacket Lös	168								
Röda Lacket PSWL	181								
Tre Ankare PSWL	277								
Tre Ankare PSWM	242								
MOIST SNUFF									
Longhorn FC Natural	237								
Longhorn FC Wintergreen	459								
Longhorn LC Mint	527								
Longhorn LC Natural	376								
Longhorn LC Straight	428								
Longhorn LC Wintergreen	396								
Longhorn Pouches Straight	364								
Longhorn Pouches Wintergreen	194								
Red Man FC Natural	261								
Red Man LC Straight	341								
Red Man LC Wintergreen	334								
Renegades Wintergreen	224								
Timber Wolf FC Natural	438								
Timber Wolf FC Wintergreen	405								
Timber Wolf LC Apple	270								
Timber Wolf LC Cool Wintergreen	444								
Timber Wolf LC Mint	246								
Timber Wolf LC Peach	295								
Timber Wolf LC Straight	308								
Timber Wolf LC Wintergreen	436								
Timber Wolf Packs Mint	265								
Timber Wolf Packs Natural	372								
Timber Wolf Packs Peach	190								
Timber Wolf Packs Wintergreen	385								
LOOSE LEAF									
Granger Select	119								
J.D.'s Blend	143								
Red Man Golden Blend	97								
Red Man Original	104								
Red Man Select	149								

BRAND <i>LOOSE LEAF Cont'd</i>	Carbamide [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	249								
Southern Pride	109								
<i>PLUG</i>									
Apple Thick Plug	41								
Brown Mule Plug	<20								
Cup Plug	44								
Days Work Plug	75								
Red Man Plug	129								
Tinsley Plug	126								

Ethyl Carbamate

Background:

- ❑ Ethyl carbamate, also known as urethane, can naturally occur in fermented foods and beverages, such as spirits, wine, beer, bread, soy sauce and yogurt. The compound is formed during the fermentation process, distillation or during storage.
- ❑ Ethanol and the amino acid arginine can form ethyl carbamate (Arginine degrades to urea by yeast fermentation. Urea is then broken down to isocyanate and reacts with ethanol). Urea is naturally occurring in cured tobacco and can react with added ethanol to form ethyl carbamate.
- ❑ Ethyl carbamate is classified as "probably carcinogenic to humans". Group 2A (IARC 2007)
- ❑ Some reported values of ethyl carbamate in the literature: Dry and moist snuff US:310-375 ppb (Brunneman. 1992)
- ❑ Internal tolerance limit (SMNE):70 ppb (dry weight)

Information of analyses:

Laboratory: R&D Chemical Analysis. Stockholm

Method: UPLC-MS/MS

Quantification limits: 5 / 30 ppb

Measurement uncertainty: Not Validated

BRAND SNUS	Ethyl Carbamate [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	58	61							
02 Strong PSOL	<30	273							
Catch Collection PSWM. Chill	164	300	480						
Catch Dry Eucalyptus PSWM	<30	<5	45						
Catch Dry Licorice PSWM	76	21	49						
Catch Eucalyptus PSWL	<30	77	140						
Catch Licorice PSOM	171	94	170						
Catch Licorice PSWL	<30	88	140						
Catch Pure Mint PSW Medium	43								
Ettan Lös	<30	16	26						
Ettan PSOL	<30	34	60						
Ettan PSWL	<30	77	130						
General Extra Sterk PSOL	<30	111	75						
General Extra Sterk Lös	<30	17	25						
General Long PSOL	<30								
General Long Sterk PSOL	106								
General Lös	<30	<5	23						
General Onyx PSWL	<30	75	470						
General PSOL	<30	24	25						
General PSOM	<30	31	90						
General PSWL	<30	39	66						
General PSWM	<30	46	85						
General Silver PSOL	<30	9	16						
General Smooth PSW Medium	<30								
General Sterk PSWL	<30	48	95						
Göteborgs Prima Fint Lös	<30	43	64						
Göteborgs Rapé Lös	<30	23	39						
Göteborgs Rapé PSWL	<30	60	110						
Göteborgs Rapé PSWM	<30	43	110						
Göteborgs Rape No2 PSWL	<30	95	160						
Grov Lös	<30	19	34						
Grov PSOL	114	67	98						
Grov PSWL	<30	173	120						
Grovsnus Svart PSWL	141	300	300						
Kronan Lös	<30	48	54						
Kronan PSOL	<30	41	70						
Kronan PSWL	<30	41	110						
Nick (and Johnny) PSOL	144	91	100						

BRAND <i>SNUS Cont'd</i>	Ethyl Carbamate [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	<30								
Probe Lös	<30	34	75						
Probe PSOL	<30	103	190						
Röda Lacket Lös	<30	27	31						
Röda Lacket PSWL	62	135	220						
Tre Ankare PSWL	<30	41	97						
Tre Ankare PSWM	<30	33	53						
MOIST SNUFF									
Longhorn FC Natural	<30	<30	52						
Longhorn FC Wintergreen	<30	191							
Longhorn LC Mint	64	92							
Longhorn LC Natural	<30	<30							
Longhorn LC Straight	<30	181							
Longhorn LC Wintergreen	107	77	33						
Longhorn Pouches Straight	<30	<30							
Longhorn Pouches Wintergreen	<30	103							
Red Man FC Natural	<30	79							
Red Man LC Straight	<30	84							
Red Man LC Wintergreen	<30	188							
Renegades Wintergreen	<30	<30							
Timber Wolf FC Natural	<30	<30							
Timber Wolf FC Wintergreen	<30	296							
Timber Wolf LC Apple	<30	76							
Timber Wolf LC Cool Wintergreen	<30	162							
Timber Wolf LC Mint	<30	32							
Timber Wolf LC Peach	<30	236							
Timber Wolf LC Straight	<30	<30							
Timber Wolf LC Wintergreen	<30	138	<5						
Timber Wolf Packs Mint	71	109							
Timber Wolf Packs Natural	<30	<30							
Timber Wolf Packs Peach	<30	353							
Timber Wolf Packs Wintergreen	<30	259	20						
LOOSE LEAF									
Granger Select	<30								
J.D.'s Blend	<30								
Red Man Golden Blend	<30								
Red Man Original	<30								
Red Man Select	<30								

BRAND <i>LOOSE LEAF Cont'd</i>	Ethyl Carbamate [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	<30								
Southern Pride	<30								
<i>PLUG</i>									
Apple Thick Plug	85								
Brown Mule Plug	72								
Cup Plug	<30								
Days Work Plug	<30								
Red Man Plug	<30								
Tinsley Plug	<30								

METALS : Arsenic

Background:

- ❑ Inorganic arsenic and arsenic compounds are classified as chemicals that are carcinogenic to humans. Group 1 (IARC).
- ❑ Several authorities around the world request information about the concentration of arsenic in smokeless tobacco products.
- ❑ WHO 1988: PTWI (Provisionally Tolerable Weekly Intake) of 15 µg/kg bodyweight.
- ❑ Reported values of arsenic in literature:
Dry and moist snuff (US) : 0.5-0.9 ppm (Brunnemann. 1992)
- ❑ The **GOTHIA TEK**[®] limit (2001): 0.5 ppm (dry weight)
- ❑ Internal tolerance limit. SMNE: 0.4 ppm (dry weight)

Information of analyses:

Laboratory:	2001-2008:Eurofins AB, Lidköping, Sweden 2009-Present: R&D Chemical Analysis, Stockholm
Method:	2001-2008:ICP-MS : 2009-Present : AAS-GF KLS:”Bestämning av As, Pb, Cd, Cr och Ni med GF-AAS i tobak, tobaksprodukter och fiberbaserade matriser”
Quantification limits:	2001-2008: 0.05 ppm 2009-Present: 0.10 ppm
Measurement uncertainty:	2001-2008: ± 40 % 2009-Present: ±20%

Comments

The consumption of 25 g snus per day by a person of 70 kg would result in a weekly intake of about 0.3 µg/kg bodyweight of arsenic, which is below the PTWI set by WHO.

A consumption of 25 g moist snuff per day by a person of 70 kg would result in a weekly intake of 0.12 µg/kg bodyweight of arsenic in worst case which is below the PTWI set by WHO. No measurable values above LOQ (0.10 ppm) was found in moist snuff 2011.

The consumption of 25 g loose leaf or plug per day by a person of 70 kg would result in a weekly intake of about 0.25 µg/kg bodyweight of arsenic, which is below the PTWI set by WHO.

Calculated on the maximum values 2011.

BRAND SNUS	Arsenic [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	<0.10	0.22							
02 Strong PSOL	<0.10	0.18							
Catch Collection PSWM. Chill	<0.10	<0.10	<0.10						
Catch Dry Eucalyptus PSWM	<0.10	<0.10	<0.10	0.11	0.11	0.10	0.13	0.16	0.08
Catch Dry Licorice PSWM	<0.10	<0.10	<0.10	0.11	0.08	0.10	0.17	0.10	0.12
Catch Eucalyptus PSWL	<0.10	<0.10	<0.10	0.13	0.11	<0.05	<0.05	0.16	
Catch Licorice PSOM	<0.10	0.21	<0.10	0.09	0.13	<0.05	0.13	0.12	<0.05
Catch Licorice PSWL	<0.10	<0.10	<0.10	0.11	<0.05	<0.05	0.15	0.14	<0.05
Catch Pure Mint PSW Medium	0.18								
Ettan Lös	<0.10	<0.10	<0.10	0.10	<0.05	0.13	0.15	0.18	0.12
Ettan PSOL	<0.10	<0.10	<0.10	0.15	0.09	0.10	0.12	0.15	0.13
Ettan PSWL	<0.10	<0.10	<0.10	0.15	0.14				
General Extra Sterk PSOL	<0.10	<0.10	<0.10	0.13					
General Extra Sterk Lös	<0.10	<0.10	<0.10						
General Long PSOL	0.21								
General Long Sterk PSOL	0.19								
General Lös	<0.10	<0.10	<0.10	0.13	0.13				
General Onyx PSWL	<0.10	<0.10	<0.10	0.14	<0.05	0.12	0.15	0.15	<0.05
General PSOL	<0.10	0.19	<0.10	0.17	0.11	0.11			
General PSOM	<0.10	0.19	0.26	0.13	0.11	<0.05	0.14		
General PSWL	<0.10	<0.10	<0.10						
General PSWM	<0.10	<0.10	<0.10	0.14	<0.05	<0.05	0.17	0.16	<0.05
General Silver PSOL	<0.10	<0.10	<0.10	<0.05	<0.05	0.10	0.13	0.17	<0.05
General Smooth PSW Medium	0.25								
General Sterk PSWL	<0.10	<0.10	<0.10	0.12	0.14	<0.05	<0.05	0.14	<0.05
Göteborgs Prima Fint Lös	<0.10	<0.10	0.21	0.16	0.13	0.12			
Göteborgs Rapé Lös	<0.10	<0.10	<0.10	0.18	0.12	<0.05	0.16	0.21	0.12
Göteborgs Rapé PSWL	<0.10	<0.10	<0.10	0.12	0.13	<0.05	0.16	0.14	<0.05
Göteborgs Rapé PSWM	<0.10	<0.10	<0.10	0.14	0.13	<0.05			
Göteborgs Rape No2 PSWL	<0.10	<0.10	<0.10	<0.05	0.12	0.14	0.16	0.13	<0.05
Grov Lös	<0.10	<0.10	<0.10	0.12	0.10	0.12	0.14	0.18	<0.05
Grov PSOL	0.22	0.22	0.27	0.15	0.13	<0.05	0.14	0.15	0.10
Grov PSWL	<0.10	<0.10	0.19	0.13	0.10	<0.05	0.13	0.16	<0.05
Grovsnus Svart PSWL	<0.10	<0.10	<0.10						
Kronan Lös	<0.10	0.20	<0.10	0.16	<0.05				
Kronan PSOL	0.20	<0.10	<0.10	0.18	0.10	<0.05			
Kronan PSWL	<0.10	<0.10	<0.10	0.19					
Nick (and Johnny) PSOL	<0.10	<0.10	<0.10	0.14	0.10				

BRAND <i>SNUS Cont'd</i>	Arsenic [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	<0.10								
Probe Lös	<0.10	<0.10	<0.10	<0.05	0.09	0.11	0.14	0.16	0.11
Probe PSOL	<0.10	<0.10	<0.10	0.14	0.13	<0.05	0.12	0.18	0.11
Röda Lacket Lös	<0.10	<0.10	<0.10	0.15	0.11	0.15	0.17	0.22	<0.05
Röda Lacket PSWL	<0.10	<0.10	<0.10	0.15	0.11	<0.05			
Tre Ankare PSWL	<0.10	<0.10	<0.10	0.14	0.14	<0.05	0.17	0.16	<0.05
Tre Ankare PSWM	<0.10	<0.10	<0.10	0.12	0.14	<0.05	0.13	0.12	<0.05
MOIST SNUFF									
Longhorn FC Natural	<0.10	<0.10	0.21	0.15	0.18	0.25	0.14	0.22	
Longhorn FC Wintergreen	<0.10	<0.10							
Longhorn LC Mint	<0.10	0.20				0.33	0.18		
Longhorn LC Natural	<0.10	<0.10							
Longhorn LC Straight	<0.10	<0.10			0.20			0.20	
Longhorn LC Wintergreen	<0.10	<0.10	0.24		0.18	0.28	0.13	0.20	
Longhorn Pouches Straight	<0.10	<0.10							
Longhorn Pouches Wintergreen	<0.10	<0.10							
Red Man FC Natural	<0.10	<0.10		0.22					
Red Man LC Straight	<0.10	<0.10		0.19					
Red Man LC Wintergreen	<0.10	<0.10		0.16					
Renegades Wintergreen	<0.10	<0.10			0.17	0.37	0.18	0.24	0.20
Timber Wolf FC Natural	<0.10	<0.10		0.19	0.23	0.27	0.17	0.22	0.25
Timber Wolf FC Wintergreen	<0.10	<0.10							
Timber Wolf LC Apple	<0.10	<0.10			0.19		0.14		
Timber Wolf LC Cool Wintergreen	<0.10	<0.10							
Timber Wolf LC Mint	<0.10	<0.10							
Timber Wolf LC Peach	<0.10	<0.10		0.17		0.36	0.14		
Timber Wolf LC Straight	<0.10	<0.10						0.30	0.21
Timber Wolf LC Wintergreen	<0.10	<0.10	0.25	0.18	0.25	0.38	0.18	0.28	0.24
Timber Wolf Packs Mint	<0.10	<0.10							
Timber Wolf Packs Natural	<0.10	<0.10		0.17	0.21				
Timber Wolf Packs Peach	<0.10	<0.10							
Timber Wolf Packs Wintergreen	<0.10	<0.10	0.25	0.18	0.22	0.27			
LOOSE LEAF									
Granger Select	0.17								
J.D.'s Blend	<0.10								
Red Man Golden Blend	0.15								
Red Man Original	0.20								
Red Man Select	<0.10								

BRAND <i>LOOSE LEAF Cont'd</i>	Arsenic [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	<0.10								
Southern Pride	0.20								
<i>PLUG</i>									
Apple Thick Plug	0.18								
Brown Mule Plug	0.13								
Cup Plug	0.19								
Days Work Plug	0.19								
Red Man Plug	<0.10								
Tinsley Plug	<0.10								

METALS : Cadmium

Background:

- ❑ Cadmium and cadmium compounds are classified as chemicals that are carcinogenic to humans. Group 1 (IARC).
- ❑ Cadmium is present in soil, partly derived from fertilizers used on crops. Cadmium is taken up by the roots of the tobacco plant and is then transported to the leaves.
- ❑ WHO 2009: PTWI (Provisionally Tolerable Weekly Intake) of 2.5 µg/kg bodyweight.
- ❑ Several authorities around the world request information about the concentration of cadmium in smokeless tobacco products.
- ❑ Reported values of cadmium in the literature:
Dry and moist snuff (US) : 0.45-1.58 ppm (Hoffmann. 1987)
- ❑ The **GOTHIA TEK**[®] (2001): 1.0 ppm (dry weight)
- ❑ The SM Target Value 2001: 2.0 ppm (dry weight)
- ❑ Internal tolerance limit. SMNE: 0.8 ppm (dry weight)

Information of analyses:

Laboratory: 2001-2008: Eurofins AB, Lidköping, Sweden.
2009-Present: R&D Chemical Analysis, Stockholm

Method: 2001-2008: ICP-MS
2009-Present: AAS-GF KLS: ”Bestämning av As, Pb, Cd, Cr och Ni med GF-AAS i tobak, tobaksprodukter och fiberbaserade matriser”

Quantification limits: 2001-2008: 0.05 ppm
2009-Present: 0.01 ppm

Measurement uncertainty: 2001-2008: ± 25 %
2009-Present: ±19%

Comments

The consumption of 25 g snus per day by a person of 70 kg would result in a weekly intake of about 1.4 µg/kg bodyweight of cadmium, which is below the PTWI set by WHO.

A consumption of 25 g moist snuff per day by a person of 70 kg would result in a weekly intake of about 1.6 µg /kg bodyweight of cadmium, which is below the PTWI set by WHO.

A consumption of 25 g loose leaf or plug per day by a person of 70 kg would result in a weekly intake of about 1.3 µg /kg bodyweight of cadmium , which is below the PTWI set by WHO.

Calculated on the maximum values 2011.

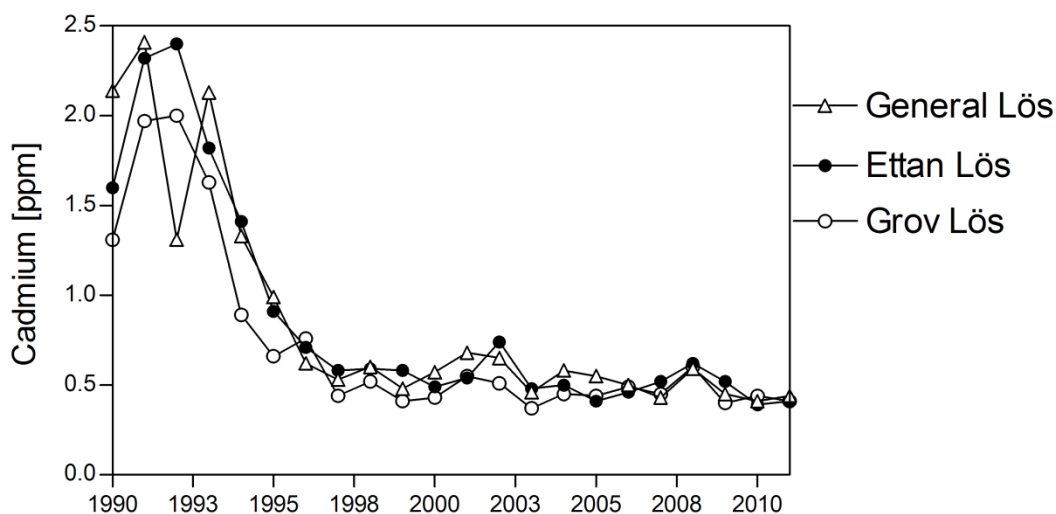


Figure 4. The cadmium level in General Lös, Ettan Lös and Grov Lös 1990-2011

BRAND SNUS	Cadmium [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	0.43	0.42							
02 Strong PSOL	0.66	1.1							
Catch Collection PSWM. Chill	0.39	0.52	0.55						
Catch Dry Eucalyptus PSWM	0.63	0.78	0.71	0.77	0.64	0.61	0.63	0.70	0.49
Catch Dry Licorice PSWM	0.59	0.77	0.72	0.73	0.63	0.61	0.65	0.51	0.59
Catch Eucalyptus PSWL	0.43	0.47	0.50	0.46	0.45	0.33	0.33	0.46	
Catch Licorice PSOM	0.42	0.40	0.39	0.46	0.51	0.36	0.41	0.35	0.37
Catch Licorice PSWL	0.36	0.49	0.62	0.44	0.51	0.38	0.42	0.39	0.42
Catch Pure Mint PSW Medium	0.35								
Ettan Lös	0.41	0.39	0.52	0.62	0.52	0.46	0.41	0.50	0.48
Ettan PSOL	0.39	0.37	0.41	0.52	0.56	0.36	0.48	0.42	0.52
Ettan PSWL	0.40	0.48	0.54	0.35	0.48				
General Extra Sterk PSOL	0.52	0.96	0.87						
General Extra Sterk Lös	0.54	0.69	0.94						
General Long PSOL	0.52								
General Long Sterk PSOL	0.67								
General Lös	0.44	0.41	0.45	0.59	0.43	0.50	0.55	0.58	0.46
General Onyx PSWL	0.83	0.83	0.68	0.68	0.52	0.47			
General PSOL	0.44	0.42	0.39	0.50	0.48	0.39	0.41	0.37	0.40
General PSOM	0.39	0.39	0.35	0.39	0.54	0.45	0.44	0.45	0.36
General PSWL	0.47	0.48	0.52	0.39	0.51	0.39	0.44	0.43	0.31
General PSWM	0.38	0.49	0.49	0.39	0.50	0.36			
General Silver PSOL	0.41	0.27	0.26	0.33	0.36	0.32	0.33	0.32	0.28
General Smooth PSW Medium	0.35								
General Sterk PSWL	0.77	0.91	0.65	0.51					
Göteborgs Prima Fint Lös	0.46	0.46	0.43	0.40	0.60	0.44	0.37	0.51	0.41
Göteborgs Rapé Lös	0.45	0.44	0.45	0.42	0.52	0.38	0.46	0.40	0.39
Göteborgs Rapé PSWL	0.54	0.48	0.56	0.35	0.50	0.33	0.42	0.42	0.36
Göteborgs Rapé PSWM	0.40	0.49	0.59	0.34	0.51	0.39			
Göteborgs Rape No2 PSWL	0.44	0.47	0.58	0.35	0.52				
Grov Lös	0.41	0.44	0.40	0.60	0.45	0.49	0.44	0.45	0.37
Grov PSOL	0.44	0.30	0.37	0.39	0.50	0.37	0.47	0.38	0.42
Grov PSWL	0.44	0.52	0.50	0.34	0.50	0.33	0.40	0.40	0.35
Grovsnus Svart PSWL	1.1	1.3	0.65						
Kronan Lös	0.31	0.32	0.36	0.30	0.57				
Kronan PSOL	0.32	0.34	0.35	0.47	0.47	0.30			
Kronan PSWL	0.52	0.49	0.60	0.27					
Nick (and Johnny) PSOL	1.0	0.89	0.95	0.74	0.54				

BRAND	Cadmium [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
SNUS Cont'd									
Nick&Johnny Strong White PSWL	0.85								
Probe Lös	0.56	0.71	0.68	0.71	0.54	0.64	0.60	0.69	0.53
Probe PSOL	0.52	0.70	0.62	0.74	0.67	0.59	0.54	0.75	0.58
Röda Lacket Lös	0.47	0.44	0.50	0.62	0.46	0.48	0.45	0.48	0.46
Röda Lacket PSWL	0.50	0.51	0.50	0.48	0.53	0.39			
Tre Ankare PSWL	0.53	0.49	0.53	0.47	0.51	0.36	0.42	0.41	0.38
Tre Ankare PSWM	0.48	0.52	0.57	0.44	0.51	0.39	0.55	0.48	0.37
MOIST SNUFF									
Longhorn FC Natural	1.1	1.1	1.0	1.3	1.2	1.3	1.0	1.5	
Longhorn FC Wintergreen	1.3	1.5							
Longhorn LC Mint	1.3	1.4				1.3	1.1		
Longhorn LC Natural	1.1	1.2							
Longhorn LC Straight	1.2	1.3			1.4			1.4	
Longhorn LC Wintergreen	1.1	1.2	1.1		1.4	1.4	1.0	1.4	
Longhorn Pouches Straight	1.1	1.3							
Longhorn Pouches Wintergreen	1.1	1.2							
Red Man FC Natural	0.88	1.2		1.4					
Red Man LC Straight	0.99	1.3		1.4					
Red Man LC Wintergreen	1.1	1.3		1.4					
Renegades Wintergreen	1.0	1.1			1.4	1.3	1.4	1.6	1.4
Timber Wolf FC Natural	1.3	1.3		1.6	1.9	1.3	1.3	1.4	1.4
Timber Wolf FC Wintergreen	1.2	1.3							
Timber Wolf LC Apple	0.94	1.1			1.3		1.1		
Timber Wolf LC Cool Wintergreen	1.1	1.3							
Timber Wolf LC Mint	0.93	1.4							
Timber Wolf LC Peach	0.99	1.2		1.3		1.5	1.1		
Timber Wolf LC Straight	1.3	1.5						1.7	1.4
Timber Wolf LC Wintergreen	1.3	1.4	1.3	1.6	1.7	1.4	1.3	1.6	1.5
Timber Wolf Packs Mint	1.2	1.2							
Timber Wolf Packs Natural	1.1	1.3		1.2	1.4				
Timber Wolf Packs Peach	1.0	1.2							
Timber Wolf Packs Wintergreen	0.99	1.3	1.3	1.3	1.4	1.4			
LOOSE LEAF									
Granger Select	0.63								
J.D.'s Blend	0.62								
Red Man Golden Blend	0.53								
Red Man Original	0.84								
Red Man Select	0.55								

BRAND	Cadmium [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
<i>LOOSE LEAF Cont'd</i>									
Red Man Silver Blend	0.71								
Southern Pride	0.71								
<i>PLUG</i>									
Apple Thick Plug	0.72								
Brown Mule Plug	0.51								
Cup Plug	1.0								
Days Work Plug	0.44								
Red Man Plug	0.50								
Tinsley Plug	0.81								

METALS : Chromium

Background:

- ❑ Chromium[VI] compounds are classified as chemicals that are carcinogenic to humans. Group 1 (IARC).
- ❑ Several authorities around the world request information about the concentration of chromium in smokeless tobacco products.
- ❑ Reported values of chromium:
Dry and moist snuff (US) : 0.5-0.9 ppm (Brunnemann. 1992)
- ❑ The **GOTHIA TEK**[®] limit (2001): 3 ppm (dry weight)
- ❑ Internal tolerance limit. SMNE: 2 ppm (dry weight)

Information of analyses:

Laboratory: 2001-2008: Eurofins AB, Lidköping, Sweden.
2009-Present: R&D Chemical Analysis, Stockholm

Method: 2001-2008: ICP-MS
2009-Present: AAS-GF KLS: "Bestämning av As, Pb, Cd, Cr och Ni med GF-AAS i tobak, tobaksprodukter och fiberbaserade matriser"

Quantification limits: 2001-2008: 0.05 ppm
2009-Present: 0.06 ppm

Measurement uncertainty: 2001-2008: ± 25 %
2009-Present: ± 24 %

BRAND <i>SNUS</i>	Chromium [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	0.66	0.89							
02 Strong PSOL	0.61	0.61							
Catch Collection PSWM. Chill	0.47	0.64	0.48						
Catch Dry Eucalyptus PSWM	0.60	0.70	0.68	1.0	0.66	0.7	1.2	1.3	0.6
Catch Dry Licorice PSWM	0.65	0.86	1.3	1.2	0.92	1.0	1.1	0.9	1.0
Catch Eucalyptus PSWL	0.46	0.58	0.44	1.2	0.87	0.5	0.6	1.5	
Catch Licorice PSOM	0.71	1.1	0.54	0.93	0.81	0.5	0.9	0.8	0.8
Catch Licorice PSWL	0.44	0.71	0.46	1.0	0.90	0.7	0.8	1.1	0.8
Catch Pure Mint PSW Medium	1.3								
Ettan Lös	0.73	0.80	0.52	0.89	0.71	0.7	0.6	1.2	0.8
Ettan PSOL	0.76	1.1	0.72	0.89	0.80	0.6	0.9	1.0	0.7
Ettan PSWL	0.38	0.56	0.48	0.87	0.75				
General Extra Sterk PSOL	0.57	0.60	0.48						
General Extra Sterk Lös	0.49	0.53	0.76						
General Long PSOL	0.78								
General Long Sterk PSOL	0.60								
General Lös	0.58	0.77	0.55	0.98	0.66	0.7	0.8	1.1	0.6
General Onyx PSWL	0.69	1.4	1.1	1.3	1.2	1.0			
General PSOL	0.65	0.79	0.68	1.3	0.72	0.6	0.9	0.9	0.9
General PSOM	0.57	0.73	0.83	0.94	0.91	0.7	0.7	1.0	0.8
General PSWL	0.46	0.65	0.48	0.58	0.86	0.6	1.0	1.1	0.8
General PSWM	0.39	0.61	0.57	0.56	0.89	0.7			
General Silver PSOL	0.63	0.69	0.80	0.91	0.73	0.7	0.8	1.0	0.6
General Smooth PSW Medium	1.7								
General Sterk PSWL	0.59	0.58	1.1	0.77					
Göteborgs Prima Fint Lös	0.99	0.73	0.72	1.5	0.98	0.9	0.8	1.1	1.0
Göteborgs Rapé Lös	0.86	0.92	0.80	1.0	0.92	0.8	0.8	0.9	0.7
Göteborgs Rapé PSWL	0.66	0.54	0.62	0.91	0.96	0.6	1.1	1.3	0.9
Göteborgs Rapé PSWM	0.61	0.61	0.53	1.3	0.91	0.7			
Göteborgs Rape No2 PSWL	0.60	0.7	0.43	0.77	0.86				
Grov Lös	0.58	0.75	0.87	0.95	1.1	0.8	0.8	1.2	0.8
Grov PSOL	0.89	0.93	0.83	1.2	0.78	0.7	1.0	1.0	1.0
Grov PSWL	0.56	0.63	0.71	1.1	1.0	0.6	0.9	1.4	0.8
Grovsnus Svart PSWL	1.1	0.56	1.4						
Kronan Lös	0.83	0.97	1.2	1.2	1.1				
Kronan PSOL	1.3	1.3	0.91	1.3	0.84	0.7			
Kronan PSWL	0.66	0.54	0.59	1.3					
Nick (and Johnny) PSOL	0.74	0.61	0.64	1.0	1.1				

BRAND	Chromium [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
SNUS Cont'd									
Nick&Johnny Strong White PSWL	0.64								
Probe Lös	0.51	0.66	0.58	0.91	0.94	1.1	0.9	1.2	0.7
Probe PSOL	0.45	0.62	0.68	1.0	0.97	0.7	0.7	1.2	0.8
Röda Lacket Lös	0.49	0.76	0.59	1.1	0.76	0.8	0.9	1.2	0.8
Röda Lacket PSWL	0.71	0.60	0.52	0.98	0.83	0.7			
Tre Ankare PSWL	0.69	0.60	0.39	1.2	0.99	0.6	0.9	1.5	0.7
Tre Ankare PSWM	0.60	0.50	0.37	1.1	0.96	0.7	0.7	0.8	0.9
MOIST SNUFF									
Longhorn FC Natural	1.0	1.2	1.0	1.7	1.7	1.1	1.1	5.5	
Longhorn FC Wintergreen	0.90	1.3							
Longhorn LC Mint	0.87	1.1				1.4	1.3		
Longhorn LC Natural	0.48	0.92							
Longhorn LC Straight	0.46	1.2			1.8			1.3	
Longhorn LC Wintergreen	0.82	1.0	0.82		1.7	1.3	1.0	1.5	
Longhorn Pouches Straight	1.6	1.3							
Longhorn Pouches Wintergreen	1.0	1.7							
Red Man FC Natural	1.1	1.6		1.7					
Red Man LC Straight	0.86	1.1		1.8					
Red Man LC Wintergreen	0.50	1.1		1.6					
Renegades Wintergreen	1.1	1.4			2.8	1.0	1.5	1.9	1.7
Timber Wolf FC Natural	1.0	1.3		1.6	2.5	1.3	1.3	1.5	1.4
Timber Wolf FC Wintergreen	0.58	1.2							
Timber Wolf LC Apple	0.74	1.1			1.5		1.2		
Timber Wolf LC Cool Wintergreen	0.86	1.2							
Timber Wolf LC Mint	0.86	1.2							
Timber Wolf LC Peach	0.81	1.3		1.6		1.3	1.1		
Timber Wolf LC Straight	0.62	1.3						1.7	1.1
Timber Wolf LC Wintergreen	0.71	1.3	1.1	1.6	1.7	1.3	1.2	1.6	1.2
Timber Wolf Packs Mint	1.1	1.5							
Timber Wolf Packs Natural	0.94	1.2		1.9	2.1				
Timber Wolf Packs Peach	0.94	1.3							
Timber Wolf Packs Wintergreen	0.89	1.3	1.1	1.5	2.0	1.2			
LOOSE LEAF									
Granger Select	0.67								
J.D.'s Blend	0.55								
Red Man Golden Blend	0.80								
Red Man Original	1.2								
Red Man Select	0.49								

BRAND	Chromium [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
<i>LOOSE LEAF Cont'd</i>									
Red Man Silver Blend	0.42								
Southern Pride	0.67								
<i>PLUG</i>									
Apple Thick Plug	1.2								
Brown Mule Plug	2.0								
Cup Plug	1.2								
Days Work Plug	0.95								
Red Man Plug	1.3								
Tinsley Plug	1.2								

METALS : Lead

Background:

- ❑ Lead and certain lead compounds are classified as chemicals that are possibly carcinogenic to humans. Group 2B (IARC).
- ❑ Highest permissible level of lead in Swedish snus : 3 ppm (wet weight) (National Food Administration. Sweden).
- ❑ Highest permissible level of lead in vegetables (Sweden) : 0 - 0.4 ppm (National Food Administration. Sweden).
- ❑ WHO 1993: PTWI (Provisionally Tolerable Weekly Intake) of 25 µg/kg bodyweight.
- ❑ Concentration of lead in smokeless tobacco products must be reported to authorities in several countries and in several states in the US.
- ❑ Reported values of lead in the literature:
Dry and moist snuff (US) : 0.27-2.96 ppm (Hoffmann. 1987)
- ❑ The **GOTHIATEK[®]** limit (2001): 2 ppm (dry weight)
- ❑ Internal tolerance limit. SMNE: 0.8 ppm (dry weight)

Information of analyses:

Laboratory:	2001-2008: Eurofins AB, Lidköping, Sweden. 2009-Present: R&D Chemical Analysis, Stockholm
Method:	2001-2008: ICP-MS 2009-Present: AAS-GF KLS:”Bestämning av As, Pb, Cd, Cr och Ni med GF-AAS i tobak. tobaksprodukter och fiberbaserade matriser”
Quantification limits:	2001-2008: 0.05 ppm 2009-Present: 0.04 ppm
Measurement uncertainty:	2001-2008: ± 20 % 2009-Present: ±16 %

Comments

The consumption of 25 g snus per day by a person of 70 kg would result in a weekly intake of about 0.6 µg/kg bodyweight of lead, which is below the PTWI set by WHO.

The consumption of 25 g moist snuff per day by a person of 70 kg would result in a weekly intake of about 0.4 µg/kg bodyweight of lead, which is below the PTWI set by WHO.

The consumption of 25 g loose leaf or plug per day by a person of 70 kg would result in a weekly intake of about 0.4 µg/kg bodyweight of lead, which is below the PTWI set by WHO.

Calculated on the maximum values 2011.

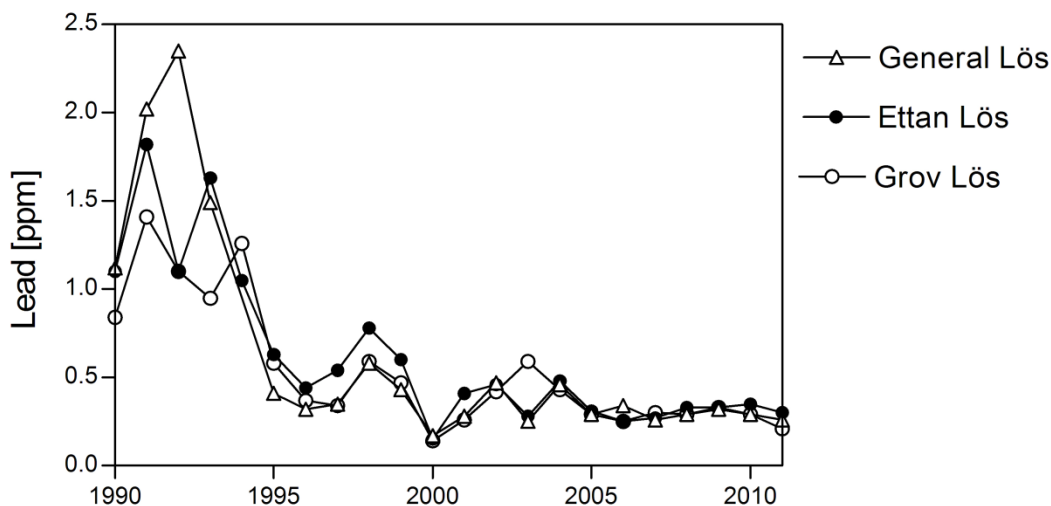


Figure 5. The level of lead in General Lös, Ettan Lös and Grov Lös 1990-2011.

BRAND	Lead [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
SNUS									
01 Original PSOL	0.26	0.35							
02 Strong PSOL	0.19	0.28							
Catch Collection PSWM. Chill	0.23	0.28	0.22						
Catch Dry Eucalyptus PSWM	0.19	0.25	0.32	0.30	0.29	0.33	0.33	0.47	0.36
Catch Dry Licorice PSWM	0.18	0.21	0.28	0.28	0.28	0.41	0.37	0.29	0.35
Catch Eucalyptus PSWL	0.20	0.28	0.27	0.30	0.27	0.18	0.22	0.42	
Catch Licorice PSOM	0.30	0.37	0.27	0.28	0.30	0.20	0.30	0.35	0.26
Catch Licorice PSWL	0.17	0.26	0.25	0.29	0.26	0.20	0.26	0.41	0.30
Catch Pure Mint PSW Medium	0.41								
Ettan Lös	0.30	0.35	0.33	0.33	0.27	0.25	0.31	0.48	0.28
Ettan PSOL	0.30	0.35	0.36	0.30	0.29	0.23	0.33	0.44	0.31
Ettan PSWL	0.18	0.25	0.23	0.25	0.27				
General Extra Sterk PSOL	0.22	0.39	0.23						
General Extra Sterk Lös	0.17	0.3	0.22						
General Long PSOL	0.36								
General Long Sterk PSOL	0.28								
General Lös	0.26	0.29	0.32	0.29	0.26	0.34	0.29	0.46	0.25
General Onyx PSWL	0.19	0.29	0.21	0.30	0.24	0.25			
General PSOL	0.30	0.35	0.36	0.33	0.26	0.28	0.34	0.41	0.29
General PSOM	0.28	0.35	0.35	0.35	0.35	0.24	0.31	0.52	0.25
General PSWL	0.19	0.25	0.24	0.29	0.29	0.22	0.38	0.45	0.24
General PSWM	0.16	0.24	0.31	0.29	0.29	0.24			
General Silver PSOL	0.21	0.29	0.28	0.26	0.24	0.24	0.27	0.42	0.23
General Smooth PSW Medium	0.46								
General Sterk PSWL	0.18	0.28	0.24	0.24					
Göteborgs Prima Fint Lös	0.30	0.28	0.30	0.40	0.38	0.30	0.35	0.55	0.33
Göteborgs Rapé Lös	0.30	0.32	0.29	0.29	0.36	0.25	0.34	0.36	0.25
Göteborgs Rapé PSWL	0.23	0.24	0.21	0.25	0.30	0.20	0.34	0.46	0.27
Göteborgs Rapé PSWM	0.22	0.23	0.19	0.25	0.29	0.19			
Göteborgs Rape No2 PSWL	0.21	0.24	0.22	0.23	0.28				
Grov Lös	0.21	0.29	0.33	0.29	0.30	0.25	0.29	0.43	0.59
Grov PSOL	0.32	0.41	0.34	0.29	0.30	0.26	0.33	0.44	0.32
Grov PSWL	0.21	0.26	0.24	0.26	0.29	0.19	0.30	0.43	0.25
Grovsnus Svart PSWL	0.22	0.26	0.24						
Kronan Lös	0.35	0.51	0.57	0.34	0.38				
Kronan PSOL	0.46	0.51	0.54	0.47	0.35	0.28			
Kronan PSWL	0.22	0.23	0.22	0.31					
Nick (and Johnny) PSOL	0.24	0.30	0.24	0.31	0.27				

BRAND	Lead [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
<i>SNUS Cont'd</i>									
Nick&Johnny Strong White PSWL	0.19								
Probe PSOL	0.22	0.25	0.29	0.33	0.32	0.35	0.29	0.46	0.32
Röda Lacket Lös	0.18	0.28	0.34	0.31	0.30	0.32	0.36	0.48	0.28
Röda Lacket PSWL	0.24	0.28	0.24	0.31	0.26	0.22			
Tre Ankare PSWL	0.22	0.26	0.26	0.30	0.34	0.20	0.37	0.44	0.27
Tre Ankare PSWM	0.23	0.25	0.25	0.28	0.31	0.23	0.33	0.39	0.29
<i>MOIST SNUFF</i>	0.27								
Longhorn FC Natural		0.30	0.27	0.35	0.48	0.36	0.40	0.43	
Longhorn FC Wintergreen	0.25	0.44							
Longhorn LC Mint	0.19	0.33				0.39	0.37		
Longhorn LC Natural	0.29	0.36							
Longhorn LC Straight	0.09	0.37			0.41			0.37	
Longhorn LC Wintergreen	0.15	0.33	0.34		0.45	0.49	0.33	0.40	
Longhorn Pouches Straight	0.28	0.34							
Longhorn Pouches Wintergreen	0.30	0.30							
Red Man FC Natural	0.25	0.49		0.36					
Red Man LC Straight	0.28	0.35		0.36					
Red Man LC Wintergreen	0.27	0.37		0.34					
Renegades Wintergreen	0.12	0.28			0.39	0.37	0.49	0.48	0.43
Timber Wolf FC Natural	0.29	0.44		0.38	0.48	0.46	0.45	0.42	0.42
Timber Wolf FC Wintergreen	0.22	0.40							
Timber Wolf LC Apple	0.15	0.25			0.40		0.34		
Timber Wolf LC Cool Wintergreen	0.27	0.38							
Timber Wolf LC Mint	0.29	0.34							
Timber Wolf LC Peach	0.33	0.30		0.31		0.44	0.34		
Timber Wolf LC Straight	0.27	0.38						0.67	0.49
Timber Wolf LC Wintergreen	0.21	0.40	0.30	0.39	0.45	0.45	0.45	0.49	0.43
Timber Wolf Packs Mint	0.20	0.36							
Timber Wolf Packs Natural	0.29	0.39		0.30	0.41				
Timber Wolf Packs Peach	0.29	0.31							
Timber Wolf Packs Wintergreen	0.26	0.39	0.35	0.33	0.41	0.39			
<i>LOOSE LEAF</i>	0.30								
Granger Select									
J.D.'s Blend	0.20								
Red Man Golden Blend	0.25								
Red Man Original	0.29								
Red Man Select	0.18								

BRAND <i>LOOSE LEAF Cont'd</i>	Lead [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	0.14								
Southern Pride	0.27								
<i>PLUG</i>									
Apple Thick Plug	0.18								
Brown Mule Plug	0.23								
Cup Plug	0.16								
Days Work Plug	0.30								
Red Man Plug	0.17								
Tinsley Plug	0.09								

METALS : Nickel

Background:

- ❑ Nickel and certain nickel compounds are classified as chemicals that are carcinogenic to humans. Group 1 (IARC).
- ❑ WHO 1993: TDI (Tolerable Daily Intake) of 5 µg/kg bodyweight.
- ❑ Several authorities around the world request information about the concentration of nickel in smokeless tobacco products.
- ❑ Reported values of nickel:
Dry and moist snuff (US) : 0.18-2.7 ppm (Brunnemann. 1992)
- ❑ The **GOTHIATEK®** limit (2001): 4.5 ppm (dry weight)
- ❑ Internal tolerance limit, SMNE: 4.0 ppm (dry weight)

Information of analyses:

Laboratory:	2001-2008: Eurofins AB, Lidköping, Sweden. 2009-Present: R&D Chemical Analysis. Stockholm
Method:	2001-2008: ICP-MS 2009-Present: AAS-GF KLS:”Bestämning av As, Pb, Cd,Cr och Ni med GF-AAS i tobak, tobaksprodukter och fiberbaserade matriser”
Quantification limits:	2001-2008: 0.5 ppm 2009-Present: 0.10 ppm
Measurement uncertainty:	2001-2008: ± 35 % 2009-Present: ±17 %

Comments

The consumption of 25 g snus per day by a person of 70 kg would result in a daily intake of about 0.7 µg/kg bodyweight of nickel, which is below the TDI set by WHO.

The consumption of 25 g moist snuff per day by a person of 70 kg would result in a daily intake of about 0.25 µg/kg bodyweight of nickel, which is below the TDI set by WHO.

The consumption of 25 g loose leaf or plug per day by a person of 70 kg would result in a daily intake of about 0.4 µg/kg bodyweight of nickel, which is below the TDI set by WHO.

Calculated on the maximum values 2011.

BRAND SNUS	Nickel [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	1.2	1.1							
02 Strong PSOL	1.9	1.1							
Catch Collection PSWM. Chill	1.6	1.2	0.90						
Catch Dry Eucalyptus PSWM	1.7	1.4	1.5	1.3	1.4	1.5	2.0	1.9	2.8
Catch Dry Licorice PSWM	1.8	1.4	1.2	1.3	1.8	1.8	1.7	0.7	3.2
Catch Eucalyptus PSWL	1.4	0.94	1.0	1.2	1.3	1.0	1.0	1.5	
Catch Licorice PSOM	1.3	1.2	0.77	1.1	1.2	0.9	1.5	0.4	2.8
Catch Licorice PSWL	1.2	1.2	0.66	1.1	1.1	1.5	1.4		
Catch Pure Mint PSW Medium	2.1								
Ettan Lös	1.5	0.87	1.0	1.3	1.1	1.3	1.2	1.1	3.0
Ettan PSOL	1.5	1.1	1.2	1.1	1.1	1.0	1.1	1.2	2.6
Ettan PSWL	1.2	1.0	0.81	0.88	1.3				
General Extra Sterk PSOL	1.6	1.0	1.5						
General Extra Sterk Lös	1.6	0.86	1.4						
General Long PSOL	1.6								
General Long Sterk PSOL	1.8								
General Lös	1.5	1.0	0.97	1.3	1.1	1.3	1.7	2.0	2.7
General Onyx PSWL	1.5	1.3	1.1	1.8	1.9	1.8			
General PSOL	1.4	1.1	1.1	1.2	1.1	1.1	1.2	0.6	2.9
General PSOM	1.3	0.91	0.95	1.2	1.6	1.2	1.1	0.6	2.5
General PSWL	1.4	1.1	0.90	1.0	1.5	1.3	1.5	0.8	2.9
General PSWM	1.2	1.3	1.0	1.1	1.9	1.2			
General Silver PSOL	1.6	0.68	1.1	0.79	0.67	1.1	1.1	1.1	2.3
General Smooth PSW Medium	3.9								
General Sterk PSWL	1.2	1.2	1.4	1.5					
Göteborgs Prima Fint Lös	1.4	1.0	0.94	1.1	1.9	2.0	1.2	1.0	3.1
Göteborgs Rapé Lös	1.3	1.2	1.4	1.0	1.7	1.0	1.2	0.6	2.3
Göteborgs Rapé PSWL	1.6	0.96	0.95	0.93	1.4	1.1	1.5	0.9	2.7
Göteborgs Rapé PSWM	1.7	1.4	1.2	0.96	1.7	1.6			
Göteborgs Rape No2 PSWL	1.3	1.1	0.90	0.86	1.5				
Grov Lös	1.2	1.2	1.3	1.3	1.6	1.4	1.5	1.2	2.9
Grov PSOL	1.3	1.0	1.1	1.1	1.4	1.0	1.7	0.6	3.1
Grov PSWL	1.2	1.1	1.3	0.94	1.9	1.1	1.6	0.9	2.7
Grovsnus Svart PSWL	1.2	1.1	1.6						
Kronan Lös	1.5	0.9	1.5	1.0	1.6				
Kronan PSOL	1.5	1.2	1.1	1.3	1.3	1.2			
Kronan PSWL	1.4	0.89	1.1	0.98					
Nick (and Johnny) PSOL	1.4	1.1	1.6	1.8	2.0				

BRAND	Nickel [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
SNUS Cont'd									
Nick&Johnny Strong White PSWL	1.2								
Probe Lös	1.7	1.3	0.94	1.4	1.2	2.1	1.6	1.5	3.2
Probe PSOL	1.7	1.4	1.3	1.5	1.7	1.6	1.3	1.7	3.2
Röda Lacket Lös	1.6	0.99	0.85	1.4	1.4	1.5	1.5	1.1	3.0
Röda Lacket PSWL	1.3	1.1	0.99	1.2	1.2	1.5			
Tre Ankare PSWL	1.4	1.1	0.91	1.3	1.6	1.2	1.5	1.4	2.7
Tre Ankare PSWM	1.4	1.0	0.84	1.3	1.5	1.3	1.1	0.6	3.1
MOIST SNUFF									
Longhorn FC Natural	1.1	1.1	1.3	1.8	2.0	1.3	1.7	4.3	
Longhorn FC Wintergreen	1.2	1.4							
Longhorn LC Mint	1.2	1.3				1.7	2.3		
Longhorn LC Natural	0.85	0.98							
Longhorn LC Straight	0.96	1.2			2.2			1.8	
Longhorn LC Wintergreen	1.4	1.2	1.3		2.4	1.5	1.6	2.3	
Longhorn Pouches Straight	1.3	1.2							
Longhorn Pouches Wintergreen	1.4	1.3							
Red Man FC Natural	1.2	1.3		1.8					
Red Man LC Straight	1.2	1.3		1.7					
Red Man LC Wintergreen	0.68	1.2		1.7					
Renegades Wintergreen	1.3	1.1			2.4	1.5	1.6	2.3	
Timber Wolf FC Natural	1.4	1.3		1.6	3.6	1.6	1.7	1.6	4.4
Timber Wolf FC Wintergreen	1.1	1.3							
Timber Wolf LC Apple	1.2	1.2			2.4		1.7		
Timber Wolf LC Cool Wintergreen	1.2	1.3							
Timber Wolf LC Mint	1.2	1.2							
Timber Wolf LC Peach	1.3	1.3		1.7		1.5	1.6		
Timber Wolf LC Straight	1.3	1.3						2.4	2.7
Timber Wolf LC Wintergreen	1.3	1.3	1.4	1.7	2.9	1.7	1.7	1.9	4.3
Timber Wolf Packs Mint	1.4	1.3							
Timber Wolf Packs Natural	1.3	1.3		1.7	2.3				
Timber Wolf Packs Peach	1.2	1.1							
Timber Wolf Packs Wintergreen	1.3	1.1	1.6	1.5	2.2	1.4			
LOOSE LEAF									
Granger Select	0.74								
J.D.'s Blend	0.70								
Red Man Golden Blend	1.0								
Red Man Original	2.3								
Red Man Select	0.46								

BRAND <i>LOOSE LEAF Cont'd</i>	Nickel [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	0.24								
Southern Pride	0.67								
<i>PLUG</i>									
Apple Thick Plug	1.8								
Brown Mule Plug	2.3								
Cup Plug	2.0								
Days Work Plug	1.6								
Red Man Plug	1.3								
Tinsley Plug	1.5								

METALS : Potassium

Background:

- ❑ Potassium ions are essential for most body functions.
- ❑ In 1980. the estimated safe and adequate daily dietary intake of potassium for adults was 1875-5625 mg (the US Food and Nutrition Board).
- ❑ The **European** Food Safety Authority (2006) and the **U.S.** Food and Nutrition Board (2004) have decided that the available data are insufficient to establish an upper level for potassium.
- ❑ An overdose of potassium leads to weakness of muscles, fatigue, loss of reflexes etc.

Information of analyses:

Laboratory: Eurofins AB, Lidköping, Sweden.

Method: NMKL161 ICP-AES

Quantification limits:

Comments

The consumption of 25 g snus per day would result in a daily intake of about 450 mg of potassium, which is below estimated safe and adequate daily dietary intake set by US Food and Nutrition Board 1980.

The consumption of 25 g moist snuff per day would result in a daily intake of about 800 mg of potassium, which is below estimated safe and adequate daily dietary intake set by US Food and Nutrition Board 1980.

The consumption of 25 g loose leaf or plug per day would result in a daily intake of about 350 mg of potassium, which is below estimated safe and adequate daily dietary intake set by US Food and Nutrition Board 1980.

Calculated on the maximum values 2011.

BRAND SNUS	Potassium [mg/g]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	27.9								
02 Strong PSOL	30.3								
Catch Collection PSWM. Chill	28.8								
Catch Dry Eucalyptus PSWM	28.2							28.7	35.9
Catch Dry Licorice PSWM	22.5						28.2	24.2	33.6
Catch Eucalyptus PSWL	29.1							31.9	
Catch Licorice PSOM	24.0						30.0	28.2	31.3
Catch Licorice PSWL	28.8						27.7	30.7	34.3
Catch Pure Mint PSW Medium	26.1								
Ettan Lös	30.0							31.5	32.2
Ettan PSOL	30.4							34.6	38.8
Ettan PSWL	29.9								
General Extra Sterk PSOL	26.4								
General Extra Sterk Lös	27.0								
General Long PSOL	29.9								
General Long Sterk PSOL	28.1								
General Lös	30.1							31.2	37.8
General Onyx PSWL	30.1								
General PSOL	29.2							33.3	35.0
General PSOM	32.0						27.6	35.1	34.1
General PSWL	33.5						32.3	32.9	31.3
General PSWM	35.8								
General Silver PSOL	29.1							30.1	35.9
General Smooth PSW Medium	33.6								
General Sterk PSWL	33.7								
Göteborgs Prima Fint Lös	28.6							29.5	34.8
Göteborgs Rapé Lös	27.8						31.5	29.7	33.0
Göteborgs Rapé PSWL	34.7						34.1	32.1	30.7
Göteborgs Rapé PSWM	30.2								
Göteborgs Rape No2 PSWL	29.2								
Grov Lös	28.9							30.2	34.8
Grov PSOL	35.3						33.4	29.0	36.3
Grov PSWL	27.7						28.1	31.6	31.4
Grovsnus Svart PSWL	30.5								
Kronan Lös	24.8								
Kronan PSOL	24.7								
Kronan PSWL	29.7								
Nick (and Johnny) PSOL	34.6								

BRAND	Potassium [mg/g]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
<i>SNUS Cont'd</i>									
Nick&Johnny Strong White PSWL	29.8								
Probe Lös	26.8							26.9	32.1
Probe PSOL	27.8						23.0	28.9	33.8
Röda Lacket Lös	27.8							29.7	34.0
Röda Lacket PSWL	30.9								
Tre Ankare PSWL	33.3						41.1	30.2	36.9
Tre Ankare PSWM	31.4						29.5	37.3	38.1
<i>MOIST SNUFF</i>									
Longhorn FC Natural	62.1							56.9	
Longhorn FC Wintergreen	38.2								
Longhorn LC Mint	38.4						31.2		
Longhorn LC Natural	65.5								
Longhorn LC Straight	40.0								
Longhorn LC Wintergreen	34.3						28.5	31.4	
Longhorn Pouches Straight	42.7								
Longhorn Pouches Wintergreen	40.5								
Red Man FC Natural	43.2								
Red Man LC Straight	35.9								
Red Man LC Wintergreen	38.6								
Renegades Wintergreen	39.5							30.8	27.5
Timber Wolf FC Natural	37.5							29.8	28.8
Timber Wolf FC Wintergreen	40.1								
Timber Wolf LC Apple	37.3						30.1		
Timber Wolf LC Cool Wintergreen	38.3								
Timber Wolf LC Mint	38.9								
Timber Wolf LC Peach	39.3						28.1		
Timber Wolf LC Straight	40.8								
Timber Wolf LC Wintergreen	38.2							36.0	32.4
Timber Wolf Packs Mint	41.2								
Timber Wolf Packs Natural	56.3								
Timber Wolf Packs Peach	39.1								
Timber Wolf Packs Wintergreen	42.3								
<i>LOOSE LEAF</i>									
Granger Select	22.0								
J.D.'s Blend	22.7								
Red Man Golden Blend	21.2								
Red Man Original	18.6								
Red Man Select	20.5								

BRAND	Potassium [mg/g]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
LOOSE LEAF Cont'd									
Red Man Silver Blend	18.7								
Southern Pride	21.6								
PLUG									
Apple Thick Plug	27.3								
Brown Mule Plug	27.7								
Cup Plug	26.3								
Days Work Plug	26.5								
Red Man Plug	20.1								
Tinsley Plug	27.4								

METALS : Sodium

Background:

- ❑ Sodium ions are essential for most body functions.
- ❑ There are studies indicating that too high intake of sodium chloride might increase the blood pressure.
- ❑ In 1993, the **European** Scientific Committee for Food established an acceptable sodium intake range for adults: 25–150 millimoles (mmol) per day, which is equivalent to 575–3,450 milligrams (mg)
- ❑ The **U.S.** Food and Nutrition Board has established an adequate intake level for sodium in grams (g) per day based on the amount needed to replace losses through sweat in moderately active people and to achieve a diet that provides sufficient amounts of other essential nutrients .

Life Stage	Age	Males and Females Sodium (g/day)
Adults	19-50 years	1.5
Adults	51-70 years	1.3
Adults	70 years and older	1.3

Information of analyses:

Laboratory: Eurofins AB, Lidköping, Sweden.

Method: NMKL161 ICP-AES

Quantification limits:

Comments

The consumption of 25 g snus per day would result in a daily intake of about 725 mg of sodium which is within the range set by EU and below the adequate intake level set by US Food and Nutrition Board.

The consumption of 25 g moist snuff per day would result in a daily intake of about 925 mg of sodium which is within the range set by EU and below the adequate intake level set by US Food and Nutrition Board.

The consumption of 25 g loose leaf or plug per day would result in a daily intake of about 225 mg of sodium which is below the range set by EU and below the adequate intake level set by US Food and Nutrition Board.

Calculated on the maximum values 2011.

BRAND SNUS	Sodium [mg/g]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	33								
02 Strong PSOL	39								
Catch Collection PSWM. Chill	45								
Catch Dry Eucalyptus PSWM	42							39	40
Catch Dry Licorice PSWM	38						42	33	39
Catch Eucalyptus PSWL	45							42	
Catch Licorice PSOM	30						36	30	31
Catch Licorice PSWL	44						42	39	36
Catch Pure Mint PSW Medium	40								
Ettan Lös	58							44	42
Ettan PSOL	42							35	35
Ettan PSWL	43								
General Extra Sterk PSOL	38								
General Extra Sterk Lös	54								
General Long PSOL	38								
General Long Sterk PSOL	36								
General Lös	54							44	48
General Onyx PSWL	47								
General PSOL	36							33	33
General PSOM	39						31	35	32
General PSWL	48						44	43	37
General PSWM	56								
General Silver PSOL	39							36	34
General Smooth PSW Medium	49								
General Sterk PSWL	52								
Göteborgs Prima Fint Lös	50							40	41
Göteborgs Rapé Lös	52						46	42	41
Göteborgs Rapé PSWL	49						46	40	36
Göteborgs Rapé PSWM	47								
Göteborgs Rape No2 PSWL	44								
Grov Lös	49							39	41
Grov PSOL	43						37	29	34
Grov PSWL	41						40	40	37
Grovsnus Svart PSWL	45								
Kronan Lös	48								
Kronan PSOL	39								
Kronan PSWL	43								
Nick (and Johnny) PSOL	44								

BRAND	Sodium [mg/g]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
<i>SNUS Cont'd</i>									
Nick&Johnny Strong White PSWL	44								
Probe Lös	57							48	49
Probe PSOL	43						36	39	39
Röda Lacket Lös	46							40	44
Röda Lacket PSWL	44								
Tre Ankare PSWL	50						49	38	41
Tre Ankare PSWM	48						33	39	36
<i>MOIST SNUFF</i>									
Longhorn FC Natural	68							61	
Longhorn FC Wintergreen	64								
Longhorn LC Mint	71						58		
Longhorn LC Natural	69								
Longhorn LC Straight	70								
Longhorn LC Wintergreen	65						51	61	
Longhorn Pouches Straight	69								
Longhorn Pouches Wintergreen	67								
Red Man FC Natural	72								
Red Man LC Straight	62								
Red Man LC Wintergreen	69								
Renegades Wintergreen	65							59	43
Timber Wolf FC Natural	69							58	50
Timber Wolf FC Wintergreen	60								
Timber Wolf LC Apple	69						56		
Timber Wolf LC Cool Wintergreen	67								
Timber Wolf LC Mint	74								
Timber Wolf LC Peach	73						54		
Timber Wolf LC Straight	65								
Timber Wolf LC Wintergreen	60							64	51
Timber Wolf Packs Mint	69								
Timber Wolf Packs Natural	69								
Timber Wolf Packs Peach	74								
Timber Wolf Packs Wintergreen	71								
<i>LOOSE LEAF</i>									
Granger Select	9.5								
J.D.'s Blend	9.1								
Red Man Golden Blend	8.4								
Red Man Original	9.2								
Red Man Select	9.3								

BRAND <i>LOOSE LEAF Cont'd</i>	Sodium [mg/g]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	11								
Southern Pride	8.8								
<i>PLUG</i>									
Apple Thick Plug	12								
Brown Mule Plug	12								
Cup Plug	12								
Days Work Plug	18								
Red Man Plug	10								
Tinsley Plug	2.6								

MYCOTOXINS : Aflatoxins and Ochratoxin

Background:

- ❑ Mycotoxins are secondary metabolites produced by toxigenic molds. Mycotoxins may impair human health through disease.
- ❑ Aflatoxins are classified as chemicals that are carcinogenic to humans. Group 1, and ochratoxin is classified as a chemical that is possibly carcinogenic to humans, Group 2B (IARC).
- ❑ Permissible level of aflatoxins in snus and chewing tobacco (Sweden): 5 µg/kg (ppb) (National Food Administration, Sweden)(2010).
- ❑ Internal tolerance limit for aflatoxins, SMNE: 1.7 ppb (dry weight) (sum of B1,B2,G1,G2)
- ❑ Within EU, the highest permissible level of ochratoxin in cereals, cereal products and dried wine fruit: 3-10 µg/kg (ppb) or TWI: 120 ng/kg bodyweight (EU 105/2010)
- ❑ Internal tolerance limit for ochratoxin, SMNE: 15 ppb (dry weight) (Feb. 2011)

Information of analyses:

Laboratory:	2000-2004:	Eurofins, Lidköping, Sweden.
	2005-Present:	R&D Chemical Analysis Stockholm
Method:	2000-2004:	EN 12955 modf. Eurofins (Aflatoxin)
	2000-2004:	NMKL 143.1992 (Ochratoxin)
	2005-Present:	LC-MS-MS
Quantification limits:	Aflatoxin B1: <0.1 ppb	
	Aflatoxin B2: <0.5 ppb	
	Aflatoxin G1: <0.5 ppb	
	Aflatoxin G2: <1 ppb	
	Ochratoxin: <0.5 ppb	

Comments

The consumption of 25 g snus per day by a person of 70 kg would result in a daily intake of about 14 ng/kg bodyweight of ochratoxin, which is below the TWI set by EU.

The consumption of 25 g moist snuff or loose leaf per day by a person of 70 kg would result in a daily intake of about 10 ng/kg bodyweight of ochratoxin, which is below the TWI set by EU.

The consumption of 25 g plug per day by a person of 70 kg would result in a daily intake of about 6 ng/kg bodyweight of ochratoxin, which is below the TWI set by EU.

Calculated on the maximum values 2011.

BRAND SNUS	Aflatoxins B1, B2, G1 and G2 [ppb]									
	2011				2010	2009	2008	2007	2006	2005
	B1	B2	G1	G2						
01 Original PSOL	<0.1	<0.5	<0.5	<1	<0.26					
02 Strong PSOL	<0.1	<0.5	<0.5	<1	<0.26					
Catch Collection PSWM. Chill	<0.1	<0.5	<0.5	<1	<0.26	<0.26				
Catch Dry Eucalyptus PSWM	<0.1	<0.5	<0.5	<1	<0.26	<0.26	0.04	<0.26	<0.26	<0.26
Catch Dry Licorice PSWM	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	0.23	
Catch Eucalyptus PSWL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Catch Licorice PSOM	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	
Catch Licorice PSWL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	
Catch Pure Mint PSW Medium	<0.1	<0.5	<0.5	<1						
Ettan Lös	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Ettan PSOL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Ettan PSWL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26		
General Extra Sterk PSOL	<0.1	<0.5	<0.5	<1	<0.26	<0.26				
General Extra Sterk Lös	<0.1	<0.5	<0.5	<1	<0.26	<0.26				
General Long PSOL	<0.1	<0.5	<0.5	<1						
General Long Sterk PSOL	<0.1	<0.5	<0.5	<1						
General Lös	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
General Onyx PSWL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	
General PSOL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	0.16	<0.26	<0.26	<0.26
General PSOM	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	
General PSWL	<0.1	<0.5	<0.5	<1	<0.26	0.10	<0.26	<0.26	<0.26	
General PSWM	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	
General Silver PSOL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
General Smooth PSW Medium	<0.1	<0.5	<0.5	<1						
General Sterk PSWL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26			
Göteborgs Prima Fint Lös	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	0.5	<0.26	<0.26
Göteborgs Rapé Lös	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	0.5	<0.26	
Göteborgs Rapé PSWL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	0.5	<0.26	
Göteborgs Rapé PSWM	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	
Göteborgs Rape´No2 PSWL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26		
Grov Lös	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Grov PSOL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	
Grov PSWL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	
Grovsnus Svart PSWL	<0.1	<0.5	<0.5	<1	<0.26	<0.26				
Kronan Lös	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26		
Kronan PSOL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	
Kronan PSWL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26			
Nick (and Johnny) PSOL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26		

BRAND	Aflatoxins B1, B2, G1 and G2									
					[ppb]					
	2011				2010	2009	2008	2007	2006	2005
	B1	B2	G1	G2						
<i>SNUS Cont'd</i>										
Nick&Johnny Strong White PSWL	<0.1	<0.5	<0.5	<1						
Probe Lös	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Probe PSOL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	
Röda Lacket Lös	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Röda Lacket PSWL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	
Tre Ankare PSWL	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	
Tre Ankare PSWM	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	
<i>MOIST SNUFF</i>										
Longhorn FC Natural	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Longhorn FC Wintergreen	<0.1	<0.5	<0.5	<1	<0.26					
Longhorn LC Mint	<0.1	<0.5	<0.5	<1	<0.26				<0.26	
Longhorn LC Natural	<0.1	<0.5	<0.5	<1	<0.26					
Longhorn LC Straight	<0.1	<0.5	<0.5	<1	<0.26			<0.26		
Longhorn LC Wintergreen	<0.1	<0.5	<0.5	<1	<0.26	<0.26		<0.26	<0.26	
Longhorn Pouches Straight	<0.1	<0.5	<0.5	<1	<0.26					
Longhorn Pouches Wintergreen	<0.1	<0.5	<0.5	<1	<0.26					
Red Man FC Natural	<0.1	<0.5	<0.5	<1	<0.26		<0.26			
Red Man LC Straight	<0.1	<0.5	<0.5	<1	<0.26		<0.26			
Red Man LC Wintergreen	<0.1	<0.5	<0.5	<1	<0.26		<0.26			
Renegades Wintergreen	<0.1	<0.5	<0.5	<1	<0.26			<0.26	<0.26	<0.26
Timber Wolf FC Natural	<0.1	<0.5	<0.5	<1	<0.26		<0.26	<0.26	<0.26	<0.26
Timber Wolf FC Wintergreen	<0.1	<0.5	<0.5	<1	<0.26					
Timber Wolf LC Apple	<0.1	<0.5	<0.5	<1	<0.26			<0.26		
Timber Wolf LC Cool Wintergreen	<0.1	<0.5	<0.5	<1	<0.26					
Timber Wolf LC Mint	<0.1	<0.5	<0.5	<1	<0.26					
Timber Wolf LC Peach	<0.1	<0.5	<0.5	<1	<0.26		<0.26		<0.26	
Timber Wolf LC Straight	<0.1	<0.5	<0.5	<1	<0.26					
Timber Wolf LC Wintergreen	<0.1	<0.5	<0.5	<1	<0.26	<0.26				
Timber Wolf Packs Mint	<0.1	<0.5	<0.5	<1	<0.26					
Timber Wolf Packs Natural	<0.1	<0.5	<0.5	<1	<0.26		<0.26	<0.26		
Timber Wolf Packs Peach	<0.1	<0.5	<0.5	<1	<0.26					
Timber Wolf Packs Wintergreen	<0.1	<0.5	<0.5	<1	<0.26	<0.26	<0.26	<0.26	<0.26	
<i>LOOSE LEAF</i>										
Granger Select	<0.1	<0.5	<0.5	<1						
J.D.'s Blend	<0.1	<0.5	<0.5	<1						
Red Man Golden Blend	<0.1	<0.5	<0.5	<1						
Red Man Original	<0.1	<0.5	<0.5	<1						
Red Man Select	<0.1	<0.5	<0.5	<1						

BRAND <i>LOOSE LEAF Cont'd</i>	Aflatoxins B1. B2. G1 and G2 [ppb]									
	2011				2010	2009	2008	2007	2006	2005
	B1	B2	G1	G2						
Red Man Silver Blend	<0.1	<0.5	<0.5	<1						
Southern Pride	<0.1	<0.5	<0.5	<1						
<i>PLUG</i>										
Apple Thick Plug	<0.1	<0.5	<0.5	<1						
Brown Mule Plug	<0.1	<0.5	<0.5	<1						
Cup Plug	0.4	<0.5	<0.5	<1						
Days Work Plug	<0.1	<0.5	<0.5	<1						
Red Man Plug	<0.1	<0.5	<0.5	<1						
Tinsley Plug	<0.1	<0.5	<0.5	<1						

BRAND SNUS	Ochratoxin [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	3.0	4.4							
02 Strong PSOL	2.8	13.0							
Catch Collection PSWM. Chill	4.6	9.1	8.2						
Catch Dry Eucalyptus PSWM	11	6.8	5.5	5.1	2.6	11.2	7.6	8.7	
Catch Dry Licorice PSWM	8.3	6.4	5.6	6.8	4.4	9.0			
Catch Eucalyptus PSWL	4.3	7.6	7.6	8.4	5.3	13.0	11.3	14.2	
Catch Licorice PSOM	1.8	4.7	5.0	11.4	8.7	12.1			
Catch Licorice PSWL	4.5	9.5	6.6	8.1	9.0	13.0			
Catch Pure Mint PSW Medium	2.7								
Ettan Lös	4.2	3.8	5.2	6.9	4.0	29.8	11.4	<5	
Ettan PSOL	2.8	5.0	5.7	8.0	2.4	13.9	13.8	10.2	
Ettan PSWL	5.4	7.1	7.3	8.5	11.0				
General Extra Sterk PSOL	2.1	8.7	9.8						
General Extra Sterk Lös	1.7	6.9	7.9						
General Long PSOL	2.2								
General Long Sterk PSOL	3.5								
General Lös	3.9	4.1	5.3	7.5	4.2	15.7	10.0	10.8	
General Onyx PSWL	5.6	11.7	9.1	10.8	2.8	10.4			
General PSOL	2.4	4.6	6.2	7.5	16.8	12.3	14.1		
General PSOM	1.9	5.8	5.4	8.3	10.0	12.9			
General PSWL	5.6	6.8	8.2	9.4	9.7	12.5			
General PSWM	4.1	7.1	8.0	8.3	9.4	13.9			
General Silver PSOL	1.3	3.5	4.9	6.4	2.9	9.9	9.8	<5	
General Smooth PSW Medium	3.5								
General Sterk PSWL	5.7	6.6	7.7	11.7					
Göteborgs Prima Fint Lös	4.0	4.4	4.7	12.9	8.0	11.2	8.1	<5	
Göteborgs Rapé Lös	3.3	3.9	4.8	14.5	4.6	13.0			
Göteborgs Rapé PSWL	5.6	6.6	7.5	15.3	9.6	13.3			
Göteborgs Rapé PSWM	4.5	10.4	6.9	15.1	8.9	12.6			
Göteborgs Rape No2 PSWL	4.9	6.8	7.6	14.7	8.6				
Grov Lös	2.6	2.9	4.9	7.8	5.9	11.4	9.9	<5	
Grov PSOL	2.8	3.6	5.5	8.5	9.4	14.2			
Grov PSWL	4.9	8.1	7.0	16.4	9.2	13.0			
Grovsnus Svart PSWL	7.4	11.4	9.0						
Kronan Lös	2.3	2.6	4.8	11.0	<0.5				
Kronan PSOL	2.7	2.5	5.1	8.7	8.2	11.6			
Kronan PSWL	5.9	7.2	6.2	9.7					
Nick (and Johnny) PSOL	4.8	12.7	9.6	4.6	6.3				

BRAND	Ochratoxin [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
<i>SNUS Cont'd</i>									
Nick&Johnny Strong White PSWL	5.6								
Probe Lös	10	7.3	6.8	7.7	5.2	12.2	9.1	9.8	
Probe PSOL	10	7.0	4.8	11.1	7.6	14.3		10.8	
Röda Lacket Lös	4.2	4.9	4.7	6.8	5.5	11.6	11.2	<5	
Röda Lacket PSWL	6.4	9.0	6.3	12.0	11.4	13.5			
Tre Ankare PSWL	4.2	6.1	7.2	12.0	5.4	12.8		12.3	
Tre Ankare PSWM	4.8	9.0	7.4	9.2	10.1	13.4			
<i>MOIST SNUFF</i>									
Longhorn FC Natural	2.7	5.3	11.0	16.8	8.8	13.2	39.7		
Longhorn FC Wintergreen	2.5	9.1							
Longhorn LC Mint	3.7	4.9				14.8			
Longhorn LC Natural	4.2	5.6							
Longhorn LC Straight	4.3	7.6			9.1				
Longhorn LC Wintergreen	3.1	6.3	12.4		8.9	13.0			
Longhorn Pouches Straight	2.5	8.5							
Longhorn Pouches Wintergreen	2.8	7.5							
Red Man FC Natural	3.0	6.6		18.0					
Red Man LC Straight	3.3	6.2		12.5					
Red Man LC Wintergreen	4.3	6.4		16.1					
Renegades Wintergreen	3.6	5.9			5.7	14.0	26.0		
Timber Wolf FC Natural	2.7	5.1		11.3	3.9	9.7	23.2		
Timber Wolf FC Wintergreen	3.6	7.1							
Timber Wolf LC Apple	6.1	6.6			4.7				
Timber Wolf LC Cool Wintergreen	2.5	6.1							
Timber Wolf LC Mint	4.2	7.9							
Timber Wolf LC Peach	4.4	7.8		19.1		15.9			
Timber Wolf LC Straight	7.6	7.1							
Timber Wolf LC Wintergreen	4.5	7.4	9.6	9.1	3.1	10.4	20.4		
Timber Wolf Packs Mint	3.9	7.3							
Timber Wolf Packs Natural	2.6	6.6		17.0	9.8				
Timber Wolf Packs Peach	2.7	6.5							
Timber Wolf Packs Wintergreen	3.2	7.5	11.3	11.8	8.2	11.6			
<i>LOOSE LEAF</i>									
Granger Select	4.0								
J.D.'s Blend	8.0								
Red Man Golden Blend	1.1								
Red Man Original	8.1								
Red Man Select	1.2								

BRAND <i>LOOSE LEAF Cont'd</i>	Ochratoxin [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	6.7								
Southern Pride	3.5								
PLUG									
Apple Thick Plug	18								
Brown Mule Plug	5.3								
Cup Plug	48								
Days Work Plug	8.4								
Red Man Plug	7.5								
Tinsley Plug	4.1								

Nitrate

Background:

- ❑ Nitrate is naturally occurring in tobacco plants.
- ❑ Nitrate can contribute to nitrite formation and thus cause endogenous formation of nitrosamines in humans. As a consequence, there is a limit of the nitrate daily intake set by WHO. Vegetables have high contents of nitrate. It is desirable to strive to a concentration of nitrate as low as possible in smokeless tobacco products.
- ❑ ADI (Acceptable Daily Intake) of 5 mg NaNO_3 /kg body weight/day or 3.7 mg NO_3^- / kg body weight
- ❑ Internal tolerance limit. SMNE: 3 % (NO_3^- , dry weight)

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm

Method: FS4 (calculated as nitrate ion). KLS. "Kvantitativ analys av nitrit/nitrat"

Quantification limits: 0.05 %

Comments

The consumption of 25 g snus from Swedish Match per day (by a 70 kg person) may result in a maximal intake of 4.2 mg NaNO_3 /kg body weight/day.

The consumption of 25 g moist snuff from Swedish Match per day (by a 70 kg person) may result in a maximal intake of 5.6 mg NaNO_3 /kg body weight/day.

The consumption of 25 g loose leaf or plug from Swedish Match per day (by a 70 kg person) may result in a maximal intake of 3.2 mg NaNO_3 /kg body weight/day.

The calculated values above are close to or just above the ADI value (5 mg NaNO_3 /kg body weight/day), too high considering additional intake from food.

(Calculated on the maximum value 2011).

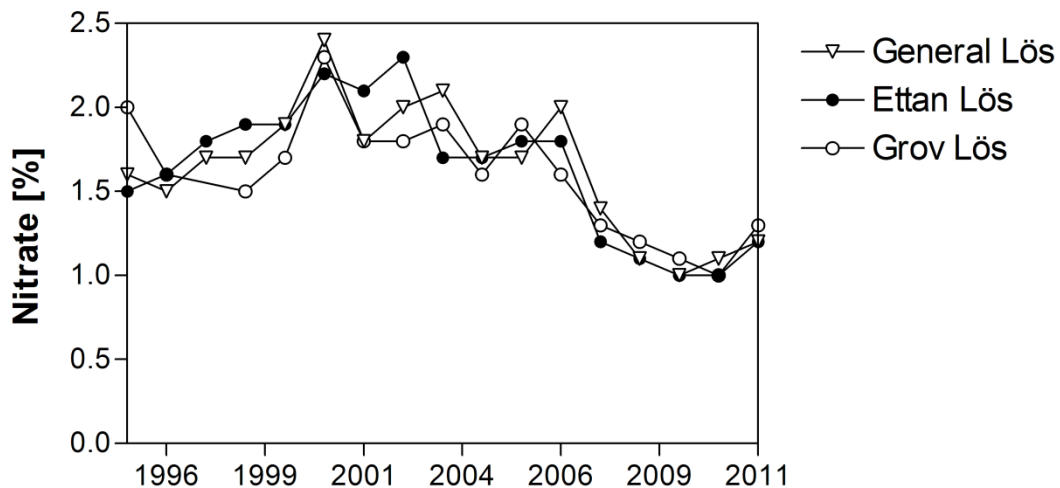


Figure 6. The nitrate level in General Lös, Ettan Lös and Grov Lös 1995-2011.

BRAND SNUS	Nitrate [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	1.3	1.3							
02 Strong PSOL	1.4	1.4							
Catch Collection PSWM. Chill	1.5	1.6	1.2						
Catch Dry Eucalyptus PSWM	1.1	1.2	1.0	1.1	1.1	1.0	1.0	1.2	1.5
Catch Dry Licorice PSWM	1.1	1.1	1.0	1.1	1.1	1.0	1.0	1.2	1.5
Catch Eucalyptus PSWL	1.5	1.5	1.3	1.2	1.5	1.9	1.7	1.6	
Catch Licorice PSOM	1.4	1.1	1.0	1.2	1.7	2.0	1.8	1.8	1.7
Catch Licorice PSWL	1.6	1.6	1.3	1.2	1.6	2.0	1.9	1.8	2.0
Catch Pure Mint PSW Medium	1.4								
Ettan Lös	1.2	1.0	1.0	1.1	1.2	1.8	1.8	1.7	1.7
Ettan PSOL	1.3	1.1	1.1	1.2	1.7	1.5	1.9	1.9	1.9
Ettan PSWL	1.7	1.6	1.3	1.1	1.7				
General Extra Sterk PSOL	1.3	1.4	1.5						
General Extra Sterk Lös	1.4	1.2	1.3						
General Long PSOL	1.4								
General Long Sterk PSOL	1.4								
General Lös	1.2	1.1	1.0	1.1	1.4	2.0	1.7	1.7	2.1
General Onyx PSWL	1.5	1.5	1.1	1.2	1.3	1.1			
General PSOL	1.4	1.2	1.1	1.1	1.6	1.8	1.9	1.8	1.9
General PSOM	1.3	1.1	1.0	1.3	1.7	1.9	1.7	2.1	1.9
General PSWL	1.7	1.5	1.3	1.1	1.6	1.9	1.8	1.9	1.7
General PSWM	1.5	1.6	1.3	1.1	1.6	1.8			
General Silver PSOL	1.4	1.2	1.2	1.4	1.4	1.9	1.4	1.4	1.7
General Smooth PSW Medium	1.4								
General Sterk PSWL	1.5	1.3	1.1	1.0					
Göteborgs Prima Fint Lös	1.2	1.2	0.9	1.1	1.4	1.5	1.4	1.4	1.5
Göteborgs Rapé Lös	1.2	1.1	1.1	1.2	1.4	1.8	1.9	1.7	1.9
Göteborgs Rapé PSWL	1.7	1.6	1.3	1.1	1.7	1.8	1.9	1.9	1.7
Göteborgs Rapé PSWM	1.5	1.6	1.3	1.2	1.6	1.8			
Göteborgs Rape No2 PSWL	1.5	1.6	1.3	1.3	1.7				
Grov Lös	1.3	1.0	1.1	1.2	1.3	1.6	1.9	1.6	1.9
Grov PSOL	1.4	1.0	1.0	1.3	1.7	2.2	2.3	1.8	2.1
Grov PSWL	1.4	1.5	1.4	1.3	1.6	1.8	1.9	1.6	1.6
Grovsnus Svart PSWL	1.4	1.6	1.2						
Kronan Lös	1.2	1.1	0.9	1.1	1.3				
Kronan PSOL	1.2	1.2	1.0	1.1	1.3	1.9			
Kronan PSWL	1.7	1.7	1.3	1.1					
Nick (and Johnny) PSOL	1.3	1.4	1.4	1.3	1.6				

BRAND	Nitrate [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
SNUS									
Nick&Johnny Strong White PSWL	1.4								
Probe Lös	1.0	1.0	1.0	1.1	1.0	1.9	1.0	1.1	1.3
Probe PSOL	1.0	1.1	0.9	1.1	1.1	1.0	1.0	1.1	1.4
Röda Lacket Lös	1.4	1.2	0.9	1.1	1.4	1.8	1.7	1.7	1.8
Röda Lacket PSWL	1.7	1.6	1.3	1.2	1.6	1.9			
Tre Ankare PSWL	1.5	1.6	1.3	1.3	1.6	1.9	1.9	1.8	1.9
Tre Ankare PSWM	1.5	1.6	1.4	1.1	1.6	1.9	1.8	2.1	2.0
MOIST SNUFF									
Longhorn FC Natural	2.0	1.8	1.8	1.9	1.7	1.8	1.7	1.7	
Longhorn FC Wintergreen	2.1	2.1							
Longhorn LC Mint	2.3	2.0				2.0	1.9		
Longhorn LC Natural	2.0	1.9							
Longhorn LC Straight	2.1	2.0			1.9			1.9	
Longhorn LC Wintergreen	2.0	1.9	1.8		1.8	1.9	1.7	1.5	
Longhorn Pouches Straight	2.1	1.9							
Longhorn Pouches Wintergreen	2.1	1.7							
Red Man FC Natural	2.0	1.9		2.0					
Red Man LC Straight	2.0	2.0		2.1					
Red Man LC Wintergreen	1.9	2.1		2.1					
Renegades Wintergreen	1.8	1.8			1.8	1.9	2.0	2.0	1.7
Timber Wolf FC Natural	2.1	2.0		2.2	2.0	2.1	2.1	2.1	2.0
Timber Wolf FC Wintergreen	2.1	2.0							
Timber Wolf LC Apple	2.0	1.9			1.9		1.9		
Timber Wolf LC Cool Wintergreen	2.1	2.0							
Timber Wolf LC Mint	2.1	2.0							
Timber Wolf LC Peach	1.9	1.9		1.9		1.9	1.8		
Timber Wolf LC Straight	2.1	2.2						2.4	2.2
Timber Wolf LC Wintergreen	2.1	2.2	2.0	2.2	2.2	2.3	2.3	2.2	2.3
Timber Wolf Packs Mint	2.2	2.0							
Timber Wolf Packs Natural	2.2	2.0		2.0	1.8				
Timber Wolf Packs Peach	1.9	1.8							
Timber Wolf Packs Wintergreen	2.1	2.0	1.9	2.0	1.9	1.6			
LOOSE LEAF									
Granger Select	0.7								
J.D.'s Blend	0.6								
Red Man Golden Blend	0.6								
Red Man Original	0.6								
Red Man Select	0.9								

BRAND	Nitrate								
	[%]								
LOOSE LEAF Cont'd	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	0.6								
Southern Pride	0.8								
PLUG									
Apple Thick Plug	1.0								
Brown Mule Plug	0.9								
Cup Plug	0.8								
Days Work Plug	0.7								
Red Man Plug	0.6								
Tinsley Plug	1.3								

Nitrite

Background:

- ❑ Nitrite (often as sodium nitrite) is a common additive in foods (colouring fixative and preservative in cured meats, smoked fish etc.).
- ❑ Nitrite is classified as a toxic compound (Health & Safety Information).
- ❑ Nitrite is not naturally occurring in plants but may be formed from nitrate by microorganisms.
- ❑ Nitrite is undesired as it may react with alkaloids to produce carcinogenic nitrosamines, either in the snuff or in the stomach.
- ❑ ADI (Acceptable Daily Intake) of $90\mu\text{g NaNO}_2/\text{kg}$ body weight or $60\mu\text{g NO}_2^-/\text{kg}$ body weight.
- ❑ Some reported values in moist snuff:
US: Nitrite-nitrogen: 0.9-1180 ppm (Hoffmann et al., 1994)
- ❑ The **GOTHIATEK**[®] limit (2001): 7 ppm (dry weight)
- ❑ Internal tolerance limit. SMNE: 4 ppm (NO_3^- , dry weight)

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm

Method: FS4 (calculated as nitrite ion) KLS, "Kvantitativ analys av nitrit/nitrat"

Quantification limits: 1 ppm

Comments

The consumption of 25 g Swedish snus per day (by a 70 kg person) may result in a maximal intake of 0.8 µg NaNO₂/kg body weight, which is below the ADI value.

The consumption of 25 g moist snuff (SMNA) per day by a 70 kg person may result in a maximal intake of 4.3 µg NaNO₂/kg body weight, which is below the ADI value.

The consumption of 25 g loose leaf or plug (SMNA) per day by a 70 kg person may result in a maximal intake of 0.3 µg NaNO₂/kg body weight, which is below the ADI value.

Approximately 5 % of nitrate is endogenously converted to nitrite. This means that the intake of nitrite from nitrate is an additional 210 µg NaNO₂/kg bodyweight for snus , 280 µg NaNO₂/kg body weight for moist snuff or 160 µg NaNO₂/kg bodyweight for loose leaf or plug, which is above the ADI value (90 µg NaNO₂/kg bodyweight)

(Calculated on the maximum values 2011)

BRAND SNUS	Nitrite [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	<1	3							
02 Strong PSOL	3	4							
Catch Collection PSWM. Chill	2	2	2						
Catch Dry Eucalyptus PSWM	1	2	2	1	2	1	2	2	2
Catch Dry Licorice PSWM	<1	2	<1	2	3	2	1	1	2
Catch Eucalyptus PSWL	2	2	1	2	2	2	2	2	
Catch Licorice PSOM	1	4	1	2	3	2	2	2	2
Catch Licorice PSWL	1	2	1	2	2	2	2	2	2
Catch Pure Mint PSW Medium	2								
Ettan Lös	3	3	<1	2	2	<1	2	2	2
Ettan PSOL	3	3	2	2	3	2	2	2	2
Ettan PSWL	1	2	1	2	3				
General Extra Sterk PSOL	1	4	2						
General Extra Sterk Lös	2	4	2						
General Long PSOL	2								
General Long Sterk PSOL	2								
General Lös	2	3	<1	2	3	2	2	2	<1
General Onyx PSWL	2	2	2	2	3	1			
General PSOL	2	2	2	2	2	2	2	1	1
General PSOM	2	2	<1	2	3	2	2	2	1
General PSWL	1	2	1	2	3	2	2	2	<1
General PSWM	1	2	1	2	3	2			
General Silver PSOL	2	2	2	2	2	2	2	2	1
General Smooth PSW Medium	1								
General Sterk PSWL	2	2	2	2					
Göteborgs Prima Fint Lös	2	3	2	2	3	2	2	2	2
Göteborgs Rapé Lös	2	3	2	2	<1	2	<1	<1	2
Göteborgs Rapé PSWL	2	2	1	2	3	2	2	2	2
Göteborgs Rapé PSWM	3	2	1	2	3	2			
Göteborgs Rape No2 PSWL	2	2	<1	2	2				
Grov Lös	3	4	<1	2	2	2	2	2	<1
Grov PSOL	2	2	1	2	4	2	2	2	2
Grov PSWL	2	2	2	2	3	2	2	<1	1
Grovsnus Svart PSWL	3	2	2						
Kronan Lös	2	4	1	2	3				
Kronan PSOL	2	2	1	1	2	2			
Kronan PSWL	2	2	<1	2					
Nick (and Johnny) PSOL	2	2	1	2	3				

BRAND	Nitrite [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
SNUS Cont'd									
Nick&Johnny Strong White PSWL	2								
Probe Lös	3	2	2	2	2	1	2	2	2
Probe PSOL	2	2	2	2	4	2	2	2	2
Röda Lacket Lös	3	2	2	2	2	2	2	2	2
Röda Lacket PSWL	2	2	1	2	3	2			
Tre Ankare PSWL	2	2	<1	2	3	2	2	2	<1
Tre Ankare PSWM	2	2	1	2	3	2	2	2	2
MOIST SNUFF									
Longhorn FC Natural	9	10	5	11	14	58	7	170	
Longhorn FC Wintergreen	9	5							
Longhorn LC Mint	3	4				4	7		
Longhorn LC Natural	10	8							
Longhorn LC Straight	3	3			5			4	
Longhorn LC Wintergreen	3	3	3		3	4	5	14	
Longhorn Pouches Straight	7	9							
Longhorn Pouches Wintergreen	9	6							
Red Man FC Natural	10	10		12					
Red Man LC Straight	7	5		3					
Red Man LC Wintergreen	4	4		3					
Renegades Wintergreen	7	7			7	13	11	110	5
Timber Wolf FC Natural	16	17		16	200	55	65	360	380
Timber Wolf FC Wintergreen	4	3							
Timber Wolf LC Apple	3	4			3		3		
Timber Wolf LC Cool Wintergreen	3	2							
Timber Wolf LC Mint	3	83							
Timber Wolf LC Peach	3	4		3		3	3		
Timber Wolf LC Straight	3	6						5	8
Timber Wolf LC Wintergreen	4	6	3	3	4	4	5	14	7
Timber Wolf Packs Mint	7	3							
Timber Wolf Packs Natural	11	23		7	11				
Timber Wolf Packs Peach	8	7							
Timber Wolf Packs Wintergreen	8	8	6	6	14	9			
LOOSE LEAF									
Granger Select	<1								
J.D.'s Blend	1								
Red Man Golden Blend	<1								
Red Man Original	1								
Red Man Select	<1								

BRAND <i>LOOSE LEAF Cont'd</i>	Nitrite [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	<1								
Southern Pride	<1								
PLUG									
Apple Thick Plug	<1								
Brown Mule Plug	<1								
Cup Plug	<1								
Days Work Plug	<1								
Red Man Plug	<1								
Tinsley Plug	<1								

NITROSAMINES : Tobacco-specific nitrosamines (TSNA)

Background:

- ❑ TSNA are measured as the sum of *N*-nitrosonornicotine (NNN). *N*-nitrosoanatabine (NAT). *N*-Nitrosoanabasine (NAB) and 4-methyl-*N*-nitrosamino-1-(3-pyridyl)-1-butanone (NNK).
- ❑ Since 2007, NNK and NNN are classified as carcinogenic to humans (Group 1) (IARC)
- ❑ Several authorities around the world request information about the concentrations of TSNA in smokeless tobacco products.
- ❑ The **GOTHIATEK**[®] limit (2001): 10 ppm (dry weight) .
- ❑ Internal tolerance limit. SMNE: 3 ppm
- ❑ Some reported values in literature :

	NNN	NAT	NAB	NNK	
Sweden	4.00	2.70	0.17	0.77	
USA	15.00	18.00	0.15	7.40	(Österdahl 1991)

Sweden (Ettan) TSNA 2.8 ppm
USA (5 moist snuff brands) TSNA 7.5 – 127.9 ppm (Massachusetts Health Dep. 2001)

SNUSAB	TSNA 0.5 (0.2-1.0) ppm (wet weight)
Swedish Match	TSNA 1.0 (0.8-1.1) ppm (wet weight)
Bengt Sändh	TSNA 1.1 (1.0-1.1) ppm (wet weight)
Gustavus	TSNA 1.4 (1.3-1.5) ppm (wet weight)
Appeltofft´s	TSNA 2.4 (1.6-3.1) ppm (wet weight)

(Livsmedelsverket 2002)

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm

Method: 2001-2006: GC-TEA KLS. "Kvantitativ analys av TSNA I och II"
2007-Present: LC-MS-MS KLS. "Kvantitativ analys av TSNA med UPLC-MS/MS"

Quantification limits: 2001-2006: 0.1 ppm
2007-Present: 0.006 ppm

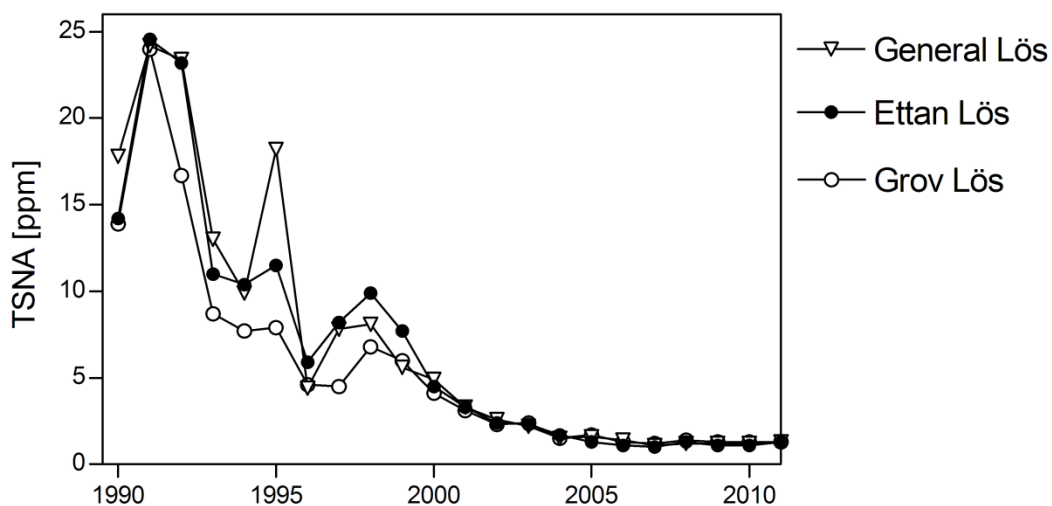


Figure 7. The TSNA level in General Lös, Ettan Lös and Grov Lös 1990-2011.

BRAND <i>SNUS</i>	NNN [ppm]	NAT [ppm]	NAB [ppm]	NNK [ppm]	TSNA [ppm]							
	2011				2011	2010	2009	2008	2007	2006	2005	2004
01 Original PSOL	0.66	0.55	0.03	0.30	1.5	1.4						
02 Strong PSOL	0.98	0.99	0.05	0.30	2.3	2.4						
Catch Collection PSWM. Chill	0.63	0.48	0.03	0.31	1.5	1.5	1.8					
Catch Dry Eucalyptus PSWM	0.68	0.55	0.04	0.17	1.4	2.0	1.9	1.7	1.6	1.5	1.5	1.5
Catch Dry Licorice PSWM	0.72	0.65	0.04	0.20	1.6	1.7	2.0	1.9	1.6	1.5	1.7	1.4
Catch Eucalyptus PSWL	0.75	0.51	0.03	0.31	1.6	1.4	1.7	1.3	1.4	1.2	1.4	1.3
Catch Licorice PSOM	0.68	0.50	0.04	0.38	1.6	1.2	1.6	1.5	1.5	1.4	1.5	1.5
Catch Licorice PSWL	0.64	0.46	0.03	0.32	1.5	1.5	1.8	1.3	1.5	1.3	1.6	1.4
Catch Pure Mint PSW Medium	0.68	0.50	0.06	0.25	1.5							
Ettan Lös	0.52	0.44	0.03	0.28	1.3	1.1	1.1	1.2	1.0	1.1	1.3	1.7
Ettan PSOL	0.68	0.42	0.03	0.29	1.4	1.5	1.7	1.6	1.5	1.4	1.8	1.8
Ettan PSWL	0.59	0.48	0.03	0.29	1.4	1.3	1.9	1.3	1.5			
General Extra Sterk PSOL	0.88	0.98	0.05	0.23	2.1	2.6	2.7					
General Extra Sterk Lös	0.78	0.75	0.04	0.21	1.8	1.8	2.0					
General Long PSOL	0.76	0.59	0.04	0.41	1.8							
General Long Sterk PSOL	0.93	0.97	0.04	0.37	2.3							
General Lös	0.58	0.43	0.03	0.25	1.3	1.2	1.2	1.3	1.1	1.4	1.6	1.5
General Onyx PSWL	0.78	0.70	0.03	0.24	1.8	1.7	2.2	1.7	1.3	1.3		
General PSOL	0.78	0.58	0.04	0.46	1.8	1.4	1.8	1.4	1.6	1.4	1.6	1.5
General PSOM	0.72	0.44	0.03	0.39	1.6	1.3	1.5	1.5	1.5	1.3	1.8	1.7
General PSWL	0.6	0.51	0.03	0.31	1.4	1.2	1.8	1.3	1.5	1.3	1.9	1.5
General PSWM	0.66	0.46	0.03	0.28	1.4	1.3	1.7	1.3	1.3	1.3		
General Silver PSOL	0.5	0.36	0.03	0.26	1.2	1.1	1.4	1.3	0.98	1.1	1.0	1.2
General Smooth PSW Medium	0.75	0.53	0.05	0.32	1.7							
General Sterk PSWL	0.74	0.71	0.03	0.28	1.8	2.0	2.1	1.5				
Göteborgs Prima Fint Lös	0.51	0.39	0.02	0.23	1.1	1.0	1.2	1.3	1.3	1.0	1.6	1.9
Göteborgs Rapé Lös	0.52	0.44	0.03	0.26	1.2	1.1	1.5	1.3	1.3	1.2	1.9	1.5
Göteborgs Rapé PSWL	0.58	0.53	0.03	0.32	1.5	1.2	1.7	1.4	1.4	1.2	1.6	1.6
Göteborgs Rapé PSWM	0.7	0.45	0.03	0.29	1.5	1.7	1.7	1.3	1.3	1.2		
Göteborgs Rape´No2 PSWL	0.6	0.49	0.03	0.29	1.4	1.3	1.7	1.4	1.4			
Grov Lös	0.57	0.41	0.03	0.24	1.3	1.3	1.3	1.4	1.2	1.3	1.7	1.5
Grov PSOL	0.67	0.57	0.04	0.34	1.6	1.1	1.5	1.3	1.5	1.4	1.7	1.4
Grov PSWL	0.65	0.51	0.03	0.29	1.5	1.4	1.7	1.4	1.5	1.3	1.8	1.5
Grovsnus Svart PSWL	0.95	0.77	0.03	0.33	2.1	2.0	2.3					
Kronan Lös	0.63	0.41	0.04	0.23	1.3	1.1	1.2	1.3	1.3			
Kronan PSOL	0.73	0.53	0.05	0.31	1.6	1.2	1.3	1.4	1.1	1.1		
Kronan PSWL	0.55	0.46	0.02	0.31	1.3	1.6	1.7	1.4				
Nick (and Johnny) PSOL	0.84	0.85	0.04	0.25	2.0	2.4	2.2	2.0	1.8			

BRAND <i>SNUS Cont'd</i>	NNN [ppm]	NAT [ppm]	NAB [ppm]	NNK [ppm]	TSNA [ppm]							
	2011				2011	2010	2009	2008	2007	2006	2005	2004
Nick&Johnny Strong White PSWL	0.73	0.7	0.02	0.27	1.7							
Probe Lös	0.61	0.42	0.03	0.17	1.2	1.7	1.6	1.7	1.3	1.3	1.3	1.4
Probe PSOL	0.67	0.47	0.03	0.14	1.3	1.8	1.7	1.7	1.7	1.4	1.6	1.6
Röda Lacket Lös	0.5	0.38	0.03	0.23	1.1	1.2	1.2	1.2	1.1	0.9	1.3	1.7
Röda Lacket PSWL	0.61	0.52	0.03	0.37	1.5	1.5	1.8	1.5	1.4	1.2		
Tre Ankare PSWL	0.70	0.51	0.03	0.27	1.5	1.4	1.6	1.4	1.2	1.2	1.9	1.5
Tre Ankare PSWM	0.61	0.43	0.03	0.3	1.4	1.7	1.6	1.4	1.6	1.3	1.7	1.6
<i>MOIST SNUFF</i>												
Longhorn FC Natural	2.8	3.3	0.18	0.76	7.0	7.8	8.2	11	7.2	7.1	7.3	9.6
Longhorn FC Wintergreen	3.4	3.7	0.18	0.95	8.3	7.9						
Longhorn LC Mint	2.6	3.3	0.17	0.75	6.9	7.9				7.6	6.8	
Longhorn LC Natural	2.6	2.8	0.14	0.66	6.1	8.9						
Longhorn LC Straight	2.7	3	0.16	0.77	6.6	7.8			8.1			6.8
Longhorn LC Wintergreen	2.8	2.9	0.17	0.71	6.6	7.0	9.0		7.6	7.1	7.3	6.9
Longhorn Pouches Straight	3.0	3.4	0.17	0.84	7.4	9.4						
Longhorn Pouches Wintergreen	2.9	3.5	0.18	0.89	7.4	8.3						
Red Man FC Natural	3.0	3.7	0.17	0.81	7.6	8.3		12				
Red Man LC Straight	2.8	3.1	0.15	0.8	6.8	8.3		11				
Red Man LC Wintergreen	2.8	2.9	0.15	0.73	6.5	8.4		11				
Renegades Wintergreen	2.6	3.2	0.16	0.73	6.7	8.3			7.7	7.7	11	13
Timber Wolf FC Natural	3.4	3.5	0.19	0.9	7.9	8.2		11	10	10	9.7	11
Timber Wolf FC Wintergreen	2.7	3.4	0.15	0.97	7.2	8.1						
Timber Wolf LC Apple	2.5	2.9	0.13	0.69	6.2	7.0			7.9		7.0	
Timber Wolf LC Cool Wintergreen	3.0	3.2	0.18	0.8	7.1	6.9						
Timber Wolf LC Mint	2.6	3.3	0.14	0.84	6.9	8.5						
Timber Wolf LC Peach	2.7	2.9	0.14	0.64	6.4	8.2		11		7.2	7.1	
Timber Wolf LC Straight	2.8	3.2	0.18	0.73	7.0	8.1						9.3
Timber Wolf LC Wintergreen	3.0	3.2	0.16	0.83	7.2	7.9	9.7	11	8.1	9.7	11	8.5
Timber Wolf Packs Mint	2.9	3.1	0.17	0.68	6.9	9.2						
Timber Wolf Packs Natural	3.1	3.7	0.2	0.82	7.9	8.8		11	8.0			
Timber Wolf Packs Peach	2.5	3.2	0.16	0.73	6.6	7.3						
Timber Wolf Packs Wintergreen	3.1	3.6	0.19	0.86	7.7	8.7	8.8	9.5	8.0	8.3		
<i>LOOSE LEAF</i>												
Granger Select	1.2	0.55	0.03	0.19	1.9							
J.D.'s Blend	1.4	0.46	0.04	0.2	2.1							
Red Man Golden Blend	0.87	0.45	0.02	0.17	1.5							
Red Man Original	0.68* (4.9)	0.40* (0.8)	0.02* (0.05)	0.18* (0.32)	1.3* (6.1)							
Red Man Select	0.87	0.44	0.03	0.21	1.5							

* Values after re-test

BRAND	NNN [ppm]	NAT [ppm]	NAB [ppm]	NNK [ppm]	TSNA [ppm]							
	2011				2011	2010	2009	2008	2007	2006	2005	2004
<i>LOOSE LEAF Cont'd</i>												
Red Man Silver Blend	0.89	0.50	0.03	0.14	1.6							
Southern Pride	1.1	0.52	0.03	0.17	1.8							
<i>PLUG</i>												
Apple Thick Plug	3.8	0.82	0.05	0.29	5.0							
Brown Mule Plug	4.0	0.77	0.04	0.20	5.0							
Cup Plug	1.1	0.92	0.05	0.22	2.3							
Days Work Plug	4.0	0.89	0.06	0.35	5.3							
Red Man Plug	0.80	0.47	0.02	0.19	1.5							
Tinsley Plug	9.7	1.5	0.10	0.39	12							

NITROSAMINES : N-Nitrosodimethylamine (NDMA)

Background:

- ❑ The highest permissible level of NDMA (N-Nitrosodimethylamine) and NPYR (N-Nitrosopyrrolidine) in bacon and beer : 5 ppb (U.S. Food and Drug Administration. U.S. Department of Agriculture).
- ❑ NDMA is classified as a compound that is probably carcinogenic to humans. Group 2A (IARC).
- ❑ The **GOTHIA TEK**[®] limit (2001): 10 ppb (dry weight) .
- ❑ Internal tolerance limit, SMNE: 2.0 ppb
- ❑ Some reported values in smokeless tobacco products:

US:	NDMA:	nd-67 ppb	(Hoffmann. 1987)
	NDMA:	nd-265 ppb	(Hoffmann. 1991)
Sweden:	NDMA:	51-63 ppb	(Hoffmann. 1991)

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm

Method: 2001-2007: GC-TEA KLS. "Analys av NDMA"
2008-Present: LC-MS-MS KLS. "Kvantitativ analys av NDMA med UPLC-MS/MS"

Quantification limits: 2001-2007: 1 ppb
2008-Present: 0.6 ppb

BRAND	NDMA [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
SNUS									
01 Original PSOL	0.9	<0.6							
02 Strong PSOL	0.8	<0.6							
Catch Collection PSWM. Chill	0.8	0.9	0.7						
Catch Dry Eucalyptus PSWM	<0.6	<0.6	<0.6	<0.6	<1.0	<1.0	<1.0	1.3	<1
Catch Dry Licorice PSWM	<0.6	<0.6	<0.6	<0.6	<1.0	<1.0	<1.0	1.1	<1
Catch Eucalyptus PSWL	3.7	1.2	0.8	<0.6	<1.0	<1.0	1.8	2.4	
Catch Licorice PSOM	<0.6	<0.6	<0.6	<0.6	<1.0	<1.0	<1.0	<1	<1
Catch Licorice PSWL	3.0	1.2	0.6	<0.6	<1.0	<1.0	<1.0	1.1	<1
Catch Pure Mint PSW Medium	0.6								
Ettan Lös	0.6	<0.6	<0.6	<0.6	1.1	<1.0	<1.0	<1	<1
Ettan PSOL	<0.6	<0.6	<0.6	<0.6	2.8	<1.0	<1.0	1.4	<1
Ettan PSWL	1.1	0.7	0.9	<0.6	1.7				
General Extra Sterk PSOL	<0.6	<0.6	0.8						
General Extra Sterk Lös	0.9	<0.6	1.0						
General Long PSOL	1.0								
General Long Sterk PSOL	<0.6								
General Lös	1.0	<0.6	<0.6	<0.6	<1.0	1.1	1.1	<1	<1
General Onyx PSWL	0.8	<0.6	1.0	<0.6	<1.0	<1.0			
General PSOL	1.0	<0.6	<0.6	<0.6	1.3	<1.0	<1.0	2.3	<1
General PSOM	0.8	0.8	<0.6	<0.6	<1.0	<1.0	<1.0	2.9	<1
General PSWL	1.7	1.4	0.9	<0.6	<1.0	<1.0	<1.0	2.2	<1
General PSWM	2.3	<0.6	1.0	<0.6	1.4	<1.0			
General Silver PSOL	2.3	<0.6	<0.6	<0.6	1.8	<1.0	<1.0	1.3	<1
General Smooth PSW Medium	<0.6								
General Sterk PSWL	0.6	1.0	1.3	<0.6					
Göteborgs Prima Fint Lös	<0.6	<0.6	<0.6	<0.6	1.9	<1.0	<1.0	<1	<1
Göteborgs Rapé Lös	1.0	<0.6	<0.6	<0.6	1.0	<1.0	<1.0	2.0	<1
Göteborgs Rapé PSWL	1.7	1.2	0.8	<0.6	<1.0	<1.0	<1.0	1.9	<1
Göteborgs Rapé PSWM	1.6	0.9	0.8	<0.6	<1.0	<1.0			
Göteborgs Rape No2 PSWL	2.2	0.7	0.8	<0.6	<1.0				
Grov Lös	1.0	<0.6	<0.6	<0.6	<1.0	<1.0	1.1	<1	<1
Grov PSOL	1.0	<0.6	<0.6	<0.6	1.5	<1.0	<1.0	<1	<1
Grov PSWL	0.8	0.7	0.8	<0.6	2.3	<1.0	<1.0	2.1	<1
Grovsnus Svart PSWL	1.2	0.7	1.0						
Kronan Lös	0.8	<0.6	<0.6	<0.6	1.5				
Kronan PSOL	<0.6	<0.6	<0.6	<0.6	<1.0	<1.0			
Kronan PSWL	1.4	0.7	0.9	<0.6					
Nick (and Johnny) PSOL	<0.6	<0.6	<0.6	<0.6	1.0				

BRAND	NDMA [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
SNUS Cont'd									
Nick&Johnny Strong White PSWL	0.9								
Probe Lös	1.0	<0.6	1.5	<0.6	<1.0	<1.0	<1.0	<1	<1
Probe PSOL	<0.6	<0.6	0.6	<0.6	<1.0	<1.0	<1.0	1.6	<1
Röda Lacket Lös	<0.6	<0.6	<0.6	<0.6	1.5	<1.0	<1.0	<1	<1
Röda Lacket PSWL	1.8	1.1	1.1	<0.6	1.3	<1.0			
Tre Ankare PSWL	1.1	0.7	0.7	<0.6	<1.0	<1.0	1.3	2.6	<1
Tre Ankare PSWM	0.8	0.9	0.6	<0.6	1.4	<1.0	<1.0	1.7	<1
MOIST SNUFF									
Longhorn FC Natural	<0.6	<0.6	<0.6	<0.6	<1.0	<1.0	1.1	3.3	
Longhorn FC Wintergreen	<0.6	<0.6							
Longhorn LC Mint	<0.6	<0.6				<1.0	1.3		
Longhorn LC Natural	<0.6	<0.6							
Longhorn LC Straight	<0.6	<0.6			<1.0			<1	
Longhorn LC Wintergreen	<0.6	<0.6	<0.6		<1.0	<1.0	<1.0	2.0	
Longhorn Pouches Straight	<0.6	0.9							
Longhorn Pouches Wintergreen	<0.6	0.7							
Red Man FC Natural	<0.6	<0.6		0.7					
Red Man LC Straight	<0.6	<0.6		<0.6					
Red Man LC Wintergreen	<0.6	<0.6		<0.6					
Renegades Wintergreen	<0.6	0.8			1.1	<1.0	2.9	1.5	<1
Timber Wolf FC Natural	<0.6	<0.6		<0.6	1.3	<1.0	2.1	2.0	2.4
Timber Wolf FC Wintergreen	<0.6	<0.6							
Timber Wolf LC Apple	<0.6	<0.6			<1.0		<1		
Timber Wolf LC Cool Wintergreen	<0.6	<0.6							
Timber Wolf LC Mint	<0.6	0.7							
Timber Wolf LC Peach	<0.6	<0.6		<0.6		<1.0	1.2		
Timber Wolf LC Straight	<0.6	<0.6						1.1	<1
Timber Wolf LC Wintergreen	<0.6	<0.6	<0.6	<0.6	<1.0	<1.0	1.1	<1	<1
Timber Wolf Packs Mint	<0.6	<0.6							
Timber Wolf Packs Natural	<0.6	0.7		0.8	<1.0				
Timber Wolf Packs Peach	<0.6	0.7							
Timber Wolf Packs Wintergreen	0.6	0.6	0.8	1.2	1.1	<1.0			
LOOSE LEAF									
Granger Select	<0.6								
J.D.'s Blend	<0.6								
Red Man Golden Blend	<0.6								
Red Man Original	<0.6								
Red Man Select	<0.6								

BRAND <i>LOOSE LEAF Cont'd</i>	NDMA [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	<0.6								
Southern Pride	<0.6								
PLUG									
Apple Thick Plug	<0.6								
Brown Mule Plug	<0.6								
Cup Plug	<0.6								
Days Work Plug	<0.6								
Red Man Plug	<0.6								
Tinsley Plug	<0.6								

NITROSAMINOACIDS : N-Nitrososarcosine (NSAR)

Background:

- ❑ N-Nitrososarcosine is classified as a compound, which is possibly carcinogenic to humans, Group 2B (IARC).
- ❑ Some reported values in moist snuff:
 - US: 0.02-0.06 ppm (Hoffmann et al., 1995)
 - Sweden 0.03-0.68 ppm (Hoffmann et al., 1991)

Information of analyses:

Laboratory: 2003: R&D Chemical Analysis Stockholm
2011: LABSTAT International ULC. Canada

Method: 2003: GC-TEA
2011: ESI LC-MS/MS Labstat Method TWT-346
Determination of NSAR in Tobacco Products (method not accredited)

Detection and Quantification limits:

		<u>LOD</u>	<u>LOQ</u>
2003:	ppb		30
2011:	ppb	0.783	2.61

BRAND <i>SNUS</i>	NSAR [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Catch Dry Eucalyptus PSWM	4.3								<30
Ettan Lös	18.7								<30
General Long PSOL	6.3								
General PSOL	26.3								
Göteborgs Rapé PSWL	10.1								
Grov Lös	12.1								<30
Grovsnus Svart PSWL	17.3								
Kronan PSOL	21.6								

NITROSAMINES :Volatile Nitrosamines

Background:

Classification according to IARC:

- ☐ N-nitrosomorpholine (NMOR) is possibly carcinogenic to humans, Group 2B (IARC, 1987).
- ☐ N-nitrosodiisopropylamine (NDiPA) Not classified
- ☐ N-nitrosodimethylamine (NDMA) is probably carcinogenic to humans, Group 2A (IARC, 1987).
- ☐ N-nitrosodiethylamine (NDEA) is probably carcinogenic to humans, Group 2A (IARC, 1987).
- ☐ N-nitrosodi-n-propylamine (NDPA) is possibly carcinogenic to humans, Group 2B (IARC, 1987).
- ☐ N-nitrosoethylmethylamine (NEMA) is possibly carcinogenic to humans, Group 2B (IARC, 1987).
- ☐ N-nitrosodibutylamine (NDBA) is possibly carcinogenic to humans, Group 2B (IARC, 1987).
- ☐ N-nitrosopiperidine (NPIP) is possibly carcinogenic to humans, Group 2B (IARC, 1987).
- ☐ N-nitrosopyrrolidine (NPYR) is possibly carcinogenic to humans, Group 2B (IARC, 1987)

Information of analyses:

Laboratory: LABSTAT International ULC. Canada

Method: GC-TEA Labstat Method TWT-332 Determination of Volatile Nitrosamines in Tobacco Samples

Detection and Quantification limits:

		<u>LOD</u>	<u>LOQ</u>
NDMA	ppb	1.18	3.90
NEMA	ppb	1.35	4.51
NDEA	ppb	1.40	4.67
NDiPA	ppb	0.579	1.93
NDPA	ppb	1.51	5.05
NDBA	ppb	2.11	7.04
NPIP	ppb	2.29	7.63
NPYR	ppb	1.66	5.53
NMOR	ppb	0.530	1.77

BRAND SNUS	Volatile Nitrosamines [ppb]								
	NMOR 2011	NDiPA 2011	NDMA 2011	NDEA 2011	NDPA 2011	NEMA 2011	NDBA 2011	NPIP 2011	NPYR 2011
Catch Dry Eucalyptus PSWM	<0.53	<0.58	<1.18	<1.40	<1.51	<1.35	<2.11	<2.29	<1.66
Ettan Lös	≥0.53<1.77	<0.58	<1.18	≥1.4<4.7	<1.51	<1.35	<2.11	<2.29	<1.66
General Long PSOL	<0.53	<0.58	<1.18	<1.40	<1.51	<1.35	<2.11	<2.29	<1.66
General PSOL	<0.53	<0.58	<1.18	<1.40	<1.51	<1.35	<2.11	<2.29	<1.66
Göteborgs Rapé PSWL	<0.53	<0.58	<1.18	<1.40	<1.51	<1.35	<2.11	<2.29	<1.66
Grov Lös	<0.53	<0.58	<1.18	<1.40	<1.51	<1.35	<2.11	<2.29	<1.66
Grovsnus Svart PSWL	<0.53	<0.58	<1.18	<1.40	<1.51	<1.35	<2.11	<2.29	<1.66
Kronan PSOL	<0.53	<0.58	<1.18	<1.40	<1.51	<1.35	<2.11	<2.29	<1.66

NITROSAMINES :N-nitrosoalkanolamines

Background:

- ❑ N-nitrosodiethanolamine (NDELA) is classified as a compound, which is possibly carcinogenic to humans, Group 2B (IARC, 2000).
- ❑ N-nitrosodiisopropanolamine (NDiPLA). Not classified.

Information of analyses:

Laboratory: LABSTAT International ULC. Canada

Method: NCI-MS/MS Labstat Method TWT-345 Determination of Volatile N-nitrosoalkanolamines in Tobacco Products (method not accredited)

Detection and Quantification limits:

		<u>LOD</u>	<u>LOQ</u>
NDELA	ppb	0.784	2.61
NDiPLA	ppb	0.643	2.14

BRAND <i>SNUS</i>	N-Nitrosoalkanolamines [ppb]	
	NDiPLA 2011	NDELA 2011
Catch Dry Eucalyptus PSWM	<0.643	20.9
Ettan Lös	<0.643	30.0
General Long PSOL	<0.643	35.4
General PSOL	<0.643	29.9
Göteborgs Rapé PSWL	<0.643	37.2
Grov Lös	<0.643	<0.784
Grovsnus Svart PSWL	<0.643	32.8
Kronan PSOL	<0.643	24.7

pH

Background:

- ❑ The pH value of smokeless tobacco products is an important parameter as it is used to calculate the amount of free nicotine available in the product.
- ❑ The high pH in snus is obtained by the addition of carbonate compounds. The carbonate slowly disappears from the product, which results in a decline in pH during storage.
- ❑ The high pH in fermented moist snuff is mainly a result of the microbiological activities during fermentation as well as the addition of carbonate compounds.
- ❑ Several authorities around the world request information about the pH value in smokeless tobacco products.

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm.

Method: pH meter, KLS, "Mätning av pH"

BRAND <i>SNUS</i>	pH								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	8.6	8.6							
02 Strong PSOL	8.7	9.0							
Catch Collection PSWM. Chill	8.7	8.6	8.6						
Catch Dry Eucalyptus PSWM	7.0	7.3	7.4	7.3	7.4	7.3	7.7	7.5	7.5
Catch Dry Licorice PSWM	7.5	7.5	7.1	7.4	7.4	7.3	7.2	7.5	7.3
Catch Eucalyptus PSWL	8.7	8.5	8.5	8.5	8.4	8.5	8.5	8.7	
Catch Licorice PSOM	8.4	8.1	8.1	8.5	8.6	8.6	8.6	8.7	8.6
Catch Licorice PSWL	8.5	8.5	8.4	8.4	8.3	8.6	8.4	8.6	8.5
Catch Pure Mint PSW Medium	8.3								
Ettan Lös	8.8	8.3	8.4	8.5	8.4	8.3	8.2	8.5	8.5
Ettan PSOL	8.8	8.5	8.7	8.5	8.5	8.7	8.6	8.7	8.6
Ettan PSWL	8.8	8.4	8.6	8.4	8.4				
General Extra Sterk PSOL	8.5	8.3	8.6						
General Extra Sterk Lös	8.6	8.6	8.5						
General Long PSOL	8.6								
General Long Sterk PSOL	8.9								
General Lös	8.8	8.3	8.3	8.3	8.2	8.3	8.1	8.5	8.5
General Onyx PSWL	8.9	8.6	8.5	8.3	8.1	8.3			
General PSOL	8.7	8.0	8.3	8.5	8.4	8.5	8.5	8.5	8.4
General PSOM	8.5	8.0	8.1	8.4	8.3	8.6	8.5	8.7	8.3
General PSWL	8.8	8.3	8.6	8.5	8.5	8.7	8.6	8.7	8.7
General PSWM	8.6	8.4	8.5	8.5	8.5	8.7			
General Silver PSOL	7.6	7.7	7.8	7.5	7.6	7.8	7.8	7.9	7.8
General Smooth PSW Medium	8.2								
General Sterk PSWL	8.8	8.6	8.7	8.5					
Göteborgs Prima Fint Lös	8.6	8.0	8.1	8.5	8.2	8.1	8.2	8.5	8.4
Göteborgs Rapé Lös	8.7	8.3	8.3	8.4	8.3	8.3	8.3	8.5	8.4
Göteborgs Rapé PSWL	8.7	8.3	8.5	8.7	8.4	8.7	8.5	8.6	8.6
Göteborgs Rapé PSWM	8.5	8.4	8.4	8.3	8.5	8.7			
Göteborgs Rape No2 PSWL	8.6	8.5	8.4	8.4	8.4				
Grov Lös	8.8	8.3	8.4	8.3	8.2	8.4	8.3	8.5	8.5
Grov PSOL	8.4	8.0	8.2	8.4	8.5	8.5	8.6	8.6	8.4
Grov PSWL	8.7	8.5	8.5	8.6	8.6	8.7	8.6	8.7	8.5
Grovsnus Svart PSWL	8.7	8.6	8.7						
Kronan Lös	8.8	8.3	8.4	8.4	8.4				
Kronan PSOL	8.5	8.2	8.5	8.3	8.4	8.7			
Kronan PSWL	8.7	8.3	8.5	8.5					
Nick (and Johnny) PSOL	8.2	8.0	8.2	8.2	8.2				
Nick&Johnny Strong White PSWL	8.6								

BRAND	pH								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
<i>SNUS Cont'd</i>									
Nick&Johnny Strong White PSWL	8.7								
Probe Lös	8.1	7.9	8.2	8.1	8.0	7.8	7.8	7.9	7.9
Probe PSOL	7.7	8.7	7.8	7.9	7.7	7.9	7.9	7.9	7.9
Röda Lacket Lös	8.6	8.2	8.2	8.4	8.4	8.5	8.4	8.6	8.6
Röda Lacket PSWL	8.7	8.4	8.5	8.3	8.4	8.6			
Tre Ankare PSWL	8.7	8.5	8.5	8.5	8.6	8.6	8.5	8.8	8.6
Tre Ankare PSWM	8.5	8.4	8.5	8.4	8.5	8.6	8.5	8.8	8.6
<i>MOIST SNUFF</i>									
Longhorn FC Natural	7.9	8.0	7.9	8.0	8.0	8.0	7.9	7.6	
Longhorn FC Wintergreen	7.9	7.8							
Longhorn LC Mint	8.0	7.7				7.6	7.9		
Longhorn LC Natural	7.8	8.2							
Longhorn LC Straight	8.2	7.8			7.8			7.7	
Longhorn LC Wintergreen	7.9	7.9	7.8		7.9	7.8	7.9	7.7	
Longhorn Pouches Straight	8.0	8.0							
Longhorn Pouches Wintergreen	7.8	7.9							
Red Man FC Natural	7.8	8.0		7.9					
Red Man LC Straight	7.6	8.2		8.1					
Red Man LC Wintergreen	7.7	8.1		8.1					
Renegades Wintergreen	7.9	7.9			7.9	7.7	7.1	7.4	7.0
Timber Wolf FC Natural	8.0	8.0		8.0	8.0	8.0	7.8	7.8	7.7
Timber Wolf FC Wintergreen	7.9	8.0							
Timber Wolf LC Apple	7.8	7.4			7.5		7.3		
Timber Wolf LC Cool Wintergreen	7.8	8.1							
Timber Wolf LC Mint	7.8	7.9							
Timber Wolf LC Peach	7.8	7.8		7.6		7.3	7.3		
Timber Wolf LC Straight	7.9	7.9						7.8	7.7
Timber Wolf LC Wintergreen	7.8	8.0	7.8	8.0	8.0	7.9	7.8	7.8	7.6
Timber Wolf Packs Mint	7.7	7.9							
Timber Wolf Packs Natural	7.7	7.8		7.7	7.8				
Timber Wolf Packs Peach	8.0	7.5							
Timber Wolf Packs Wintergreen	7.8	7.9	7.8	8.0	7.9	7.8			
<i>LOOSE LEAF</i>									
Granger Select	5.7								
J.D.'s Blend	6.1								
Red Man Golden Blend	5.6								
Red Man Original	5.7								
Red Man Select	5.9								

BRAND <i>LOOSE LEAF Cont'd</i>	pH								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	6.6								
Southern Pride	5.8								
PLUG									
Apple Thick Plug	5.4								
Brown Mule Plug	5.1								
Cup Plug	5.5								
Days Work Plug	5.5								
Red Man Plug	5.7								
Tinsley Plug	5.9								

POLYCYCLIC AROMATIC HYDROCARBONS: Benzo(a)pyrene Sum of Carcinogenic PAHs and Other PAHs

Background:

- PAH (polycyclic aromatic hydrocarbons) are usually formed by incomplete combustion of organic material.
- PAHs can be divided into two groups depending on their toxicity, carcinogenic PAHs and other PAHs.

Carcinogenic PAHs: Benzo(a)Antreacene, Benzo(a)Pyrene, Benzo(b,k)Fluorantene, Dibenzo(a,h)Antracene, Indeno(1,2,3cd)Pyrene, Chrysene

Other PAHs: Acenaphthene, Acenaphtylen, Antracene, Benzo(g,h,i)Perylene, Phenantrene, Fluoranthrene, Fluorene, Naphthalene, Pyrene.

- Four indicators for PAHs in food (oils and fats. smoked meat. smoked fish and smoked seafood) are suggested by EU; Benzo(a)Antreacene, Benzo(a)Pyrene, Benzo(b)Fluorantene and Chrysene. New maximum levels for the sum of the four substances are suggested whilst maintaining a separate maximum level for Benzo(a)Pyrene.

(SANCO /10616/2009 REV. 5 (21.2.2011))

- Since 2009, Benzo(a)pyrene is classified as carcinogenic to humans (Group 1)
- Concentrations above 200 ng/g have been detected in fire-cured tobacco.
- Authorities in several countries request information about the concentration of benzo(a)pyrene in smokeless tobacco products.
- Some reported values of benzo(a)pyrene in the literature:
Dry and moist snuff (US): < 0.1-90.5 ppb.(Hoffmann. 1987)
Indian snuff: 8-70 ppb. (Bhide et al.. 1984)
- The **GOTHIA TEK**[®] limit (2001) for BaP: 20 ppb (dry weight).
- Internal tolerance limit for BaP, SMNE: 6 ppb

Information of analyses:

Laboratory:	B(a)P: R&D Chemical Analysis Stockholm PAH: Eurofins, Lidköping.
Method:	B(a)P: HPLC-F.D. KLS," Kvantitativ analys av B(a)P" PAH: GC-MS
Quantification limits:	1 ppb (B(a)P) 30 ppb (individual PAHs) 72 ppb (sum of carc. PAHs), 108 ppb (sum of other PAHs)

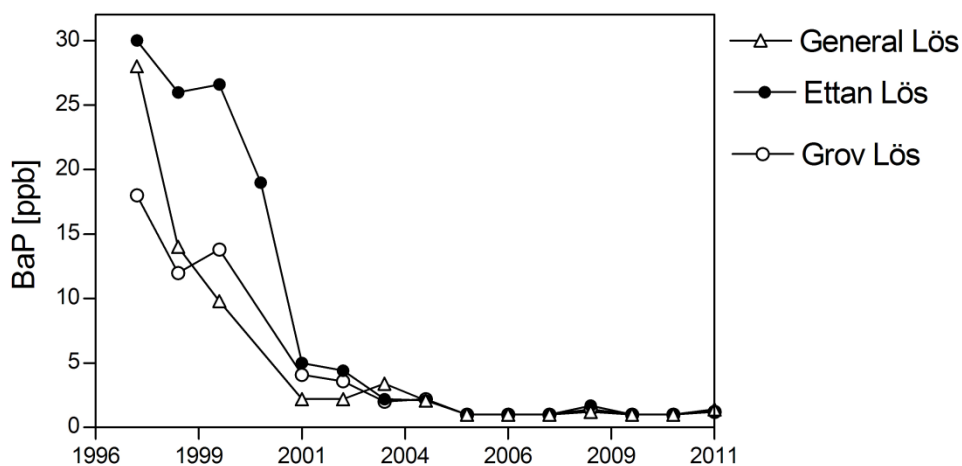


Figure 8. The level of B(a)P in General Lös, Ettan Lös and Grov Lös 1997-2011.

BRAND SNUS	BaP [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	<1	<1							
02 Strong PSOL	1.0	1.1							
Catch Collection PSWM. Chill	<1	1.1	<1						
Catch Dry Eucalyptus PSWM	1.1	1.0	1.3	1.4	<1	<1	1.4	4.4	2.4
Catch Dry Licorice PSWM	1.3	1.3	1.3	1.3	<1	<1	1.3	1.4	2.3
Catch Eucalyptus PSWL	<1	1.1	<1	1.3	<1	<1	1.8	2.0	
Catch Licorice PSOM	<1	<1	<1	1.5	<1	<1	<1	1.8	1.8
Catch Licorice PSWL	1.1	1.4	<1	1.6	<1	<1	<1	<1	2.8
Catch Pure Mint PSW Medium	<1								
Ettan Lös	1.2	<1	<1	1.7	<1	<1	<1	2.1	2.2
Ettan PSOL	3.0	1.1	<1	1.4	<1	<1	1.9	2.2	2.2
Ettan PSWL	<1	1.3	<1	1.7	<1				
General Extra Sterk PSOL	1.2	1.1	1.7						
General Extra Sterk Lös	1.4	<1	<1						
General Long PSOL	<1								
General Long Sterk PSOL	1.2								
General Lös	1.4	<1	<1	1.2	<1	<1	<1	2.1	3.4
General Onyx PSWL	<1	<1	<1	<1	<1	<1			
General PSOL	<1	1.1	<1	1.4	<1	<1	1.9	2.2	3.3
General PSOM	<1	1.1	<1	2.2	<1	<1	1.8	2.1	1.8
General PSWL	<1	1.1	<1	1.6	<1	<1	2.0	<1	2.9
General PSWM	<1	1.3	<1	1.4	<1	<1			
General Silver PSOL	<1	3	<1	1.0	<1	<1	1.9	<1	2.1
General Smooth PSW Medium	<1								
General Sterk PSWL	<1	<1	1.9	1.8					
Göteborgs Prima Fint Lös	1.1	1.5	1.9	2.2	<1	<1	<1	2.1	<1
Göteborgs Rapé Lös	<1	1.1	2.0	1.6	<1	<1	2.1	2.3	<1
Göteborgs Rapé PSWL	<1	<1	<1	1.7	<1	<1	2.0	2.0	1.9
Göteborgs Rapé PSWM	<1	1.3	<1	1.4	<1	<1			
Göteborgs Rape No2 PSWL	<1	<1	<1	1.6	<1				
Grov Lös	1.2	<1	<1	1.4	<1	<1	<1	2.2	2.0
Grov PSOL	<1	<1	<1	1.7	<1	<1	<1	1.8	2.1
Grov PSWL	<1	<1	<1	1.8	<1	<1	<1	<1	2.5
Grovsnus Svart PSWL	<1	<1	<1						
Kronan Lös	1.1	1.3	2	1.6	<1				
Kronan PSOL	1.0	1.1	<1	1.3	<1	<1			
Kronan PSWL	<1	1.0	<1	1.6					
Nick (and Johnny) PSOL	<1	<1	<1	1.1	<1				

BRAND	BaP [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
SNUS Cont'd									
Nick&Johnny Strong White PSWL	<1								
Probe Lös	1.7	1.1	1.9	2.0	<1	<1	<1	2.9	2.5
Probe PSOL	1.3	<1	1.8	1.8	<1	<1	1.9	3.5	2.3
Röda Lacket Lös	1.4	<1	<1	1.6	<1	<1	<1	2.0	2.0
Röda Lacket PSWL	<1	<1	<1	<1	<1	<1			
Tre Ankare PSWL	<1	<1	<1	<1	<1	<1	<1	<1	3.9
Tre Ankare PSWM	<1	1.3	<1	1.3	<1	<1	1.8	<1	1.9
MOIST SNUFF									
Longhorn FC Natural	64	34	48	51	54	49	38	31	
Longhorn FC Wintergreen	49	51							
Longhorn LC Mint	64	37				47	62		
Longhorn LC Natural	51	47							
Longhorn LC Straight	43	52			49			55	
Longhorn LC Wintergreen	52	32	42		46	63	47	31	
Longhorn Pouches Straight	52	59							
Longhorn Pouches Wintergreen	52	41							
Red Man FC Natural	75	29		55					
Red Man LC Straight	57	26		46					
Red Man LC Wintergreen	53	48		53					
Renegades Wintergreen	63	29			59	80	160	86	56
Timber Wolf FC Natural	58	41		73	90	77	66	68	74
Timber Wolf FC Wintergreen	45	45							
Timber Wolf LC Apple	63	26			56		72		
Timber Wolf LC Cool Wintergreen	57	33							
Timber Wolf LC Mint	68	38							
Timber Wolf LC Peach	62	28		49		61	110		
Timber Wolf LC Straight	46	51						56	71
Timber Wolf LC Wintergreen	48	53	58	63	88	78	67	67	55
Timber Wolf Packs Mint	44	37							
Timber Wolf Packs Natural	59	39		57	51				
Timber Wolf Packs Peach	47	28							
Timber Wolf Packs Wintergreen	55	56	55	52	48	70			
LOOSE LEAF									
Granger Select	7.8								
J.D.'s Blend	7.0								
Red Man Golden Blend	4.3								
Red Man Original	6.0								
Red Man Select	11								

BRAND <i>LOOSE LEAF Cont'd</i>	BaP [ppb]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	21								
Southern Pride	8.1								
PLUG									
Apple Thick Plug	3.6								
Brown Mule Plug	3.4								
Cup Plug	16								
Days Work Plug	1.9								
Red Man Plug	4.5								
Tinsley Plug	1.1								

BRAND SNUS	Sum carcinogenic PAHs and other PAHs [ppb]									
	2011		2010		2002		2001		2000	
	Carc.	Other	Carc	Other	Carc	Other	Carc	Other	Carc	Other
01 Original PSOL	<72	160	<300	<300						
02 Strong PSOL	<72	350	<300	370						
Catch Collection PSWM. Chill	<72	88	<300	<300						
Catch Dry Eucalyptus PSWM	<72	310	56	470	<140	330	<140	350		
Catch Dry Licorice PSWM	<72	260	<300	320						
Catch Eucalyptus PSWL	<72	200	<300	490						
Catch Licorice PSOM	<72	72	<300	<300						
Catch Licorice PSWL	<72	170	<300	<300						
Catch Pure Mint PSW Medium	<72	48								
Ettan Lös	<72	120	<300	870	<140	640	<140	740	150	1700
Ettan PSOL	<72	130	<300	420	<140	690	160	2100	170	2900
Ettan PSWL	<72	82	<300	<300						
General Extra Sterk PSOL	<72	440	<300	610						
General Extra Sterk Lös	<72	510	<300	340						
General Long PSOL	<72	150								
General Long Sterk PSOL	<72	230								
General Lös	<72	73	<300	85	<140	170	<140	500	230	1500
General Onyx PSWL	<72	70	<300	330						
General PSOL	<72	170	<300	430						
General PSOM	<72	120	<300	170						
General PSWL	<72	140	<300	<300						
General PSWM	<72	150	<300	<300						
General Silver PSOL	<72	57	<300	220	<140	83	<140	750	320	4200
General Smooth PSW Medium	<72	49								
General Sterk PSWL	<72	110	<300	<300						
Göteborgs Prima Fint Lös	<72	140	<300	<300	<140	220	<140	530	140	1400
Göteborgs Rapé Lös	<72	68	<300	<300						
Göteborgs Rapé PSWL	<72	130	<300	<300						
Göteborgs Rapé PSWM	<72	85	<300	230						
Göteborgs Rape No2 PSWL	<72	88	<300	<300						
Grov Lös	<72	80	<300	390	<140	220	<140	790	120	1400
Grov PSOL	<72	130	<300	<300						
Grov PSWL	<72	110	<300	<300						
Grovsnus Svart PSWL	<72	66	<300	<300						
Kronan Lös	<72	<108	<300	<300						
Kronan PSOL	<72	120	<300	300						
Kronan PSWL	<72	140	<300	350						
Nick (and Johnny) PSOL	<72	180	130	570						

BRAND <i>SNUS Cont'd</i>	Sum carcinogenic PAHs and other PAHs [ppb]									
	2011		2010		2002		2001		2000	
	Carc.	Other	Carc.	Other	Carc.	Other	Carc.	Other	Carc.	Other
Nick&Johnny Strong White PSWL	<72	96								
Probe Lös	<72	220	<300	600	<140	410				
Probe PSOL	<72	200	<300	470	<140	300	<140	390	42	520
Röda Lacket Lös	<72	150	<300	540	<140	540	<140	830	200	1500
Röda Lacket PSWL	<72	110	<300	<300						
Tre Ankare PSWL	<72	100	<300	<300	<140	170	<140	590	140	1600
Tre Ankare PSWM	<72	140	<300	300						
MOIST SNUFF										
Longhorn FC Natural	340	7400	550	8300						
Longhorn FC Wintergreen	320	7200	770	8500						
Longhorn LC Mint	360	6900	660	10000						
Longhorn LC Natural	340	6800	790	9800						
Longhorn LC Straight	340	7900	690	8400						
Longhorn LC Wintergreen	340	8200	650	9200						
Longhorn Pouches Straight	380	6800	710	7900						
Longhorn Pouches Wintergreen	370	7300	670	8100						
Red Man FC Natural	430	8200	620	9200						
Red Man LC Straight	450	9700	630	7100						
Red Man LC Wintergreen	360	7600	690	9600						
Renegades Wintergreen	370	7200	630	7900	830	15000	1100	14000	680	16000
Timber Wolf FC Natural	330	7400	580	7300	790	14000	1300	15000	880	19000
Timber Wolf FC Wintergreen	320	7500	650	9200						
Timber Wolf LC Apple	410	9100	630	8600						
Timber Wolf LC Cool Wintergreen	340	7900	650	8200						
Timber Wolf LC Mint	380	7500	330	6000						
Timber Wolf LC Peach	420	7600	610	9000						
Timber Wolf LC Straight	340	8600	740	8900						
Timber Wolf LC Wintergreen	330	8800	810	10000	560	12000	1100	15000	820	16000
Timber Wolf Packs Mint	360	5600	700	9300						
Timber Wolf Packs Natural	380	6900	680	7800						
Timber Wolf Packs Peach	380	7000	630	6900						
Timber Wolf Packs Wintergreen	430	7600	690	19000						
LOOSE LEAF										
Granger Select	120	2000								
J.D.'s Blend	150	2400								
Red Man Golden Blend	1.5	1300								
Red Man Original	2.4	1300								
Red Man Select	150	2600								

BRAND <i>LOOSE LEAF Cont'd</i>	Sum carcinogenic PAHs and other PAHs [ppb]									
	2011		2010		2002		2001		2000	
	Carc.	Other	Carc.	Other	Carc.	Other	Carc.	Other	Carc.	Other
Red Man Silver Blend	230	5900								
Southern Pride	180	2900								
PLUG										
Apple Thick Plug	2.4	400								
Brown Mule Plug	4.0	470								
Cup Plug	300	5100								
Days Work Plug	1.4	310								
Red Man Plug	2.5	1200								
Tinsley Plug	<72	300								

BRAND SNUS	Four suitable indicators of PAH in food suggested by EU [ppb]							
	2011				2010			
	B(a)A	B(a)P	B(b)F	Chrysene	B(a)A	B(a)P	B(b)F	Chrysene
01 Original PSOL	<30	<1	<30	<30	<30	<1	<30	<30
02 Strong PSOL	<30	1.0	<30	<30	<30	1.1	<30	<30
Catch Collection PSWM. Chill	<30	<1	<30	<30	<30	1.1	<30	<30
Catch Dry Eucalyptus PSWM	<30	1.1	<30	<30	<30	1.0	<30	<30
Catch Dry Licorice PSWM	<30	1.3	<30	<30	<30	1.3	<30	<30
Catch Eucalyptus PSWL	<30	<1	<30	<30	<30	1.1	<30	<30
Catch Licorice PSOM	<30	<1	<30	<30	<30	<1	<30	<30
Catch Licorice PSWL	<30	1.1	<30	<30	<30	1.4	<30	<30
Catch Pure Mint PSW Medium	<30	<1	<30	<30				
Ettan Lös	<30	1.2	<30	<30	<30	<1	<30	<30
Ettan PSOL	<30	3.0	<30	<30	<30	1.1	<30	<30
Ettan PSWL	<30	<1	<30	<30	<30	1.3	<30	<30
General Extra Sterk PSOL	<30	1.2	<30	<30	<30	1.1	<30	<30
General Extra Sterk Lös	<30	1.4	<30	<30	<30	<1	<30	<30
General Long PSOL	<30	<1	<30	<30				
General Long Sterk PSOL	<30	1.2	<30	<30				
General Lös	<30	1.4	<30	<30	<30	<1	<30	<30
General Onyx PSWL	<30	<1	<30	<30	<30	<1	<30	<30
General PSOL	<30	<1	<30	<30	<30	1.1	<30	<30
General PSOM	<30	<1	<30	<30	<30	1.1	<30	<30
General PSWL	<30	<1	<30	<30	<30	1.1	<30	<30
General PSWM	<30	<1	<30	<30	<30	1.3	<30	<30
General Silver PSOL	<30	<1	<30	<30	<30	3	<30	<30
General Smooth PSW Medium	<30	<1	<30	<30				
General Sterk PSWL	<30	<1	<30	<30	<30	<1	<30	<30
Göteborgs Prima Fint Lös	<30	1.1	<30	<30	<30	1.5	<30	<30
Göteborgs Rapé Lös	<30	<1	<30	<30	<30	1.1	<30	<30
Göteborgs Rapé PSWL	<30	<1	<30	<30	<30	<1	<30	<30
Göteborgs Rapé PSWM	<30	<1	<30	<30	<30	1.3	<30	<30
Göteborgs Rape No2 PSWL	<30	<1	<30	<30	<30	<1	<30	<30
Grov Lös	<30	1.2	<30	<30	<30	<1	<30	<30
Grov PSOL	<30	<1	<30	<30	<30	<1	<30	<30
Grov PSWL	<30	<1	<30	<30	<30	<1	<30	<30
Grovsnus Svart PSWL	<30	<1	<30	<30	<30	<1	<30	<30
Kronan Lös	<30	1.1	<30	<30	<30	1.3	<30	<30
Kronan PSOL	<30	1.0	<30	<30	<30	1.1	<30	<30
Kronan PSWL	<30	<1	<30	<30	<30	1.0	<30	<30
Nick (and Johnny) PSOL	<30	<1	<30	<30	66.9	<1	<30	62.2

BRAND	Four suitable indicators of PAH in food suggested by EU [ppb]							
	2011				2010			
	B(a)A	B(a)P	B(b)F	Chrysene	B(a)A	B(a)P	B(b)F	Chrysene
<i>SNUS Cont'd</i>								
Nick&Johnny Strong White PSWL	<30	<1	<30	<30				
Probe Lös	<30	1.7	<30	<30	<30	1.1	<30	<30
Probe PSOL	<30	1.3	<30	<30	<30	<1	<30	<30
Röda Lacket Lös	<30	1.4	<30	<30	<30	<1	<30	<30
Röda Lacket PSWL	<30	<1	<30	<30	<30	<1	<30	<30
Tre Ankare PSWL	<30	<1	<30	<30	<30	<1	<30	<30
Tre Ankare PSWM	<30	<1	<30	<30	<30	1.3	<30	<30
<i>MOIST SNUFF</i>								
Longhorn FC Natural	152	64	<30	154	178	34	81.8	259
Longhorn FC Wintergreen	145	49	<30	141	307	51	121	307
Longhorn LC Mint	164	64	<30	156	218	37	102	286
Longhorn LC Natural	159	51	<30	145	263	47	119	364
Longhorn LC Straight	154	43	<30	150	265	52	95.9	286
Longhorn LC Wintergreen	153	52	<30	151	217	32	98.8	296
Longhorn Pouches Straight	150	52	<30	195	270	59	121	289
Longhorn Pouches Wintergreen	168	52	<30	170	208	41	112	294
Red Man FC Natural	200	75	<30	183	202	29	88.7	282
Red Man LC Straight	219	57	<30	199	222	26	94.8	282
Red Man LC Wintergreen	171	53	<30	142	244	48	106	305
Renegades Wintergreen	162	63	<30	172	225	29	93.8	263
Timber Wolf FC Natural	150	58	<30	140	221	41	86.5	241
Timber Wolf FC Wintergreen	152	45	<30	136	246	45	98.4	266
Timber Wolf LC Apple	175	63	<30	196	194	26	132	271
Timber Wolf LC Cool Wintergreen	149	57	<30	151	213	33	101	284
Timber Wolf LC Mint	162	68	<30	178	125	38	<30	154
Timber Wolf LC Peach	165	62	<30	216	198	28	97.0	277
Timber Wolf LC Straight	147	46	<30	155	284	51	120	284
Timber Wolf LC Wintergreen	151	48	<30	143	329	53	117	329
Timber Wolf Packs Mint	155	44	<30	171	241	37	105	302
Timber Wolf Packs Natural	169	59	<30	167	251	39	109	271
Timber Wolf Packs Peach	160	47	<30	188	211	28	105	268
Timber Wolf Packs Wintergreen	169	55	<30	222	226	56	117	292
<i>LOOSE LEAF</i>								
Granger Select	55.7	7.8	<30	58.3				
J.D.'s Blend	69.4	7.0	<30	78.8				
Red Man Golden Blend	<30	4.3	<30	<30				
Red Man Original	<30	6.0	<30	<30				
Red Man Select	64.4	11	<30	76.7				

BRAND <i>LOOSE LEAF Cont'd</i>	Four suitable indicators of PAH in food suggested by EU [ppb]							
	2011				2010			
	B(a)A	B(a)P	B(b)F	Chrysene	B(a)A	B(a)P	B(b)F	Chrysene
Red Man Silver Blend	104	21	<30	120				
Southern Pride	83.6	8.1	<30	94.3				
PLUG								
Apple Thick Plug	<30	3.6	<30	<30				
Brown Mule Plug	<30	3.4	<30	<30				
Cup Plug	131	16	<30	160				
Days Work Plug	<30	1.9	<30	<30				
Red Man Plug	<30	4.5	<30	<30				
Tinsley Plug	<30	1.1	<30	<30				

RADIONUCLIDES: Polonium 210. Uranium 235 and Uranium 238

Background:

- ❑ Polonium 210, Uranium 235 and Uranium 238 are α -emitter and may hence pose a health hazard.
- ❑ The major source of Po-210, U-235 and U-238 are certain types of fertilizers.
- ❑ The levels in snus can be compared to 2 or 3 dental x-ray single image shootings per year or one week of ambient radiation per year. (C. Samuelsson, Läkartidningen, Vol. 86 Nr 24 1989.)
- ❑ Reported value in the literature:

US: Moist snuff:

Po-210: 0.16 – 1.22 pCi/g eller 6 - 45 Bq/kg wet weight (Hoffmann et al. 1987)

U-235: 2.4 pCi/g or 88 Bq/kg wet weight (Sharma et al. 1985)

U-238: 1.91 pCi/g or 71 Bq/kg wet weight (Sharma et al. 1985)

Information of analyses:

2011: LABSTAT International ULC, Canada

2001: Radiofysik Jubileumsinstitutionen.

Universitetssjukhuset, Lund, Sweden.

1998, 1987: Kemikonsult Aktivitetsmatningar,
Varberg, Sweden

BRAND SNUS	²¹⁰ Po [Bq/kg] <i>as is</i>			
	2011	2001	1998	1987
Catch Dry Eucalyptus PSWM	4.0	5.1		
Ettan Lös	4.5	4.4	3.9	18-21
General Long PSOL	8.5			
General PSOL	5.0			
Göteborgs Rapé PSWL	6.0			
Grov Lös	<4	2.9	2.5	11-50
Grovsnus Svart PSWL	7.5			
Kronan PSOL	4.0			

BRAND SNUS	²³⁵ U [Bq/kg] <i>as is</i>								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Catch Dry Eucalyptus PSWM	<1								
Ettan Lös	<1								
General Long PSOL	<1								
General PSOL	<1								
Göteborgs Rapé PSWL	<1								
Grov Lös	<1								
Grovsnus Svart PSWL	<1								
Kronan PSOL	<1								

BRAND SNUS	²³⁸ U [Bq/kg] <i>as is</i>								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Catch Dry Eucalyptus PSWM	<1								
Ettan Lös	1.5								
General Long PSOL	<1								
General PSOL	<1								
Göteborgs Rapé PSWL	<1								
Grov Lös	<1								
Grovsnus Svart PSWL	<1								
Kronan PSOL	<1								

SUGARS: Glucose, Fructose and Sucrose + Maltose

Background:

- ❑ Sugars are not added to snus from SMNE. The sugars present are compounds naturally occurring in the tobacco plant.
- ❑ The content of monosaccharides, such as glucose and fructose, are reduced in tobacco during curing, heat treatment and fermentation.

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm.

Method: 2001-2004: Enzymatic kit (Boehringer)
2005- Present: HPLC-RI KLS. "Kvantitativ HPLC/RID-analys av socker och mjukgörare"

Quantification limits: 2001-2002: 0.1 %
2005-Present : 0.1 %

BRAND SNUS	Glucose [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	0.24	0.36							
02 Strong PSOL	<0.1	<0.1							
Catch Collection PSWM. Chill	0.26	0.30	0.35						
Catch Dry Eucalyptus PSWM	0.27	0.20	0.22	0.17	0.20	0.29	0.36		
Catch Dry Licorice PSWM	0.33	0.24	0.25	0.25	0.25	0.31	0.38		
Catch Eucalyptus PSWL	0.27	0.36	0.33	0.38	0.26	0.23	0.28		
Catch Licorice PSOM	0.20	0.34	0.39	0.19	<0.1	<0.1	0.21		
Catch Licorice PSWL	0.29	0.32	0.32	0.42	0.34	0.24	0.35		
Catch Pure Mint PSW Medium	0.51								
Ettan Lös	0.52	0.65	0.50	0.46	0.53	0.26	0.29		
Ettan PSOL	<0.1	0.23	0.28	<0.1	<0.1	<0.1	0.12		
Ettan PSWL	0.25	0.35	0.34	0.38	0.32				
General Extra Sterk PSOL	<0.1	<0.1	0.19						
General Extra Sterk Lös	0.27	0.33	0.25						
General Long PSOL	0.27								
General Long Sterk PSOL	<0.1								
General Lös	0.52	0.61	0.57	0.47	0.43	0.33	0.33		
General Onyx PSWL	0.21	0.22	0.34	0.25	0.22	0.22			
General PSOL	0.23	0.41	0.40	0.26	<0.1	<0.1	<0.1		
General PSOM	<0.1	0.35	0.43	0.31	<0.1	<0.1	0.20		
General PSWL	0.25	0.33	0.33	0.43	0.31	0.24	0.33		
General PSWM	0.24	0.35	0.32	0.44	0.35	0.22			
General Silver PSOL	0.4	0.33	0.38	0.24	0.19	0.28	0.34		
General Smooth PSW Medium	0.52								
General Sterk PSWL	0.22	0.29	0.32	0.27					
Göteborgs Prima Fint Lös	0.38	0.47	0.50	0.42	0.32	0.29	0.31		
Göteborgs Rapé Lös	0.45	0.63	0.52	0.51	0.46	0.26	0.33		
Göteborgs Rapé PSWL	0.24	0.33	0.29	0.40	0.32	0.23	0.33		
Göteborgs Rapé PSWM	0.26	0.30	0.30	0.44	0.33	0.23			
Göteborgs Rape No2 PSWL	0.27	0.35	0.33	0.43	0.34				
Grov Lös	0.48	0.76	0.63	0.45	0.40	0.26	0.29		
Grov PSOL	0.27	0.34	0.41	0.25	0.23	<0.1	0.24		
Grov PSWL	0.25	0.34	0.31	0.43	0.31	0.23	0.34		
Grovsnus Svart PSWL	0.18	0.23	0.32						
Kronan Lös	0.48	0.55	0.69	0.78	0.71				
Kronan PSOL	0.33	0.40	0.50	0.48	0.49	0.20			
Kronan PSWL	0.25	0.35	0.30	0.61					
Nick (and Johnny) PSOL	0.17	0.17	0.19	0.20	<0.1				

BRAND	Glucose [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
<i>SNUS Cont'd</i>									
Nick&Johnny Strong White PSWL	0.19								
Probe Lös	0.54	0.38	0.45	0.43	0.45	0.53	0.58		
Probe PSOL	0.36	0.29	0.32	0.29	0.29	0.40	0.46		
Röda Lacket Lös	0.41	0.50	0.48	0.37	0.30	<0.1	<0.1		
Röda Lacket PSWL	0.24	0.33	0.33	0.46	0.30	0.24			
Tre Ankare PSWL	0.25	0.33	0.29	0.40	0.33	0.22	0.34		
Tre Ankare PSWM	0.28	0.32	0.31	0.38	0.31	0.23	<0.1		
<i>MOIST SNUFF</i>									
Longhorn FC Natural	<0.1	<0.1	0.39	<0.1	<0.1	<0.1	<0.1		
Longhorn FC Wintergreen	<0.1	<0.1							
Longhorn LC Mint	<0.1	<0.1				<0.1	<0.1		
Longhorn LC Natural	<0.1	<0.1							
Longhorn LC Straight	<0.1	<0.1			<0.1				
Longhorn LC Wintergreen	<0.1	<0.1	0.44		<0.1	<0.1	<0.1		
Longhorn Pouches Straight	<0.1	<0.1							
Longhorn Pouches Wintergreen	0.22	0.23							
Red Man FC Natural	<0.1	<0.1		<0.1					
Red Man LC Straight	<0.1	<0.1		<0.1					
Red Man LC Wintergreen	<0.1	<0.1		<0.1					
Renegades Wintergreen	0.22	0.21			0.20	0.19	0.20		
Timber Wolf FC Natural	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1		
Timber Wolf FC Wintergreen	<0.1	<0.1							
Timber Wolf LC Apple	<0.1	<0.1			<0.1		<0.1		
Timber Wolf LC Cool Wintergreen	<0.1	<0.1							
Timber Wolf LC Mint	<0.1	<0.1							
Timber Wolf LC Peach	<0.1	<0.1		0.25		<0.1	<0.1		
Timber Wolf LC Straight	<0.1	<0.1							
Timber Wolf LC Wintergreen	<0.1	<0.1	0.39	<0.1	<0.1	<0.1	<0.1		
Timber Wolf Packs Mint	0.21	<0.1							
Timber Wolf Packs Natural	0.26	0.25		0.36	<0.1				
Timber Wolf Packs Peach	0.21	0.23							
Timber Wolf Packs Wintergreen	0.24	0.23	0.54	0.35	0.21	<0.1			
<i>LOOSE LEAF</i>									
Granger Select	5.7								
J.D.'s Blend	7.8								
Red Man Golden Blend	7.9								
Red Man Original	8.3								
Red Man Select	12								

BRAND <i>LOOSE LEAF Cont'd</i>	Glucose [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	0.22								
Southern Pride	7.2								
PLUG									
Apple Thick Plug	7.9								
Brown Mule Plug	7.8								
Cup Plug	5.1								
Days Work Plug	10								
Red Man Plug	4.7								
Tinsley Plug	6.2								

BRAND	Fructose [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
SNUS									
01 Original PSOL	0.79	1.0							
02 Strong PSOL	0.55	0.41							
Catch Collection PSWM. Chill	0.63	0.57	0.63						
Catch Dry Eucalyptus PSWM	0.68	0.55	0.48	0.52	0.53	0.73	0.84		
Catch Dry Licorice PSWM	0.67	0.58	0.54	0.63	0.64	0.79	0.91		
Catch Eucalyptus PSWL	0.66	0.70	0.6	0.80	0.57	0.64	0.70		
Catch Licorice PSOM	0.57	0.93	1.0	0.54	0.46	0.47	0.57		
Catch Licorice PSWL	0.66	0.64	0.63	0.87	0.69	0.70	0.78		
Catch Pure Mint PSW Medium	1.3								
Ettan Lös	1.2	1.3	1.0	0.97	0.95	0.78	0.72		
Ettan PSOL	0.44	0.45	0.45	0.41	0.25	0.34	0.37		
Ettan PSWL	0.63	0.72	0.66	0.78	0.65				
General Extra Sterk PSOL	0.47	0.35	0.30						
General Extra Sterk Lös	0.66	0.73	0.44						
General Long PSOL	0.72								
General Long Sterk PSOL	0.47								
General Lös	1.2	1.2	1.1	0.98	0.89	0.85	0.81		
General Onyx PSWL	0.42	0.4	0.49	0.48	0.44	0.56			
General PSOL	0.7	1.1	0.95	0.76	0.46	0.50	0.48		
General PSOM	0.51	0.85	0.91	0.74	0.44	0.48	0.59		
General PSWL	0.61	0.7	0.64	0.89	0.66	0.69	0.76		
General PSWM	0.57	0.69	0.61	0.84	0.69	0.61			
General Silver PSOL	0.68	0.63	0.61	0.52	0.45	0.59	0.59		
General Smooth PSW Medium	1.4								
General Sterk PSWL	0.44	0.59	0.48	0.53					
Göteborgs Prima Fint Lös	0.86	0.94	0.99	0.87	0.62	0.87	0.80		
Göteborgs Rapé Lös	1.0	1.3	1.0	1.0	0.94	0.81	0.84		
Göteborgs Rapé PSWL	0.6	0.67	0.54	0.82	0.70	0.66	0.78		
Göteborgs Rapé PSWM	0.63	0.61	0.57	0.81	0.69	0.66			
Göteborgs Rape´No2 PSWL	0.64	0.73	0.63	0.86	0.70				
Grov Lös	1.1	1.5	1.2	0.94	0.83	0.77	0.76		
Grov PSOL	0.75	0.92	0.91	0.72	0.58	0.52	0.72		
Grov PSWL	0.63	0.69	0.61	0.88	0.65	0.66	0.81		
Grovsnus Svart PSWL	0.34	0.40	0.42						
Kronan Lös	1.2	1.2	1.3	1.5	1.3				
Kronan PSOL	0.93	1.2	1.1	1.1	1.1	0.79			
Kronan PSWL	0.60	0.72	0.58	1.2					
Nick (and Johnny) PSOL	0.45	0.44	0.34	0.39	0.31				

BRAND	Fructose [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
SNUS Cont'd									
Nick&Johnny Strong White PSWL	0.40								
Probe Lös	0.74	0.56	0.65	0.58	0.62	0.83	0.86		
Probe PSOL	0.60	0.48	0.46	0.48	0.45	0.67	0.79		
Röda Lacket Lös	0.98	1.0	0.96	0.76	0.59	0.58	0.53		
Röda Lacket PSWL	0.58	0.65	0.59	0.87	0.60	0.67			
Tre Ankare PSWL	0.64	0.68	0.60	0.87	0.69	0.64	0.84		
Tre Ankare PSWM	0.65	0.62	0.61	0.76	0.63	0.67	0.52		
MOIST SNUFF									
Longhorn FC Natural	<0.1	<0.1	0.32	<0.1	<0.1	<0.1	<0.1		
Longhorn FC Wintergreen	<0.1	<0.1							
Longhorn LC Mint	<0.1	<0.1				<0.1	<0.1		
Longhorn LC Natural	<0.1	<0.1							
Longhorn LC Straight	<0.1	<0.1			<0.1				
Longhorn LC Wintergreen	<0.1	<0.1	0.34		<0.1	<0.1	<0.1		
Longhorn Pouches Straight	<0.1	<0.1							
Longhorn Pouches Wintergreen	<0.1	<0.1							
Red Man FC Natural	<0.1	<0.1		<0.1					
Red Man LC Straight	<0.1	<0.1		<0.1					
Red Man LC Wintergreen	<0.1	<0.1		<0.1					
Renegades Wintergreen	<0.1	<0.1			<0.1	<0.1	<0.1		
Timber Wolf FC Natural	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1		
Timber Wolf FC Wintergreen	<0.1	<0.1							
Timber Wolf LC Apple	<0.1	<0.1			<0.1		<0.1		
Timber Wolf LC Cool Wintergreen	<0.1	<0.1							
Timber Wolf LC Mint	<0.1	<0.1							
Timber Wolf LC Peach	<0.1	<0.1		<0.1		<0.1	<0.1		
Timber Wolf LC Straight	<0.1	<0.1							
Timber Wolf LC Wintergreen	<0.1	<0.1	0.37	<0.1	<0.1	<0.1	<0.1		
Timber Wolf Packs Mint	<0.1	<0.1							
Timber Wolf Packs Natural	<0.1	<0.1		<0.1	<0.1				
Timber Wolf Packs Peach	<0.1	<0.1							
Timber Wolf Packs Wintergreen	<0.1	<0.1	0.43	0.23	<0.1	<0.1			
LOOSE LEAF									
Granger Select	2.1								
J.D.'s Blend	4.4								
Red Man Golden Blend	4.0								
Red Man Original	7.9								
Red Man Select	7.0								

BRAND <i>LOOSE LEAF Cont'd</i>	Fructose [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	<0.1								
Southern Pride	3.9								
<i>PLUG</i>									
Apple Thick Plug	7.5								
Brown Mule Plug	8.8								
Cup Plug	4.6								
Days Work Plug	9.3								
Red Man Plug	0.86								
Tinsley Plug	3.7								

BRAND SNUS	Sucrose +Maltose [%]							Sucrose [%]	
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	<0.1	<0.1							
02 Strong PSOL	<0.1	<0.1							
Catch Collection PSWM. Chill	<0.1	<0.1	<0.1						
Catch Dry Eucalyptus PSWM	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.13		
Catch Dry Licorice PSWM	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Catch Eucalyptus PSWL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Catch Licorice PSOM	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Catch Licorice PSWL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Catch Pure Mint PSW Medium	<0.1								
Ettan Lös	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Ettan PSOL	<0.1	<0.1	<0.1	0.2	0.19	<0.1	<0.1		
Ettan PSWL	<0.1	<0.1	<0.1	<0.1	<0.1				
General Extra Sterk PSOL	<0.1	<0.1	<0.1						
General Extra Sterk Lös	<0.1	<0.1	<0.1						
General Long PSOL	<0.1								
General Long Sterk PSOL	<0.1								
General Lös	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
General Onyx PSWL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
General PSOL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
General PSOM	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
General PSWL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
General PSWM	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
General Silver PSOL	0.28	0.26	0.27	0.27	0.27	0.20	0.34		
General Smooth PSW Medium	<0.1								
General Sterk PSWL	<0.1	<0.1	<0.1	<0.1					
Göteborgs Prima Fint Lös	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Göteborgs Rapé Lös	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Göteborgs Rapé PSWL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Göteborgs Rapé PSWM	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Göteborgs Rape No2 PSWL	<0.1	<0.1	<0.1	<0.1	<0.1				
Grov Lös	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Grov PSOL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Grov PSWL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Grovsnus Svart PSWL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Kronan Lös	<0.1	<0.1	<0.1						
Kronan PSOL	<0.1	<0.1	<0.1	<0.1	0.26				
Kronan PSWL	<0.1	<0.1	<0.1	<0.1	0.28	<0.1			
Nick (and Johnny) PSOL	<0.1	<0.1	<0.1	<0.1					

BRAND	Sucrose +Maltose [%]							Sucrose [%]	
		2010	2009	2008	2007	2006	2005	2004	2003
SNUS Cont'd									
Nick&Johnny Strong White PSWL	<0.1								
Probe Lös	<0.1	<0.1	<0.1	<0.1					
Probe PSOL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Röda Lacket Lös	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.24		
Röda Lacket PSWL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Tre Ankare PSWL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Tre Ankare PSWM	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
MOIST SNUFF									
Longhorn FC Natural	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Longhorn FC Wintergreen	<0.1	<0.1							
Longhorn LC Mint	<0.1	<0.1				<0.1	<0.1		
Longhorn LC Natural	<0.1	<0.1							
Longhorn LC Straight	<0.1	<0.1			<0.1				
Longhorn LC Wintergreen	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		
Longhorn Pouches Straight	<0.1	<0.1							
Longhorn Pouches Wintergreen	<0.1	<0.1							
Red Man FC Natural	<0.1	<0.1		<0.1					
Red Man LC Straight	<0.1	<0.1		<0.1					
Red Man LC Wintergreen	<0.1	<0.1		<0.1					
Renegades Wintergreen	<0.1	<0.1			<0.1	<0.1	0.40		
Timber Wolf FC Natural	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1		
Timber Wolf FC Wintergreen	<0.1	<0.1							
Timber Wolf LC Apple	<0.1	<0.1			<0.1		<0.1		
Timber Wolf LC Cool Wintergreen	<0.1	<0.1							
Timber Wolf LC Mint	<0.1	<0.1							
Timber Wolf LC Peach	<0.1	<0.1		<0.1		<0.1	<0.1		
Timber Wolf LC Straight	<0.1	<0.1							
Timber Wolf LC Wintergreen	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Timber Wolf Packs Mint	<0.1	<0.1							
Timber Wolf Packs Natural	<0.1	<0.1		<0.1	<0.1				
Timber Wolf Packs Peach	<0.1	<0.1							
Timber Wolf Packs Wintergreen	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
LOOSE LEAF									
Granger Select	24								
J.D.'s Blend	26								
Red Man Golden Blend	24								
Red Man Original	8.3								
Red Man Select	18								

BRAND <i>LOOSE LEAF Cont'd</i>	Sucrose +Maltose [%]							Sucrose [%]	
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	<0.1								
Southern Pride	23								
PLUG									
Apple Thick Plug	8.1								
Brown Mule Plug	5.8								
Cup Plug	6.3								
Days Work Plug	10								
Red Man Plug	25								
Tinsley Plug	15								

SUGARS: Sum Sugars

Background:

- ❑ Sugars are not added to snus from SMNE. The sugars present are compounds naturally occurring in the tobacco plant.
- ❑ The content of monosaccharides, such as glucose and fructose, are reduced in tobacco during curing, heat treatment and fermentation.
- ❑ An HPLC method was introduced in 2005 that measures the concentration of glucose, fructose and sucrose+maltose. The concentration is presented here as the sum of each or Total Sugars.

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm.

Method: 2001-2005: UV KLS. "Kvantitativ analys av totalsocker"
2005-Present : HPLC-RI KLS. "Kvantitativ HPLC/RID-
analys av socker och mjukgörare"

Quantification limits: 0.1 %

BRAND <i>SNUS</i>	Sum sugar [%]							Total sugar [%]		
	2011	2010	2009	2008	2007	2006	2005 HPLC	2005 UV	2004	2003
01 Original PSOL	1.1	1.4								
02 Strong PSOL	0.69	0.41								
Catch Collection PSWM. Chill	0.96	0.88	0.97							
Catch Dry Eucalyptus PSWM	1.0	0.75	0.70	0.69	0.73	1.0	1.3	1.4	1.0	1.2
Catch Dry Licorice PSWM	1.0	0.82	0.79	0.87	0.88	1.1	1.3	1.6	1.1	1.1
Catch Eucalyptus PSWL	1.0	1.1	0.93	1.2	0.83	0.87	0.98	1.2	1.1	
Catch Licorice PSOM	0.85	1.3	1.4	0.73	0.46	0.47	0.78	1.0	0.8	0.7
Catch Licorice PSWL	1.0	0.96	0.95	1.3	1.0	0.94	1.1	1.2	1.1	0.8
Catch Pure Mint PSW Medium	1.8									
Ettan Lös	1.8	1.9	1.5	1.4	1.5	1.0	1.0	1.3	1.4	1.2
Ettan PSOL	0.59	0.67	0.73	0.61	0.44	0.34	0.49	0.5	0.5	0.4
Ettan PSWL	0.96	1.1	1.0	1.2	0.97					
General Extra Sterk PSOL	0.6	0.35	0.49							
General Extra Sterk Lös	1.0	1.1	0.70							
General Long PSOL	1.1									
General Long Sterk PSOL	0.6									
General Lös	1.8	1.8	1.7	1.4	1.3	1.2	1.1	1.4	1.3	1.3
General Onyx PSWL	0.71	0.62	0.82	0.73	0.66	0.77				
General PSOL	1.0	1.5	1.4	1.0	0.46	0.50	0.48	0.7	0.9	0.7
General PSOM	0.65	1.2	1.3	1.1	0.44	0.48	0.79	0.9	1.0	0.6
General PSWL	0.94	1.0	0.97	1.3	0.97	0.93	1.1	1.3	1.1	0.9
General PSWM	0.88	1.0	0.94	1.3	1.0	0.83				
General Silver PSOL	1.4	1.2	1.3	1.0	0.91	1.1	1.3	1.4	1.3	1.3
General Smooth PSW Medium	1.9									
General Sterk PSWL	0.73	0.88	0.80	0.79						
Göteborgs Prima Fint Lös	1.3	1.4	1.5	1.3	0.94	1.2	1.1	1.5	1.5	1.6
Göteborgs Rapé Lös	1.5	1.9	1.5	1.6	1.4	1.1	1.2	1.4	1.2	1.2
Göteborgs Rapé PSWL	0.91	1.0	0.83	1.2	1.0	0.89	1.1	1.4	1.0	1.0
Göteborgs Rapé PSWM	0.96	0.91	0.88	1.3	1.0	0.89				
Göteborgs Rape No2 PSWL	0.99	1.1	0.95	1.3	1.0					
Grov Lös	1.7	2.2	1.8	1.4	1.2	1.0	1.0	1.3	1.5	1.4
Grov PSOL	1.1	1.3	1.3	0.97	0.81	0.52	0.96	1.1	0.9	0.6
Grov PSWL	0.95	1.0	0.92	1.3	0.96	0.89	1.1	1.4	1.1	0.9
Grovsnus Svart PSWL	0.59	0.63	0.74							
Kronan Lös	1.8	1.8	2.0	2.3	2.2					
Kronan PSOL	1.3	1.6	1.6	1.6	1.8	1.0				
Kronan PSWL	0.92	1.1	0.88	1.9						
Nick (and Johnny) West PSWL	0.69	0.61	0.60	0.82						

BRAND	Sum sugar [%]							Total sugar [%]		
	2011	2010	2009	2008	2007	2006	2005 HPLC	2005 UV	2004	2003
SNUS Cont'd										
Nick&Johnny Strong White PSWL	0.66									
Probe Lös	1.4	0.94	1.1	1.0	1.1	1.4	1.4	1.9	1.5	1.4
Probe PSOL	1.0	1.5	0.77	0.78	0.73	1.1	1.5	1.6	1.1	1.3
Röda Lacket Lös	1.5	0.98	1.4	1.1	0.89	0.58	0.53	0.9	0.9	0.8
Röda Lacket PSWL	0.89	1.0	0.92	1.3	0.91	0.91				
Tre Ankare PSWL	0.97	0.94	0.89	1.3	1.0	0.86	1.2	1.4	1.0	1.1
Tre Ankare PSWM	1.0		0.92	1.1	0.95	0.89	0.52	0.8	0.9	0.7
MOIST SNUFF		<0.1								
Longhorn FC Natural	0.24	<0.1	0.70	<0.1	<0.1	<0.1	<0.1	0.4	0.4	
Longhorn FC Wintergreen	0.24	<0.1								
Longhorn LC Mint	0.24	<0.1				<0.1	<0.1	<0.1		
Longhorn LC Natural	0.24	<0.1								
Longhorn LC Straight	0.24	<0.1			<0.1				0.2	
Longhorn LC Wintergreen	0.24	<0.1	0.77		<0.1	<0.1	<0.1	0.4	0.4	
Longhorn Pouches Straight	0.24	0.23								
Longhorn Pouches Wintergreen	0.37	<0.1								
Red Man FC Natural	0.25	<0.1		<0.1						
Red Man LC Straight	0.24	<0.1		<0.1						
Red Man LC Wintergreen	0.24	0.21		<0.1						
Renegades Wintergreen	0.37	<0.1			0.20	0.19	0.6	0.5	0.7	0.6
Timber Wolf FC Natural	0.24	<0.1		<0.1	<0.1	<0.1	<0.1	0.3	0.3	0.3
Timber Wolf FC Wintergreen	0.24	<0.1								
Timber Wolf LC Apple	0.24	<0.1			<0.1		<0.1			
Timber Wolf LC Cool Wintergreen	0.24	<0.1								
Timber Wolf LC Mint	0.25	<0.1								
Timber Wolf LC Peach	0.24	<0.1		0.25		<0.1	<0.1	0.5		
Timber Wolf LC Straight	0.24	<0.1							0.2	0.2
Timber Wolf LC Wintergreen	0.24	<0.1	0.76	<0.1	<0.1	<0.1	<0.1	0.2	0.2	0.1
Timber Wolf Packs Mint	0.37	0.25								
Timber Wolf Packs Natural	0.44	0.23		0.36	<0.1					
Timber Wolf Packs Peach	0.36	0.23								
Timber Wolf Packs Wintergreen	0.40	1.5	0.96	0.57	0.21	<0.1				
LOOSE LEAF										
Granger Select	32									
J.D.'s Blend	38									
Red Man Golden Blend	36									
Red Man Original	24									
Red Man Select	37									

BRAND <i>LOOSE LEAF Cont'd</i>	Sum sugar [%]							Total sugar [%]		
	2011	2010	2009	2008	2007	2006	2005 HPLC	2005 UV	2004	2003
Red Man Silver Blend	0.33									
Southern Pride	35									
<i>PLUG</i>										
Apple Thick Plug	23									
Brown Mule Plug	22									
Cup Plug	16									
Days Work Plug	30									
Red Man Plug	30									
Tinsley Plug	25									

VOLATILE ALDEHYDES : Formaldehyde and acetaldehyde

Background:

- ❑ Since 2004. Formaldehyde is classified as carcinogenic to humans (Group 1) and acetaldehyde is classified as possibly carcinogenic to humans (Group 2B) (IARC).
- ❑ Several authorities around the world request information about the concentration of formaldehyde in smokeless tobacco products.
- ❑ Some reported values of formaldehyde and acetaldehyde in the literature:
Smokeless tobacco: formaldehyde 2.2-7.4 ppm; acetaldehyde 1.4-27 ppm (Hoffmann. 1991)

Information of analyses:

Laboratory:	2001-2007: R&D Chemical Analysis Stockholm (The method is not validated) 2009-Present: Eurofins, Lidköping
Method:	2001 -2007: HPLC-UV 2009-Present: LC-MS/MS
Quantification limits:	2001-2007: Formaldehyde 1.5 ppm, Acetaldehyde 2.0ppm 2009-Present: Formaldehyde 5 ppm, Acetaldehyde 5 ppm

Comments

The results for formaldehyde and acetaldehyde are much higher in 2009 and 2010 as compared to previous years. In 2009-2011. Eurofins analyzed the products with a LC-MS/MS method. In prior years, the aldehydes were analyzed in-house with HPLC-UV. The lower results are more similar to the values reported by Hoffmann.

BRAND SNUS	Formaldehyde [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	18.1	40.3							
02 Strong PSOL	26.9	55.4							
Catch Collection PSWM. Chill	19.8	44.6	27.4						
Catch Dry Eucalyptus PSWM	17.9	28.0	23.4		8.7	8.2	6.6	7.1	15
Catch Dry Licorice PSWM	23.8	24.3	22.6		13				
Catch Eucalyptus PSWL	20.0	37.4	20.5		7.9	6.3	7.4	5.1	
Catch Licorice PSOM	20.3	27.7	23.1		12				
Catch Licorice PSWL	17.5	28.8	20.6		11				
Catch Pure Mint PSW Medium	21.5								
Ettan Lös	10.5	16.8	18.0		6.6	2.4	5.0	4.5	5.7
Ettan PSOL	19.0	49.1	25.6		12	6.9	8.5	7.2	14
Ettan PSWL	18.1	28.0	20.2		9.6				
General Extra Sterk PSOL	19.8	70.8	34.8						
General Extra Sterk Lös	7.9	17.2	14.3						
General Long PSOL	16.4								
General Long Sterk PSOL	24.8								
General Lös	11.2	17.0	14.1		6.6	3.2	5.5	3.2	8.6
General Onyx PSWL	18.8	64.2	30.6		6.8	5.7			
General PSOL	21.9	33.7	25.7		11	4.4	5.6		
General PSOM	21.4	35.8	21.8		12				
General PSWL	26.0	27.6	24.3		9.9				
General PSWM	19.7	41.0	21.9		12				
General Silver PSOL	14.9	25.4	18.6		9.6	2.9	6.4	7.4	12
General Smooth PSW Medium	33.6								
General Sterk PSWL	26.2	51.2	47.8						
Göteborgs Prima Fint Lös	8.57	11.7	13.2		8.7		5.1	4.0	6.2
Göteborgs Rapé Lös	10.9	16.0	15.1		10				
Göteborgs Rapé PSWL	23.7	30.9	24.1		11				
Göteborgs Rapé PSWM	20.8	54.5	27.6		14				
Göteborgs Rape´No2 PSWL	21.9	33.0	22.1		11				
Grov Lös	11.8	20.6	14.4		8.7	2.9	4.1	3.5	6.5
Grov PSOL	20.4	33.8	22.2		11				
Grov PSWL	20.3	30.9	26.2		11				
Grovsnus Svart PSWL	17.7	27.1	34.5						
Kronan Lös	12.0	14.5	16.0		9.8				
Kronan PSOL	23.0	38.1	23.1		11	4.8			
Kronan PSWL	26.0	37.3	26.3						
Nick (and Johnny) PSOL	16.5	33.4	28.2		9.3				

BRAND <i>SNUS Cont'd</i>	Formaldehyde [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	33.3								
Probe Lös	9.56	18.3	15.6		16	1.7	5.5	4.6	6.5
Probe PSOL	14.8	34.6	27.2		14			5.7	12
Röda Lacket Lös	9.13	13.3	12.4		9.6	2.5	3.3	4.4	6.0
Röda Lacket PSWL	23.6	24.7	25.0		10				
Tre Ankare PSWL	24.1	31.7	22.2		13			9.5	17
Tre Ankare PSWM	25.9	51.9	20.3		13				
MOIST SNUFF									
Longhorn FC Natural	11.6	24.0			16	3.9	9.2		
Longhorn FC Wintergreen	13.1	22.5							
Longhorn LC Mint	14.5	30.6							
Longhorn LC Natural	15.1	22.3							
Longhorn LC Straight	15.6	22.4			18				
Longhorn LC Wintergreen	13.7	27.7			17			8.3	
Longhorn Pouches Straight	14.6	40.5							
Longhorn Pouches Wintergreen	12.9	27.5							
Red Man FC Natural	14.6	30.2							
Red Man LC Straight	14.7	30.2							
Red Man LC Wintergreen	15.2	26.4							
Renegades Wintergreen	13.4	31.9			21	4.4	12	20	11
Timber Wolf FC Natural	13.0	22.1			23	5.3	10	7.3	4.3
Timber Wolf FC Wintergreen	15.4	26.6							
Timber Wolf LC Apple	13.8	23.3			15				
Timber Wolf LC Cool Wintergreen	13.1	22.3							
Timber Wolf LC Mint	15.2	29.2							
Timber Wolf LC Peach	13.0	27.7							
Timber Wolf LC Straight	15.9	24.3							
Timber Wolf LC Wintergreen	13.7	24.6			21	4.8	13	12	8.0
Timber Wolf Packs Mint	11.8	48.3							
Timber Wolf Packs Natural	14.5	50.1			19				
Timber Wolf Packs Peach	12.9	28.7							
Timber Wolf Packs Wintergreen	13.1	44.8			18				
LOOSE LEAF									
Granger Select	2.85								
J.D.'s Blend	2.94								
Red Man Golden Blend	2.92								
Red Man Original	2.72								
Red Man Select	3.56								

BRAND	Formaldehyde								
	[ppm]								
<i>LOOSE LEAF Cont'd</i>	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	2.00								
Southern Pride	2.83								
<i>PLUG</i>									
Apple Thick Plug	6.08								
Brown Mule Plug	10.4								
Cup Plug	8.23								
Days Work Plug	9.34								
Red Man Plug	4.52								
Tinsley Plug	4.40								

BRAND SNUS	Acetaldehyde [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	32.8	30.3							
02 Strong PSOL	38.7	48.7							
Catch Collection PSWM. Chill	43.2	42.8	38.4						
Catch Dry Eucalyptus PSWM	14.1	14.0	12.2		6.9	8.8	10	9.7	7.7
Catch Dry Licorice PSWM	23.8	24.3	17.6		11				
Catch Eucalyptus PSWL	32.7	48.6	37.2		24	33	30	25	
Catch Licorice PSOM	31.4	31.4	26.6		21				
Catch Licorice PSWL	44.2	48.1	41.3		27				
Catch Pure Mint PSW Medium	29.1								
Ettan Lös	36.4	43.6	50.6		20	24	25	22	24
Ettan PSOL	22.8	23.6	21.9		16	25	28	21	22
Ettan PSWL	37.3	44.8	44.0		29				
General Extra Sterk PSOL	41.3	58.7	60.9						
General Extra Sterk Lös	49.9	46.6	68.6						
General Long PSOL	31.5								
General Long Sterk PSOL	38.0								
General Lös	36.6	43.6	36.7		23	22	26	20	26
General Onyx PSWL	43.3	66.0	55.9		32	30			
General PSOL	32.8	31.9	27.5		27	25	26		
General PSOM	33.8	32.2	29.1		28				
General PSWL	31.6	46.0	44.9		30				
General PSWM	41.2	44.7	40.1		35				
General Silver PSOL	13.4	14.7	14.7		8.2	12	14	12	12
General Smooth PSW Medium	30.5								
General Sterk PSWL	35.6	51.2	66.9						
Göteborgs Prima Fint Lös	34.3	38.2	36.5		26		25	22	23
Göteborgs Rapé Lös	39.8	46.1	44.3		31				
Göteborgs Rapé PSWL	31.0	49.1	51.9		27				
Göteborgs Rapé PSWM	41.6	43.6	46.0		30				
Göteborgs Rape No2 PSWL	40.1	49.5	44.2		35				
Grov Lös	41.2	49.5	40.6		22	27	31	26	29
Grov PSOL	37.2	32.0	30.7		26				
Grov PSWL	35.1	54.2	48.6		27				
Grovsnus Svart PSWL	59.1	69.6	72.9						
Kronan Lös	43.5	49.1	43.9		20				
Kronan PSOL	30.0	31.1	24.9		15	19			
Kronan PSWL	35.3	42.9	47.0						
Nick (and Johnny) West PSWL	44.5	45.2	63.2						

BRAND <i>SNUS Cont'd</i>	Acetaldehyde [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	36.8								
Probe Lös	36.3	42.1	38.9		24	25	24	27	22
Probe PSOL	24.1	27.7	30.9		19			19	18
Röda Lacket Lös	35.7	36.5	31.4		16	20	20	18	18
Röda Lacket PSWL	38.1	47.5	48.1		33				
Tre Ankare PSWL	35.2	48.4	37.0		25			24	28
Tre Ankare PSWM	40.7	46.4	35.1		31				
MOIST SNUFF									
Longhorn FC Natural	22.0	25.9			29	10	9.0		
Longhorn FC Wintergreen	19.1	19.0							
Longhorn LC Mint	16.4	42.9							
Longhorn LC Natural	18.3	20.2							
Longhorn LC Straight	32.0	38.8			27			14	
Longhorn LC Wintergreen	28.2	35.6			29				
Longhorn Pouches Straight	40.7	48.2							
Longhorn Pouches Wintergreen	42.4	49.0							
Red Man FC Natural	9.05	22.2							
Red Man LC Straight	21.9	40.3							
Red Man LC Wintergreen	24.4	30.5							
Renegades Wintergreen	33.6	45.0			36	29	19	35	15
Timber Wolf FC Natural	8.68	16.5			27	13	14	15	12
Timber Wolf FC Wintergreen	34.1	30.7							
Timber Wolf LC Apple	33.4	40.7			32				
Timber Wolf LC Cool Wintergreen	22.2	36.5							
Timber Wolf LC Mint	26.6	25.0							
Timber Wolf LC Peach	37.3	47.5							
Timber Wolf LC Straight	24.5	32.5							
Timber Wolf LC Wintergreen	28.2	34.9			38	27	22	13	19
Timber Wolf Packs Mint	37.3	48.3							
Timber Wolf Packs Natural	41.1	45.9			39				
Timber Wolf Packs Peach	45.0	42.1							
Timber Wolf Packs Wintergreen	36.3	46.8			37				
LOOSE LEAF									
Granger Select	5.83								
J.D.'s Blend	4.94								
Red Man Golden Blend	5.18								
Red Man Original	5.07								
Red Man Select	6.03								

BRAND <i>LOOSE LEAF Cont'd</i>	Acetaldehyde [ppm]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	6.40								
Southern Pride	5.12								
<i>PLUG</i>									
Apple Thick Plug	7.57								
Brown Mule Plug	9.77								
Cup Plug	7.52								
Days Work Plug	7.95								
Red Man Plug	6.52								
Tinsley Plug	5.71								

Water activity, a_w

Background:

- ❑ Water activity is an important parameter in smokeless tobacco products. as this parameter describes how much of the water in the product is “available”. or not bound to salt, proteins, etc. A high water activity value means that a large part of the water is available for microbiological growth.
- ❑ Different microorganisms stop growing at different a_w -values. The most frequent found bacteria in tobacco and smokeless tobacco products, *Bacillus spp.* is unable to grow when the a_w -value is below 0.90. This value is set as an internal limit for SMNE products.
- ❑ Internal tolerance limit, SMNE: 0.9

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm.

Method: Water activity : AquaLab equipment , KLS ” Mätning av vattenaktivitet”

Quantification limits: -

BRAND SNUS	Water activity								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
01 Original PSOL	0.86	0.85							
02 Strong PSOL	0.86	0.87							
Catch Collection PSWM. Chill	0.87	0.85	0.88						
Catch Dry Eucalyptus PSWM	0.69			0.67			0.66	0.59	0.65
Catch Dry Licorice PSWM	0.69			0.67				0.66	0.65
Catch Eucalyptus PSWL	0.86	0.87	0.84	0.83	0.84	0.81	0.86	0.85	
Catch Licorice PSOM	0.89	0.88	0.88	0.87	0.88	0.86	0.88	0.88	0.87
Catch Licorice PSWL	0.84	0.87	0.87	0.85	0.86	0.83	0.86	0.82	0.88
Catch Pure Mint PSW Medium	0.82								
Ettan Lös	0.88	0.89	0.87	0.88	0.88	0.87	0.86	0.87	0.87
Ettan PSOL	0.89	0.89	0.88	0.89	0.88	0.87	0.89	0.87	0.87
Ettan PSWL	0.86	0.86	0.88	0.86	0.87				
General Extra Sterk PSOL	0.86	0.87	0.88						
General Extra Sterk Lös	0.88	0.89	0.87						
General Long PSOL	0.86								
General Long Sterk PSOL	0.85								
General Lös	0.89	0.88	0.88	0.88	0.87	0.87	0.87	0.88	0.87
General Onyx PSWL	0.86	0.87	0.83	0.82	0.86	0.85			
General PSOL	0.87	0.88	0.88	0.86	0.89	0.88	0.88	0.89	0.88
General PSOM	0.88	0.9	0.89	0.89	0.89	0.86	0.87	0.89	0.87
General PSWL	0.87	0.86	0.88	0.86	0.86	0.86	0.87	0.87	0.86
General PSWM	0.86	0.86	0.86	0.86	0.87	0.86			
General Silver PSOL	0.87	0.89	0.86	0.85	0.88	0.86	0.88	0.88	0.88
General Smooth PSW Medium	0.81								
General Sterk PSWL	0.86	0.88	0.87	0.83					
Göteborgs Prima Fint Lös	0.88	0.89	0.88	0.88	0.87	0.87	0.88	0.88	0.88
Göteborgs Rapé Lös	0.88	0.89	0.88	0.88	0.88	0.87	0.87	0.88	0.87
Göteborgs Rapé PSWL	0.88	0.87	0.88	0.86	0.86	0.82	0.86	0.86	0.84
Göteborgs Rapé PSWM	0.86	0.87	0.87	0.87	0.85	0.85			
Göteborgs Rape No2 PSWL	0.87	0.87	0.87	0.86	0.83				
Grov Lös	0.89	0.9	0.88	0.89	0.88	0.88	0.87	0.89	0.88
Grov PSOL	0.89	0.91	0.89	0.88	0.88	0.86	0.89	0.89	0.87
Grov PSWL	0.87	0.87	0.88	0.83	0.83	0.86	0.86	0.86	0.87
Grovsnus Svart PSWL	0.87	0.86	0.88						
Kronan Lös	0.89	0.89	0.88	0.88	0.88				
Kronan PSOL	0.86	0.89	0.87	0.87	0.87	0.87			
Kronan PSWL	0.88	0.86	0.88	0.87					
Nick (and Johnny) PSOL	0.86	0.86	0.86	0.88	0.85				

BRAND	Water activity								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
<i>SNUS Cont'd</i>									
Nick&Johnny Strong White PSWL	0.86								
Probe Lös	0.87	0.87	0.86	0.87	0.86	0.85	0.85	0.86	0.85
Probe PSOL	0.87	0.88	0.88	0.89	0.87	0.86	0.86	0.88	0.89
Röda Lacket Lös	0.87	0.88	0.86	0.88	0.88	0.86	0.86	0.87	0.87
Röda Lacket PSWL	0.87	0.87	0.89	0.87	0.86	0.86			
Tre Ankare PSWL	0.88	0.87	0.87	0.88	0.87	0.86	0.87	0.84	0.87
Tre Ankare PSWM	0.86	0.87	0.85	0.85	0.87	0.86	0.88	0.85	0.87
<i>MOIST SNUFF</i>									
Longhorn FC Natural	0.84	0.84	0.84	0.83	0.83	0.82	0.83	0.83	
Longhorn FC Wintergreen	0.84	0.86							
Longhorn LC Mint	0.84	0.85				0.81	0.84		
Longhorn LC Natural	0.83	0.83							
Longhorn LC Straight	0.85	0.86			0.85			0.85	
Longhorn LC Wintergreen	0.86	0.85	0.86		0.86	0.85	0.85	0.85	
Longhorn Pouches Straight	0.87	0.86							
Longhorn Pouches Wintergreen	0.85	0.86							
Red Man FC Natural	0.85	0.86		0.84					
Red Man LC Straight	0.86	0.86		0.81					
Red Man LC Wintergreen	0.86	0.85		0.74					
Renegades Wintergreen	0.85	0.85			0.84	0.84	0.85	0.88	0.88
Timber Wolf FC Natural	0.84	0.85		0.84	0.83	0.83	0.82	0.83	0.84
Timber Wolf FC Wintergreen	0.87	0.86							
Timber Wolf LC Apple	0.85	0.85			0.84		0.83		
Timber Wolf LC Cool Wintergreen	0.85	0.85							
Timber Wolf LC Mint	0.86	0.85							
Timber Wolf LC Peach	0.85	0.85		0.85		0.85	0.85		
Timber Wolf LC Straight	0.87	0.86						0.85	0.86
Timber Wolf LC Wintergreen	0.86	0.86	0.86	0.86	0.84	0.85	0.85	0.85	0.86
Timber Wolf Packs Mint	0.88	0.88							
Timber Wolf Packs Natural	0.86	0.87		0.87	0.87				
Timber Wolf Packs Peach	0.87	0.87							
Timber Wolf Packs Wintergreen	0.86	0.85	0.86	0.86	0.84	0.85			
<i>LOOSE LEAF</i>									
Granger Select	0.71								
J.D.'s Blend	0.73								
Red Man Golden Blend	0.74								
Red Man Original	0.75								
Red Man Select	0.74								

	Water activity								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
BRAND									
<i>LOOSE LEAF Cont'd</i>									
Red Man Silver Blend	0.75								
Southern Pride	0.75								
<i>PLUG</i>									
Apple Thick Plug	0.68								
Brown Mule Plug	0.63								
Cup Plug	0.68								
Days Work Plug	0.67								
Red Man Plug	0.67								
Tinsley Plug	0.68								

Water content

Background:

- In order to compare the concentrations of chemical compounds in smokeless tobacco products, all analytical data is calculated on dry weight basis and therefore, it is necessary to measure the water content.

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm.

Method: 2001-2008: Karl-Fisher KLS. "Bestämning av vattenhalt-Karl Fischer"
2009-Present: KLS. "Bestämning av vatten i tobak, tobaksprodukter och fiberbaserade matriser med GC-TCD"

Quantification limits: 2001-2008: 5 %

Range: 2009-Present: 5-60%

BRAND SNUS	Water content [%]								
	2011	2010	2009 GC	2008	2007	2006	2005	2004	2003
01 Original PSOL	39.1	40.5							
02 Strong PSOL	40.5	40.4							
Catch Collection PSWM. Chill	44.4	43.9	45.3						
Catch Dry Eucalyptus PSWM	21.9	21.4	23.0	23.8	21.4	21.6	23.4	23.4	22.1
Catch Dry Licorice PSWM	20.1	21.8	20.4	22.1	20.4	21.3	22.0	21.6	22.5
Catch Eucalyptus PSWL	45.0	46.5	46.3	47.5	44.7	48.0	45.7	49.9	
Catch Licorice PSOM	45.8	45.9	43.7	43.0	42.9	44.7	46.6	43.3	45.6
Catch Licorice PSWL	48.0	48.0	46.7	47.4	45.3	49.8	49.5	51.2	50.4
Catch Pure Mint PSW Medium	34.8								
Ettan Lös	53.3	51.8	50.6	51.8	47.7	52.1	51.5	52.4	50.3
Ettan PSOL	47.3	45.0	45.3	46.3	41.4	46.7	47.9	45.1	45.9
Ettan PSWL	46.4	46.4	45.5	48.0	48.0				
General Extra Sterk PSOL	39.5	42.1	42.5						
General Extra Sterk Lös	51.9	50.6	49.0						
General Long PSOL	39.7								
General Long Sterk PSOL	39.5								
General Lös	53.5	49.5	50.9	50.9	46.9	52.3	50.9	51.9	52.4
General Onyx PSWL	46.9	47.0	44.5	47.1	42.1	45.0			
General PSOL	45.2	43.6	45.5	46.2	43.3	43.7	46.3	49.0	45.7
General PSOM	43.8	44.1	45.0	49.0	48.4	46.2	45.6	51.6	44.2
General PSWL	46.2	45.6	46.6	48.4	48.9	49.1	50.4	51.3	45.6
General PSWM	44.2	46.3	45.2	48.2	48.5	49.3			
General Silver PSOL	41.6	41.0	46.2	45.9	42.1	49.5	48.7	50.1	47.1
General Smooth PSW Medium	34.5								
General Sterk PSWL	46.6	49.2	47.7	49.5					
Göteborgs Prima Fint Lös	47.5	47.7	47.9	50.5	49.8	50.0	51.2	52.6	51.1
Göteborgs Rapé Lös	49.7	50.1	50.3	52.5	52.3	52.4	52.4	52.8	51.4
Göteborgs Rapé PSWL	45.2	45.0	46.0	48.6	49.8	49.0	50.1	50.1	47.8
Göteborgs Rapé PSWM	47.1	45.0	45.7	47.8	48.6	48.7			
Göteborgs Rape´No2 PSWL	45.2	45.4	45.7	47.9	46.6				
Grov Lös	51.5	51.5	50.7	51.8	46.4	51.2	51.8	53.6	51.2
Grov PSOL	46.2	43.8	41.4	48.6	46.4	46.3	49.1	44.9	47.6
Grov PSWL	45.9	48.3	46.5	49.9	48.5	49.2	50.1	49.4	49.0
Grovsnus Svart PSWL	44.2	48.3	47.9						
Kronan Lös	51.7	49.1	49.9	53.3	52.3				
Kronan PSOL	43.4	42.2	43.7	44.1	42.9	46.0			
Kronan PSWL	46.1	46.4	46.8	48.0					
Nick (and Johnny) PSOL	39.3	40.2	39.8	44.7	40.9				

BRAND	Water content								
	[%]								
<i>SNUS Cont'd</i>	2011	2010	2009 GC	2008	2007	2006	2005	2004	2003
Nick&Johnny Strong White PSWL	43.0								
Probe Lös	47.7	45.4	46.0	48.2	42.8	47.0	46.7	47.9	47.0
Probe PSOL	46.1	42.2	44.9	48.5	47.4	46.1	47.9	48.1	46.8
Röda Lacket Lös	49.6	48.0	45.8	48.0	46.2	49.8	49.3	49.5	50.0
Röda Lacket PSWL	44.9	47.4	48.0	48.0	47.1	49.2			
Tre Ankare PSWL	46.0	46.3	45.9	47.3	49.3	49.4	51.3	50.4	51.2
Tre Ankare PSWM	45.9	46.1	45.8	45.8	49.1	48.5	45.7	51.7	47.5
MOIST SNUFF									
Longhorn FC Natural	50.1	49.9	50.2	51.1	49.8	47.7	49.4	50.8	
Longhorn FC Wintergreen	50.3	51.1							
Longhorn LC Mint	50.5	51.0				51.6	51.9		
Longhorn LC Natural	49.6	50.6							
Longhorn LC Straight	50.0	51.0			50.8			51.8	
Longhorn LC Wintergreen	50.4	49.4	49.9		50.7	50.8	50.9	52.3	
Longhorn Pouches Straight	50.8	48.1							
Longhorn Pouches Wintergreen	48.1	49.0							
Red Man FC Natural	51.4	50.4		50.5					
Red Man LC Straight	49.8	50.4		52.4					
Red Man LC Wintergreen	50.8	50.8		52.5					
Renegades Wintergreen	49.4	46.7			42.6	45.8	52.8	54.6	49.1
Timber Wolf FC Natural	49.3	50.3		49.4	47.8	48.0	47.2	49.6	48.0
Timber Wolf FC Wintergreen	50.1	51.2							
Timber Wolf LC Apple	49.1	48.4			49.5		50.2		
Timber Wolf LC Cool Wintergreen	50.4	50.7							
Timber Wolf LC Mint	51.2	52.0							
Timber Wolf LC Peach	49.1	49.5		51.0		49.5	50.2		
Timber Wolf LC Straight	51.0	50.7						53.4	51.4
Timber Wolf LC Wintergreen	50.3	51.3	50.0	50.7	51.1	50.6	50.9	52.8	50.7
Timber Wolf Packs Mint	49.0	50.3							
Timber Wolf Packs Natural	53.8	52.1		53.0	51.3				
Timber Wolf Packs Peach	48.9	47.8							
Timber Wolf Packs Wintergreen	50.4	48.7	48.0	48.2	45.9	48.6			
LOOSE LEAF									
Granger Select	22.8								
J.D.'s Blend	25.1								
Red Man Golden Blend	24.7								
Red Man Original	19.2								
Red Man Select	27.0								

BRAND <i>LOOSE LEAF Cont'd</i>	Water content [%]								
	2011	2010	2009 GC	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	25.0								
Southern Pride	25.8								
PLUG									
Apple Thick Plug	19.4								
Brown Mule Plug	17.1								
Cup Plug	16.2								
Days Work Plug	20.8								
Red Man Plug	20.3								
Tinsley Plug	16.0								

Moisture

Background:

- ❑ Many tobacco companies are using the moisture to calculate all analytical data to dry weight basis. In this report, all analytical data presented on dry weight basis is calculated on the water content.
- ❑ Moisture is specified for each snus brand in the manufacturing specification.

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm.

Method: KLS: "Bestämning av fukthalt i tobak, tobaksprodukter och fiberbaserade matriser genom uttorkning"

Range: 2 - 70%

BRAND	Moisture [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
SNUS									
01 Original PSOL	45.0	44.7							
02 Strong PSOL	44.3	45.3							
Catch Collection PSWM. Chill	51.9	52.1	52.85						
Catch Dry Eucalyptus PSWM	24.9	24.6	25.69						
Catch Dry Licorice PSWM	23.8	24.2	23.46						
Catch Eucalyptus PSWL	51.4	53.0	51.36						
Catch Licorice PSOM	53.7	51.4	49.17						
Catch Licorice PSWL	53.4	53.8	51.85						
Catch Pure Mint PSW Medium	38.4								
Ettan Lös	58.4	57.3	56.41						
Ettan PSOL	50.1	50.0	50.78						
Ettan PSWL	53.8	52.8	51.26						
General Extra Sterk PSOL	46.7	45.8	49.49						
General Extra Sterk Lös	58.6	57.8	55.41						
General Long PSOL	46.5								
General Long Sterk PSOL	46.1								
General Lös	58.3	57.0	56.07						
General Onyx PSWL	54.0	53.6	51.27						
General PSOL	50.9	47.9	49.49						
General PSOM	49.9	54.5	51.78						
General PSWL	53.3	52.2	50.51						
General PSWM	51.5	52.6	50.26						
General Silver PSOL	47.7	49.9	49.87						
General Smooth PSW Medium	38.6								
General Sterk PSWL	54.5	55.3	52.18						
Göteborgs Prima Fint Lös	56.5	54.8	53.05						
Göteborgs Rapé Lös	58.7	57.2	56.11						
Göteborgs Rapé PSWL	52.9	52.6	52.00						
Göteborgs Rapé PSWM	51.8	51.0	51.42						
Göteborgs Rape´No2 PSWL	52.7	52.4	52.09						
Grov Lös	58.4	57.1	56.33						
Grov PSOL	50.8	50.9	50.44						
Grov PSWL	53.4	54.6	52.63						
Grovsnus Svart PSWL	52.7	53.1	53.60						
Kronan Lös	57.9	57.1	55.64						
Kronan PSOL	48.2	52.5	51.15						
Kronan PSWL	53.4	52.5	52.36						
Nick (and Johnny) PSOL	42.9	46.9	46.23						

BRAND	Moisture [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
SNUS Cont'd									
Nick&Johnny Strong White PSWL	52.5								
Probe Lös	53.5	53.0	52.34						
Probe PSOL	50.6	47.4	51.38						
Röda Lacket Lös	55.7	54.2	51.69						
Röda Lacket PSWL	53.4	53.0	52.58						
Tre Ankare PSWL	53.1	52.9	50.71						
Tre Ankare PSWM	51.8	51.6	50.43						
MOIST SNUFF									
Longhorn FC Natural	52.8	52.4	53.49						
Longhorn FC Wintergreen	55.2	55.4							
Longhorn LC Mint	54.6	54.1							
Longhorn LC Natural	52.3	52.3							
Longhorn LC Straight	54.7	55.1							
Longhorn LC Wintergreen	54.7	54.1	53.80						
Longhorn Pouches Straight	54.8	53.5							
Longhorn Pouches Wintergreen	53.1	52.4							
Red Man FC Natural	53.9	53.6							
Red Man LC Straight	54.5	55.6							
Red Man LC Wintergreen	55.0	55.1							
Renegades Wintergreen	55.7	52.4							
Timber Wolf FC Natural	52.0	51.8							
Timber Wolf FC Wintergreen	55.4	55.7							
Timber Wolf LC Apple	51.9	52.1							
Timber Wolf LC Cool Wintergreen	55.1	55.8							
Timber Wolf LC Mint	54.7	54.7							
Timber Wolf LC Peach	52.5	51.2							
Timber Wolf LC Straight	55.7	54.9							
Timber Wolf LC Wintergreen	55.3	55.3	54.42						
Timber Wolf Packs Mint	53.7	55.7							
Timber Wolf Packs Natural	54.6	55.5							
Timber Wolf Packs Peach	54.4	53.9							
Timber Wolf Packs Wintergreen	53.8	52.2	52.15						
LOOSE LEAF									
Granger Select	23.5								
J.D.'s Blend	25.8								
Red Man Golden Blend	26.0								
Red Man Original	25.7								
Red Man Select	27.0								

BRAND <i>LOOSE LEAF Cont'd</i>	Moisture [%]								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Red Man Silver Blend	27.7								
Southern Pride	26.7								
PLUG									
Apple Thick Plug	20.6								
Brown Mule Plug	16.9								
Cup Plug	19.3								
Days Work Plug	21.9								
Red Man Plug	19.5								
Tinsley Plug	17.7								

Unit Weight

Background:

- The unit weight of each portion packed snus products from SMNE is specified in SMNE's quality assurance system, KLS

Information of analyses:

Laboratory: R&D Chemical Analysis Stockholm.

Method: Average of 6 measurements on a 4-decimal balance.

Quantification limits: -

BRAND	Unit Weight [g]							
	2011	SD	2010	SD	2009	SD	2008	SD
SNUS								
01 Original PSOL	0.911	0.027	0.929	0.040				
02 Strong PSOL	0.896	0.014	0.905	0.028				
Catch Collection PSWM. Chill	0.492	0.033	0.489	0.024	0.467	0.048		
Catch Dry Eucalyptus PSWM	0.343	0.012	0.326	0.012	0.356	0.019		
Catch Dry Licorice PSWM	0.335	0.012	0.328	0.010	0.326	0.014		
Catch Eucalyptus PSWL	0.953	0.021	1.007	0.036	1.050	0.078		
Catch Licorice PSOM	0.546	0.019	0.511	0.032	0.497	0.009		
Catch Licorice PSWL	0.968	0.023	0.938	0.035	1.026	0.038		
Catch Pure Mint PSW Medium	0.616	0.012						
Ettan Lös								
Ettan PSOL	1.042	0.012	0.979	0.015	1.008	0.052		
Ettan PSWL	0.967	0.024	1.004	0.037	1.029	0.029		
General Extra Sterk PSOL	1.071	0.035	1.077	0.013	1.049	0.025		
General Extra Sterk Lös								
General Long PSOL	0.888	0.018						
General Long Sterk PSOL	0.89	0.033						
General Lös								
General Onyx PSWL	0.916	0.018	1.089	0.054	1.024	0.074		
General PSOL	0.983	0.035	1.015	0.057	0.962	0.020		
General PSOM	0.532	0.018	0.501	0.028	0.504	0.033		
General PSWL	1.036	0.032	1.052	0.042	1.026	0.055		
General PSWM	0.473	0.031	0.537	0.032	0.501	0.040		
General Silver PSOL	0.997	0.022	1.001	0.033	0.989	0.029		
General Smooth PSW Medium	0.639	0.030						
General Sterk PSWL	1.03	0.053	1.027	0.059	1.028	0.093		
Göteborgs Prima Fint Lös								
Göteborgs Rapé Lös								
Göteborgs Rapé PSWL	0.943	0.060	0.922	0.053	1.047	0.050		
Göteborgs Rapé PSWM	0.472	0.023	0.502	0.032	0.477	0.033		
Göteborgs Rape´No2 PSWL	0.954	0.022	1.030	0.035	1.010	0.046		
Grov Lös								
Grov PSOL	0.987	0.025	1.027	0.048	0.927	0.029		
Grov PSWL	0.943	0.033	1.029	0.045	0.986	0.024		
Grovsnus Svart PSWL	0.96	0.030	1.099	0.077	1.035	0.109		
Kronan Lös								
Kronan PSOL	0.987	0.035	0.933	0.027	0.977	0.025		
Kronan PSWL	0.919	0.044	0.910	0.036	0.845	0.064		
Nick (and Johnny) PSOL	0.891	0.021	0.984	0.048	0.941	0.021		

BRAND	Unit Weight [g]							
	2011	SD	2010	SD	2009	SD	2008	SD
<i>SNUS Cont'd</i>								
Nick&Johnny Strong White PSWL	0.923	0.036						
Probe Lös								
Probe PSOL	0.942	0.024	0.957	0.046	0.925	0.059		
Röda Lacket Lös								
Röda Lacket PSWL	1.028	0.015	1.026	0.027	1.077	0.024		
Tre Ankare PSWL	0.935	0.101	1.008	0.058	0.998	0.042		
Tre Ankare PSWM	0.486	0.028	0.535	0.026	0.540	0.034		
<i>MOIST SNUFF</i>								
Longhorn FC Natural								
Longhorn FC Wintergreen								
Longhorn LC Mint								
Longhorn LC Natural								
Longhorn LC Straight								
Longhorn LC Wintergreen								
Longhorn Pouches Straight	1.494	0.037	0.983	0.016				
Longhorn Pouches Wintergreen	1.563	0.033	0.987	0.063				
Red Man FC Natural								
Red Man LC Straight								
Red Man LC Wintergreen								
Renegades Wintergreen	0.997	0.027	0.921	0.050				
Timber Wolf FC Natural								
Timber Wolf FC Wintergreen								
Timber Wolf LC Apple								
Timber Wolf LC Cool Wintergreen								
Timber Wolf LC Mint								
Timber Wolf LC Peach								
Timber Wolf LC Straight								
Timber Wolf LC Wintergreen								
Timber Wolf Packs Mint	1.559	0.076	1.562	0.030				
Timber Wolf Packs Natural	1.555	0.049	1.565	0.063				
Timber Wolf Packs Peach	1.525	0.055	1.500	0.038				
Timber Wolf Packs Wintergreen	1.519	0.071	1.503	0.018				
<i>LOOSE LEAF</i>								
Granger Select								
J.D.'s Blend								
Red Man Golden Blend								
Red Man Original								
Red Man Select								

BRAND <i>LOOSE LEAF Cont'd</i>	Unit Weight [g]							
	2011	SD	2010	SD	2009	SD	2008	SD
Red Man Silver Blend								
Southern Pride								
PLUG								
Apple Thick Plug								
Brown Mule Plug								
Cup Plug								
Days Work Plug								
Red Man Plug								
Tinsley Plug								