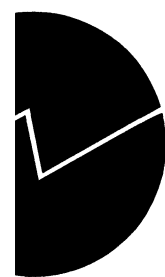


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**Testing the NOSE Manual for
Industrial Discharges to Water
in Norway**

Documents



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1. Background

The NOSE (Nomenclature Of Sources of Emissions) project provides a classification for emission sources which is linked directly to the European standard for classification of economic activities, NACE Revision 1. The structure and concepts of NOSE are presented in a draft manual (NOSE 1997).

Standard statistical classifications are needed in order to ensure that statistical data collected at different times, for different purposes, and in different countries, can be used together. The NOSE project aims at producing practical tools for the description of sources of emissions within an emission inventory or register. NOSE covers the use of two independent classifications which serve as descriptors in a database, one being NACE (following the normal rules for classification of local units and local kind of activity units), the other being the NOSE Process List. The novel part of NOSE is the NOSE Process List, which gives a list of technical activities generating emissions (NOSE 1997).

The NOSE descriptors (NACE and the NOSE Process List) may be used within a database to describe the emissions from multiple specific processes in an industrial installation. They can also be used to aggregate emission data either in terms of economic branches (using NACE) or in terms of processes (using NOSE Process List).

The core of NOSE is the NOSE Process List (NOSE-P) which will be a list of technically-defined processes capable of giving rise to emissions of any of a wide range of pollutants, into any medium (air, water, land etc.). The NOSE-P can be used at different levels of detail (NOSE 1997). High-level NOSE-P groups are represented in table 1.

The breakdown of emissions by process, according to NOSE Process List, will also act as a “check list”, ensuring that the emissions registered for an installation cover the full range of processes taking place at the installation. However, it may be appropriate systematically to exclude some categories of processes when emissions are registered for installations. In particular, it is suggested that mobile sources should not normally be registered at the installation level, since emission from these sources are normally estimated in other ways.

NOSE Process List

The current air part of NOSE Process List is derived directly from the SNAP (Selected Nomenclature for Air Pollution) nomenclature. NOSE uses the process description within SNAP to provide a process list which is essentially complete for the processes giving rise to air emissions of a wide range of pollutants.

For emissions to water it appears that national lists of processes are less well developed than those for air emissions. One exception is the list used by the French “Financial Basin Agencies”. This is, however, a detailed list and it has partly been integrated into the NOSE Process List.

In order both to maximise compatibility with existing national inventories, and also to facilitate the incorporation of new process codes, it was decided to structure the list of production processes according to the NACE branches for which they are characteristic, after a group of general-purpose processes. NOSE-P groups 10401 (Production processes involving fuel combustion) and 10501 (Production processes not involving fuel combustion) therefore cover general-purpose industrial processes which are found in several kinds of industries; more codes need to be added under this heading (NOSE 1997).

The high-level NOSE-P groups are summarized in table 1. The table also indicates if the NOSE-P groups are common to all NACE branches plus households or the processes are characteristic of one NACE branch or found in several NACE branches. Dark squares indicate that a category is relevant for a high-level NOSE-P group.

Table 1. High-level NOSE-P groups

NOSE-P Section	NOSE-P Group	Process category	SNAP-94	Common to all NACE branches plus households	Characteristic of one NACE branch	Found in several NACE branches
1		Stationary processes	01, 02, 03 (part)			
	101	Combustion processes (production of heat and electricity)				
	102	(code reserved for future use)				
	103	(code reserved for future use)				
	104	Production processes involving fuel combustion	03 (part)			
	105	Production processes not involving fuel combustion	04			
	106	Processes specific to the extraction and distribution of fossil fuels and geothermal energy	05			
	107	Processes involving use of solvents and other products	06			
	108	Processes specific to nuclear power generation				
	109	Waste treatment and disposal operations	09			
	110	Processes specific to agriculture and forestry	10			
	111	Processes characteristic of service branches				
	112	Processes common to all branches				
2		Mobile processes				
	201	Road transport	07			
	202	Other mobile sources and machinery	08			
3		Processes in nature	09			
	301	Processes in nature	11			

Source: NOSE 1997.

2. Testing the NOSE water for Norway

2.1. Data used in the testing

In this study the aim is to test the NOSE manual for industrial water emissions for Norway. The NOSE manual has suggested a nomenclature for water emissions which is mainly based on a French reporting system. It is, consequently, important to test the relevance of this classification for more countries.

For the testing of NOSE a data set obtained from INKOSYS, which is a register administered by the Norwegian Pollution Control Authority, is used. INKOSYS is a register based on direct reporting of emission to air, discharges to water and waste generated from the industries themselves. The Norwegian Pollution Control Authority controls the data. The register contains industrial water discharges of about 60 components, like heavy metals, PAH, dioxins, nitrogen, phosphorus, sulphur, organic and inorganic compounds (see table 3 in the appendix), from about 300 installations mainly in the manufacturing industries. Data for 1996 is used in this work. The data in INKOSYS are classified according to NACE branches. There are other industries in Norway that may give discharges to water, INKOSYS only includes those industries which have a pollution licence. Some waste water plants and offshore facilities are not included at all.

2.2. Classifying installations according to the NOSE Process List

In this work we have tried to classify the data from INKOSYS by process according to the suggested NOSE Process List. For each individual plant with registered discharges to water or group of similar plants we have assigned a relevant NOSE-P category, or if no appropriate one was found, suggested a new one. The assignment is based on knowledge of each installation (main production) and own discretion. The conclusions are given in table 2 (see chapter 3), below we will discuss some of the problems encountered.

As already mentioned, the Norwegian data are classified according to NACE branches. Several processes (defined by several NOSE-P categories) may be relevant for one plant or branch. For several branches it is difficult to split the discharge from one plant or NACE branch to several NOSE-P groups. Detailed process knowledge is needed in order to perform such a splitting. Furthermore, it may be difficult to describe the origin of a discharge when it is unclear what exact kind of production an installation has.

In some cases, the same plant is assigned to a different NACE branch in INKOSYS and the national business register. We have here used the INKOSYS assignment.

General processes like NOSE-P 107 (solvent use), 112 (common processes) and 201 (road transport) in the NOSE Process List (table 1) may be relevant to almost all the NACE branches considered in this study. As already mentioned, it may be appropriate to exclude some categories of processes. Mobile sources and households are not included in INKOSYS. Combustion processes, NOSE-P 104, may give water discharges and waste, but it is not considered in this report as it will be difficult to split the emissions to several processes without detailed knowledge. Considering use of organic solvents, emissions from processes in NOSE-P 107 may be included in a number of branches. However, the emissions will only be partly represented in the data set, as emissions from fugitive sources in some cases may be estimated elsewhere. In this work NOSE-P group 107 is only considered in cases where no other NOSE-P groups seem suitable.

In the following an attempt has been made to classify the installations, given in INKOSYS (with NACE codes), according to the NOSE-P. In the testing, the NOSE Process List in the NOSE draft manual from 12 August 1997 is used. In table 4 in the appendix, the result of the testing is given. The table shows emissions of different components from the installations classified according to the NOSE-P. If less than 3 installations contribute to the emissions in a particular NOSE-P group, the emissions from several groups are added. Abbreviations for the emission components are given in table 3 in the appendix.

NACE 13.1, 13.2 (Mining of ores). 21 industries are included in INKOSYS. The branches are important for the emissions of heavy metals (also arsenic), sulphur and suspended dry matter. All the NACE branches are placed in NOSE-P group 1050201 "Extraction of mineral ores (except energy producing materials)".

NACE 14.3 (Mining of chemical and fertiliser minerals) and 14.5 (Other mining and quarrying). 4 industries are registered with these NACE codes. The branches give emission of suspended dry matter and fluoride (NACE 14.5). The branches are placed in NOSE-P 1050202 "Extraction of other ores including asbestos production".

Note that INKOSYS does not include emission and discharges from offshore oil and gas production.

NACE 15 (Manufacture of food products and beverages). Less than three installations are registered in INKOSYS at this level (without sub level). The branches may be important for emissions of Cu, water and SO₄-S. A suitable NOSE-P group is 1050318 "Yeast industry". But one of the installations

has a major production of sweetening, for which there exists no NOSE-P group. So there is suggestion for a new group, NOSE-P group *10503xx "Sweetening"*.

NACE 15.31 (Processing and preserving of potatoes). 6 industries are registered in INKOSYS. They have minor emissions of phosphate and suspended dry matter. These branches are probably corresponding to NOSE-P 1050320 "Chicory, potatoes".

NACE 15.411 (Manufacture of crude fish oils and fats). 10 industries are registered in INKOSYS, all with low emission of suspended organic matter. The installations may correspond to NOSE-P 1050326 "Fish processing" and/or 1070404 "Fat, edible and non-edible oil extraction". The branches may also be included in NOSE-P 1050324 "Rendering". The difference between the groups 1070404 and 1050324 is not clear to us.

NACE 15.421 (Manufacture of refined oils from animals). Less than three installations are registered. They are important for emissions of Ni and fat. Main products are meal/pellets from meat, and stearin acid. Suitable NOSE-P groups may be 1050324 "Rendering" and 1070404 "Fat, edible and non-edible oil extraction".

NACE 15.422 (Manufacture of refined oils from vegetables). Less than three installations are included. They give emissions of Ni and fat, particularly fat. Suitable NOSE-P groups may be 1050324 "Rendering" and 1070404 "Fat, edible and non-edible oil extraction".

If oil and fat production from animals, fish and vegetables are all included in the NOSE-P groups 1050324 and 1070404, they seem like suitable groups for the plants in NACE 15.411, 15.421 and 15.422.

NACE 15.7 (Manufacture of prepared animal feeds). Less than three installations with low emissions of water are registered. The installations are not divided into subgroups. Since the NOSE Process List not has a group for animal feed, we suggest a new group *10503xx "Manufacture of animal feeds"*.

NACE 15.71 (Manufacture of prepared feeds for farm animals). 7 installations with some emissions of nitrogen, phosphorus, fat and TOC are registered. The main production seems to be animal food, but also some production of glue is recorded. Suitable NOSE-P group is the one suggested, *10503xx "Manufacture of animal feeds"*.

NACE 15.89 (Manufacture of other food products.). Less than three installations with considerable emissions of formaldehyde, other organic matter, phosphorus and nitrogen are registered. The main product for one of them is natural polymers. It may partly be classified in NOSE-P 1050321 "Other food industry processes based on vegetable products". There may be a need for a NOSE-P group including biotechnology processes, as this is an area which most likely will expand in the coming years.

NACE 17 (Manufacture of textiles). 7 installations with considerable emissions of heavy metals, and some emissions of Hg and oil, are registered at this level (not divided to sub levels). A suitable group for some of the installations is 1050401 "Textile finishing". For the rest of the installations it seems like there is a need for a new group, *10504xx "Spinning and weaving"*.

NACE 17.1 (Preparation and spinning of textile fibres). 4 installations with discharges of sulphate and heavy metals, and some Hg, water and oil are registered. NOSE-P groups 1050401 "Textile finishing" and the new *10504xx "Spinning and weaving"* are suitable.

NACE 17.2 (Weaving). Less than three installations with some emissions of Cu, Zn and oil are recorded. Suitable NOSE-P group may be the suggested one, *10504xx "Spinning and weaving"*. Common for all the textile branches mentioned, is that it is most likely the dyeing process that generates the emissions. There is a NOSE-P group for printing and dyeing operations. But as mentioned it will be difficult to split the emissions to several processes without detailed knowledge.

NACE 18.3 (Dressing and dyeing of fur; manufacture of articles of fur). Less than three installations are registered. They have considerable discharges of Cr. Suitable NOSE-P group is 1050501 "Leather

tanning". It seems like the installations are placed in incorrect NACE code in INKOSYS. NACE 19.1 (Tanning and dressing of leather) seems to be a more appropriate group.

NACE 19.1 (Tanning and dressing of leather). Less than three installations are registered. They have considerable discharges of Cr and H₂S. Suitable NOSE-P groups are 1050501 "Leather tanning" and 1050502 "Treatment of skins and leathers". Again, the INKOSYS data does not allow a splitting of the emissions to several processes.

NACE 20.2 (Manufacture of veneer sheets, plywood, laminboard, particle board, fibre board and other panels and boards). Less than three installations are registered in this branch. They have some discharge of water. Suitable NOSE-P group is 1050601 "Chipboard". But manufacture of other boards, especially fibre boards, is also important at the installations.

NACE 21 (Manufacture of pulp, paper and paper products). 5 installations which are not divided to sub levels, are registered. They give considerable discharges of nitrogen, suspended dry matter, phosphorus, Cu and absorbable chloroorganic matter. The installations can be divided into the NOSE-P groups; 1050701 "Paper pulp (Kraft process)", 1050702 "Paper pulp (acid sulphite process)" and 1050703 "Paper pulp (Neutral Sulphite Semi-Chemical process)". The two processes first mentioned are probably the most important ones for Norway. The installations also produce paper, but that is not included in the NOSE Process List. We suggest a new group to be made, *10507xx "Production of paper and paperboard"*.

NACE 21.1 (Manufacture of pulp, paper and paperboard). Three installations, which are not specified to sub level, are registered. Considerable emissions of suspended organic matter, water and nitrogen are recorded. NOSE-P group 10507 "Characteristic processes in the manufacture of pulp, paper and paper products" seems to be insufficient for Norway. The suggested group *10507xx "Production of paper (including paper used for newspaper) and paperboard"* is suitable for the installations.

NACE 21.111 (Manufacture of mechanical pulp). 5 installations are recorded. They give considerable emissions of nitrogen, suspended dry matter and organic matter and phosphorus. The installations may partly be included in NOSE-P 1050701 "Paper pulp (Kraft process)" and the new group *10507xx "Production of paper and paperboard"*.

NACE 21.112 (Manufacture of chemical processed pulp). Less than 3 installations are registered. They are important for emissions of suspended organic matter and absorbable chloroorganic compounds. Suitable NOSE-P groups may be 1050702 "Paper pulp (acid sulphite process)", 1050703 "Paper pulp (Neutral Sulphite Semi-Chemical process)" and *10507xx "Production of paper and paperboard"*.

NACE 21.12 (Manufacture of paper and paperboard). 11 installations, which are important for emissions of heavy metals (particular Mn), nitrogen, phosphorus and suspended organic matter, are registered. Suitable NOSE-P group may be the proposed *10507xx "Production of paper and paperboard"*. In addition, some of the installations will also partly be included in 1050706 "Processing waste paper and paperboard".

NACE 21.21 (Manufacture of corrugated paper and paperboard and of containers of paper and paperboard). Less than 3 installations are registered. They have some emissions of heavy metals, CO and water. Production of paper products, like boxes of paper etc. has no proper group in the NOSE Process List. There may be a need for a new group, *10507xx "Paper products"*.

NACE 22.22 (Printing). There are more installations in Norway than the < 3 installations that are registered in INKOSYS (see section 2.1). Low discharges of Cr, Cu and Ni make this branch less important for industrial discharges to water. A suitable NOSE-P groups will be 1070403 "Printing industry".

NACE 23.2 (Manufacture of refined oil petroleum products). Three installations, which are important for emissions of H₂S, cyanide, phenol, DOC, TOC and ammonium are registered. NOSE-P group 1050801 "Petroleum products processing" is suitable. There are several relevant processes included in this group, but we are not able to divide the discharges without further knowledge.

NACE 24 (Manufacture of chemicals and chemical products). 15 installations, which have not been divided to a sub level. The installations are important for emissions of heavy metals (particularly Ti, V, Fe and Mn), dioxins, 1,2-dichloroethane, sulphate, nitrogen, other inorganic matter, chloroorganic matter, TOC and water. Since the production (e.g. pigments based on titanoxide and sulphur acid are among the main products) varies very much between the different installations, the following NOSE-P groups are suitable:

1050901 "Sulphuric acid"

1050907 "NKP fertiliser"

1050910 "Titanium dioxide"

1050913 "Chlorine production"

1050917 "Pigment manufacture (inorganic pigments)"

1050920 "1,2-dichloroethane"

1050921 "Vinylchloride"

1050923 "Polyethylen low density"

1050924 "Polyethylen high density"

1050926 "Polypropylen"

10509xx "Production of acetic acid" (suggestion)

10509xx "Production of methanol" (suggestion)

10510 "Characteristic processes in the manufacture of rubber and plastic"

1070404 "Fat, edible and non-edible oil extraction"

1090102 "Incineration of industrial wastes (except flaring)"

Each of the fifteen installations can be placed in one or several of the NOSE-P groups above.

NACE 24.1 (Manufacture of basic chemicals). Less than 3 installations (not divided to sub levels) are registered. They give discharges of water, and some phenol and TOC. A suitable group may be 10510 "Characteristic processes in the manufacture of rubber and plastic products", as resins, which are used in making plastic, is the main product at one of the installations. One of the other installations seems to have incorrect NACE in INKOSYS. A more appropriate NACE is 11.10 (Extraction of crude petroleum and natural gas. NOSE-P group 1060305 "Natural gas cleaning" a sub group in 10603 "Extraction, 1st treatment and loading of gaseous fuels", is suitable for this installation.

NACE 24.131 (Manufacture of carbides). 4 installations, which are important for emissions of heavy metals, cyanide, PAH, nitrogen, suspended dry matter and water, are registered. The main products are silicium carbide and calcium carbide, so NOSE-P group 1050912 "Calcium carbide production" and 1051213 "Silicium production" seems to be suitable. The latter NOSE-P group is however inaccurate for silicium carbide production.

NACE 24.15 (Manufacture of fertilisers and nitrogen compounds). Less than 3 installations, which are important for the emissions of HCl, methanol, water, nitrogen and other inorganic matter, are registered. NOSE-P group 1050907 "NPK fertilisers" seems to cover the production at the installations, but sub-processes are production of nitric acid and ammonia. Corresponding NOSE-P groups are 1050902 "Nitric acid" and 1050903 "Ammonia". Due to the difficulties to split discharges to several processes without further knowledge, we allocate all to NOSE-P group 1050907.

NACE 24.16 (Manufacture of plastics in primary forms). Less than 3 installations are registered. They give some discharges of Hg. NOSE-P groups 1050925 "Polyvinylchloride" and 1070301 "Polyester processing" seems suitable for the branch according to the main products.

NACE 24.3 (Manufacture of paints, varnishes and similar coatings, printing ink and mastics). 6 installations, which give some discharges of water, are registered. NOSE-P group 1070307 "Paints manufacturing" is suitable.

NACE 24.4 (Manufacture of pharmaceuticals, medicinal chemicals and botanical products). 4 installations, giving emissions of ammonium, Zn, water, organic solvents and other inorganic and organic matter, are registered. NOSE-P group 1070306 "Pharmaceutical products manufacturing" seems to be suitable.

NACE 24.51 (Manufacture of soap and detergents, cleaning and polishing preparations). Less than 3 installations, giving emissions of SO₃-S, SO₄-S and other organic matter, are registered. The main product is detergents. No NOSE-P group seems to cover this production, so a suggestion is made, 10509xx "Manufacture of soap and detergents".

NACE 24.6 (Manufacture of other chemical products). Three installations giving emissions of water and TOC, are registered. NOSE-P group 1070315 "Chemical products manufacturing or processing, other" seems to cover the branch.

NACE 24.61 (Manufacture of explosives). Less than 3 installations, giving emissions of nitrogen (tot-N and NO₃-N), SO₄-S, water and other organic matter, are registered. No NOSE-P group seems to cover the production in this branch, so a proposal will be 10509xx "Manufacture of explosives".

NACE 25 (Manufacture of rubber and plastic products). Less than 3 installations (not divided to sub level in INKOSYS) giving low emissions of water and oil are registered. Proper NOSE-P group may be 10510 "Characteristic processes in the manufacture of rubber and plastic products".

NACE 25.21 (Manufacture of plastic plates, sheets, tubes and profiles). Less than 3 installations giving low emissions of phosphorus and water, are registered. Corresponding NOSE-P group may be 1070304 "Polystyrene foam processing", since the main product of the branches are production of foam rubber from polymers of styrene.

NACE 25.24 (Manufacture of other plastic products). 4 installations with low emissions of water and TOC are registered. Since the main product is articles of rubber, NOSE-P 10510 "Characteristic processes in the manufacture of rubber and plastic products" seems to be the only one suitable.

NACE 26.1 (Manufacture of glass and glass products). 5 installations are registered. They give considerable discharges of formaldehyde and phenol, and some fluoride, Pb and water. NOSE-P group suitable: 1051103 "Glass (decarbonizing)" and 1051105 "Glass working". It is unclear to us what the latter group includes. However most likely it is the colouring process that matters for the discharges to water.

NACE 26.51 (Manufacture of cement). Less than 3 installations are registered, with small emissions of suspended dry matter. Suitable NOSE-P group may be 1051102 "Cement (decarbonizing)".

NACE 26.8 (Manufacture of other non-metallic mineral products). 4 installations are registered. They give discharges of water, and some phenol and TOC. The main products are concrete and glass wool. NOSE-P 1041103 "Concrete plants" and 1041107 "Glass wool (except binding)" may be suitable. These groups apply to production processes involving fuel combustion. Since the emissions to water registered in INKOSYS seems to originate from the production process, we suggest two new NOSE-P groups, 10511xx "Glass wool" and 10511xx "Concrete".

NACE 27.1 (Manufacture of basic iron, steel and ferro-alloys). Less than 3 installations, giving discharges of oil, are registered. The main product is iron/steel bars. A breakdown according to NOSE-P gives the following groups:

1051205 "Open hearth furnace steel plant"

1051206 "Basic oxygen furnace steel plant"

1051207 "Electric furnace steel plant"

1051203 "Pig iron tapping"

It is difficult to relate discharges to the different processes without further knowledge.

NACE 27.3 (Other first processing of iron and steel and production of ferro alloys). 10 installations, including the large ferro alloy industry, are registered. They give considerable emissions of heavy metals (particularly Zn, Al and Fe), suspended dry matter, water and some emission of CO and PAH. A breakdown to NOSE-P group gives 1051212 "Ferro alloys".

NACE 27.4 (Manufacture of precious and non-ferrous metals). Less than 3 installations are registered. They are important for discharges of Mo, phosphorus and water. NOSE-P group 10512 "Characteristic processes in the manufacture of basic metals and fabricated metal products", seems to miss a sub level. A suggested group for one of the installations making constructions and articles of aluminium, is 10512xx "*Manufacture of metal constructions/articles*". One of the other installations recycles aluminium, for which NOSE-P group 10514 "Characteristic processes in recycling industries" is relevant (the group has no sub-level).

NACE 27.421 (Production of primary aluminium). 7 installations are registered. They give considerable emissions of SO₂, fluorides, water, PAH, tar and heavy metals. Proper NOSE-P group is 1051211 "Aluminium production (electrolysis)".

NACE 27.45 (Other non-ferrous metal production). 4 installations are registered. They give considerable emissions of Cd, Pb, Zn, Co, organic halon compounds, Hg, dioxins, hexachlorbenzene and other heavy metals. Main products at the installations are Mg, Ni, Zn, and precious metals. Since there are no NOSE-P groups for zinc production and manufacture of precious metals other than 1051203 "Other", new groups are suggested. Proper NOSE-P groups for the installations are:
1051214 "Magnesium production"
1051215 "Nickel production"
10512xx "*Zinc production*" (suggestion)
10512xx "*Manufacture of precious metals*" (suggestion)

NACE 27.5 (Casting of metals) and NACE 27.54 (Casting of other non-ferrous metals). Less than 3 installations, with some emissions of heavy metals and water, are registered. The main products are several articles of different metals, so the new NOSE-P 10512xx "*Manufacture of metal constructions/articles*" may be proper.

NACE 28.1 (Manufacture of structural metal products). Less than 3 installations, with low discharge of oil, are registered. A proper NOSE-P group may be the suggested 10512xx "*Manufacture of metal constructions/articles*".

NACE 28.4 (Forging, pressing, stamping and roll forming of metal; powder metallurgy). Less than 3 installations, which give low emissions of Al, Cr and water, are registered. The main products are plates/band of aluminium. No proper NOSE-P group found, but the new group 10512xx "*Manufacture of metal constructions/articles*" may be proper.

NACE 28.5 (Treatment and coating of metals; general mechanical engineering). 85 installations are included. They are important for discharges of heavy metals, free cyanide, water and fluoride. The main products differ between the installations, e.g. instruments in connection to electric circuits, nails and screws of steel/iron, pump for liquid, thread of iron/steel, other iron/steel construction, machine, machine parts. Common for the production of the products are processes like sandblasting, purifying of metals, industry painting, galvanising etc. The following NOSE-P groups are suitable:

1050102 "Galvanising"
1050105 "Impregnation treatment (other than wood)"
1050106 "Pickling"
1050107 "Mechanical grinding"
1050111 "Laboratory processes"

It is unclear to us what the latter group includes. It is difficult to distribute the discharges between NOSE processes, as technical knowledge is needed to know where they should be placed.

NACE 28.75 (Manufacture of other fabricated metal products.). Less than 3 installations are registered. They give low emissions of heavy metals and fluorides. The main business is metal pickling. Proper NOSE-P group is 1050106 "Pickling".

NACE 29.3 (Manufacture of agricultural and forestry machinery). Less than 3 installations are registered, giving some discharges of heavy metals and water. No proper NOSE-P group is found in the NOSE Process List. A proposal could be group 1050107 "Mechanical grinding", a process that most likely is included in the branch as the main product is plows.

NACE 31 (Manufacture of electrical machinery and apparatus). Less than 3 installations with some discharges of heavy metals and water. Since the main product is lead accumulators, NACE 31.40 (Manufacture of accumulators, primary cells and primary batteries) seems to be more appropriate. NOSE-P group 1051301 "Batteries manufacturing" seems to be relevant.

NACE 40 (Electricity, gas, steam and hot water supply). 10 installations, including hospitals and water cleaning installations, are registered. They give considerable emissions of Cl₂ (g), some emissions of Hg, Pb, Cd and SO₄-S. Proper NOSE-P group is 10515 "Characteristic processes in collection, purification and distribution of water".

NACE 60 (Land transport; transport via pipelines). Less than 3 installations, with some discharges of phenol, TOC and some oil, are registered. Suitable NOSE-P group is 1060601 "Pipelines". Only the point source emissions are reported in INKOSYS.

NACE 74.81 (Photographic activities). Less than 3 installations are registered. Only some discharges of Ag are reported. The NOSE-P group 1070311 "Adhesive, magnetic tapes, films and photographs (chemical products manufacturing or processing)" seems relevant.

NACE 75 (Public administration and defence; compulsory social security). Less than 3 installations, with low discharges of oil, are registered. An appropriate NOSE-P group is 1050111 "Laboratory processes".

NACE 90.00 (Sewage and refuse disposal, sanitation and similar activities). Less than 3 installations, some emission of ammonia, heavy metals and water, insignificant emission of Hg. One of the installations recycle scrap iron. It seems like the installation is placed in incorrect NACE in INKOSYS. NACE 37.10 (Recycling of metal waste and scrap) seems to be a more appropriate. A relevant NOSE-P group will be 10514 "Characteristic processes in recycling industries" (the group has no sub-level).

In the following, we have made a list of the branches to which there has not been suggested a NOSE-P group, due to difficulties and besides most of them have low discharges to water.

- NACE 26.2 (Manufacture of non-refractory ceramic goods other than for construction purposes; manufacture of refractory ceramic products). Three installations registered, discharge of suspended dry matter.
- NACE 26.4 (Manufacture of bricks, tiles and construction products, in baked clay). Less than 3 installations registered, low discharge of water.
- NACE 26.61 (Manufacture of concrete products for construction purposes). Less than 3 installations registered, inconsiderable discharge of water.
- NACE 35.111 (Building and repairing of ships and hulls more than 100 g.r.tons). Less than 3 installations, low discharges of nitrogen, phosphorus, water, TOC and oil.

3. Conclusions and summary

Table 2 summarises the classification of NACE branches according to the NOSE Process List. It also shows the main products in each branch. There may be other products, but only the products with the largest production is mentioned in the table.

Table 2. Classifying NACE branches according to NOSE Process List. Norwegian plants. (Proposed new groups in italics).

NACE		Main products	NOSE-P	
13.1	Mining of iron ores	Iron ore	1050201	Extraction of mineral ores
13.2	Mining of non-ferrous metal ores, except uranium and thorium ores	Zink ore	1050201	Extraction of mineral ores
14.3	Mining of chemical and fertiliser minerals	Lime stone	1050202	Other (incl. asbestos prod.)
14.5	Other mining and quarrying	Natural grafit	1050202	Other (incl. asbestos prod.)
15	Manufacture of food products and beverages	Yeast and sweetening	1050318 <i>10503xx</i>	Yeast industry <i>Sweetening</i>
15.31	Processing and preserving of potatoes	Potatoes, prepared/conserved	1050320	Chicory, potatoes
15.411	Manufacture of crude fish oils and fats	Meal/pellets of herring and fish, fish oil	1050326 1070404	Fish processing Fat, edible and non-edible oil extraction
15.421	Manufacture of refined oils from animals	Meal/pellets of meat, stearin acid	1050324 1070404	Fish processing Fat, edible and non-edible oil extraction
15.422	Manufacture of refined oils from vegetables	Oil cakes	1050324 1070404	Fish processing Fat, edible and non-edible oil extraction
15.7	Manufacture of prepared animal feeds	Animal feed	<i>10503xx</i>	<i>Manufacture of animal feeds</i>
15.71	Manufacture of prepared feeds for farm animals	Animal feed	<i>10503xx</i>	<i>Manufacture of animal feeds</i>
15.89	Manufacture of other food products	Animal feed	<i>10503xx</i>	<i>Manufacture of animal feeds</i>
17	Manufacture of textiles	Wool products, bedclothes and textiles	1050401 <i>10504xx</i>	Textile finishing <i>Spinning and weaving</i>
17.1	Preparation and spinning of textile fibres	Wool products	1050401 <i>10504xx</i>	Textile finishing <i>Spinning and weaving</i>
17.2	Textile weaving	Textiles	<i>10504xx</i>	<i>Spinning and weaving</i>
18.3	Dressing and dyeing of fur; manufacture of articles of fur	Leather	1050501	Leather tanning
19.1	Tanning and dressing of leather	Leather	1050501 1050502	Leather tanning Treatment of skins and leathers
20.2	Manufacture of veneer sheets, plywood, laminboard, particle board, fibre board and other panels and boards	Chipboard, fibre boards, other boards	1050601	Chipboard
21	Manufacture of pulp, paper and paper products	Pulp and paper	1050701 1050702 1050703 <i>10507xx</i>	Paper pulp (kraft process) Paper pulp (acid sulphite process) Paper pulp (Neutral Sulphite Semi-Chemical process) <i>Production of paper and paperboard</i>
21.1	Manufacture of pulp, paper and paperboard	Paper used for newspapers, and paperboard	<i>10507xx</i>	<i>Production of paper and paperboard</i>
21.111	Manufacture of mechanical pulp	Pulp and paper used for newspaper	1050701 <i>10507xx</i>	Paper pulp (kraft process) <i>Production of paper and paperboard</i>

21.112	Manufacture of chemical processed pulp	Pulp and paper	1050702 1050703 <i>10507xx</i>	Paper pulp (acid sulphite process) Paper pulp (Neutral Sulphite Semi-Chemical process) <i>Production of paper and paperboard</i>
21.12	Manufacture of paper and paperboard	Paper and paperboard	1050706 <i>10507xx</i>	Processing waste paper and paperboard <i>Production of paper and paperboard</i>
21.21	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard	Boxes of corrugated paper	<i>10507xx</i>	<i>Paper products</i>
22.22	Printing	Magazines	1070403	Printing industry
23.2	Manufacture of refined oil petroleum products	Petroleum products	1050801	Petroleum products processing
24	Manufacture of chemicals and chemical products	Varies a lot between the installations	1050901 1050907 1050910 1050913 1050917 1050920 1050921 1050923 1050924 1050926 <i>10509xx</i> <i>10509xx</i> 10510 1090102	Sulphuric acid NKP fertiliser Titanium dioxide Chlorine production Pigment manufacture (inorganic pigments) 1,2-dichloroethane Vinylchloride Polyethylen low density Polyethylen high density Polypropylen <i>Production of acetic acid</i> <i>Production of methanol</i> Characteristic processes in the manufacture of rubber and plastic Incineration of industrial wastes (except flaring)
24.1	Manufacture of basic chemicals	Natural gas and resins	1060305 10510	Natural gas cleaning Characteristic processes in the manufacture of rubber and plastic
24 131	Manufacture of carbides	Carbides of silicium and calcium	1050912 1051213	Calcium carbide production Silicium production
24.15	Manufacture of fertilisers and nitrogen compounds	Fertiliser	1050907 1050902 1050903	NKP fertiliser Nitric acid Ammonia
24.16	Manufacture of plastics in primary forms	Plastic	1050925 1070301	Polyvinylchloride Polyester processing
24.3	Manufacture of paints, varnishes and similar coatings, printing ink and mastics	Paint	1070307	Paints manufacturing
24.4	Manufacture of pharmaceuticals, medicinal chemicals and botanical products	Pharmaceutical products	1070306	Pharmaceutical products manufacturing
24.51	Manufacture of soap and detergents, cleaning and polishing preparations	Detergents	<i>10509xx</i>	<i>Manufacture of soap and detergent</i>
24.6	Manufacture of other chemical products	Chemicals	1070315	Chemical products manufacturing or processing, other
24.61	Manufacture of explosives	Explosives	<i>10509xx</i>	<i>Manufacture of explosives</i>
25	Manufacture of rubber and plastic products	Rubber and plastic products	10510	Characteristic processes in the manufacture of rubber and plastic
25.21	Manufacture of plastic plates, sheets, tubes and profiles	Foam rubber products from polymers of styrene	1070304	Polystyrene foaming

25.24	Manufacture of other plastic products	Isolators and parts for electric equipment, and rubber products	10510	Characteristic processes in the manufacture of rubber and plastic
26.1	Manufacture of glass and glass products	Glass and glass fibres	1051103 1051105	Glass (decarbonizing) Glass working
26.2	Manufacture of non-refractory ceramic goods other than for construction purposes; manufacture of refractory ceramic products	China	<i>No proper group</i>	
26.4	Manufacture of bricks, tiles and construction products, in baked clay	Bricks	<i>No proper group</i>	
26.51	Manufacture of cement	Cement	1051102	Cement (decarbonizing)
26.61	Manufacture of concrete products for construction purposes	Concrete products	<i>No proper group</i>	
26.8	Manufacture of other non-metallic mineral products	Concrete and glass wool	10511xx 10511xx	Concrete Glass wool
27.1	Manufacture of basic iron, steel and ferro-alloys	Rod iron/steel	1051203 1051205 1051206 1051207	Pig iron tapping Open hearth furnace steel plant Basic oxygen furnace steel plant Electric furnace steel plant
27.3	Other first processing of iron and steel and production of ferro alloys	Ferro alloys	1051212	Ferro alloys
27.4	Manufacture of basic precious and non-ferrous metals	Recycling of metals, and constructions/articles of aluminium	10512xx 10514	<i>Manufacture of metal constructions/articles</i> Characteristic processes in recycling industries
27.421	Production of primary aluminium	Aluminium	1051211	Aluminium production (electrolysis)
27.45	Other non-ferrous metal production	Ni, Mg, Zn, Ag, Au and Pt	1051214 1051215 10512xx 10512xx	Magnesium production Nickel production Zinc production <i>Manufacture of precious metals</i>
27.5	Casting of metals	Articles of different metals	10512xx	<i>Manufacture of metal constructions/articles</i>
27.54	Casting of other non-ferrous metals	Articles of different metals	10512xx	<i>Manufacture of metal constructions/articles</i>
28.1	Manufacture of structural metal products	Metal constructions	10512xx	<i>Manufacture of metal constructions/articles</i>
28.4	Forging, pressing, stamping and roll forming of metal; powder metallurgy	Plates/band of aluminium	10512xx	<i>Manufacture of metal constructions/articles</i>
28.5	Treatment and coating of metals; general mechanical	Differ a lot between the installations. Nails and screws, thread, constructions of steel/iron, machine parts etc.	1050102 1050105 1050106 1050107 1050111	Galvanising Impregnation treatment (other than wood) Pickling Mechanical grinding Laboratory processes
28.75	Manufacture of other fabricated metal products	Metal painting	1050106	Pickling
29.3	Manufacture of agricultural and forestry machinery	Plows	1050107	Mechanical grinding
31	Manufacture of electrical machinery and apparatus	Lead accumulators	1051301	Batteries manufacturing
35.111	Building and repairing of ships and hulls more than 100 g.r.tons	Building and reparation of ships	<i>No proper group</i>	
40	Electricity, gas, steam and hot water supply		10515	Characteristic processes in collection, purification and distribution of water
60	Land transport; transport via pipelines		1060601	Gas distribution networks, Pipelines

74.81	Photographic activities		1070311	Adhesive, magnetic tapes, films and photographs (chemical products manufacturing or processing)
75	Public administration and defence; compulsory social security		1050111	Laboratory processes
90	Sewage and refuse disposal, sanitation and similar activities	Recycling of scrap iron	10514	Characteristic processes in recycling industries

The list below summarises the proposed new NOSE-P groups from the testing of the NOSE manual for industrial water discharges in Norway:

- 10503xx *“Sweetening”*
- 10503xx *“Manufacture of animal feeds”*
- 10504xx *“Spinning and weaving”*
- 10507xx *“Production of paper and paperboard”*
- 10507xx *“Paper products”*
- 10509xx *“Manufacture of explosives”*
- 10509xx *“Production of acetic acid”*
- 10509xx *“Production of methanol”*
- 10509xx *“Manufacture of soap and detergents”*
- 10511xx *“Concrete”*
- 10511xx *“Glass wool”*
- 10512xx *“Zinc production”*
- 10512xx *“Manufacture of precious metals”*
- 10512xx *“Manufacture of metal constructions/articles”*

The proposed groups seem to be of a certain importance to industrial water discharges in Norway according to INKOSYS. However, not all the groups represent considerable discharges to water.

Allocating NACE branches to NOSE-P groups is troublesome for several branches, especially for production of basic metals and fabricated metal products, including machinery and equipment. NOSE-P is also insufficient for production of chemical products like explosives, detergents etc., and have a less specific classification for a number of NACE branches (e.g. production of rubber and plastic products). The NACE nomenclature includes codes for production and products, while the NOSE Process List seems to be incomplete regarding production processes for several products.

In some cases it is uncertain whether the branches are included in a NOSE-P group, and it is unclear to us what the group includes. This is the case for branches like NACE 15.411, 15.421 and 26.1 (see table 2). We miss definitions/explanations for what the NOSE-P groups include.

Several processes (defined by several NOSE-P categories) may be relevant for one plant or branch. For several branches it is difficult to split the discharge from one plant or NACE branch to several NOSE-P groups. Detailed process knowledge is needed in order to perform such a splitting. Furthermore, it may be difficult to describe the origin of a discharge when it is unclear what exact kind of production an installation has.

The list above suggests some additives to the NOSE Process List. The industry structure varies greatly between countries. It would therefore be advantageous to test the NOSE Process List in more countries, to achieve knowledge of imperfections and shortcomings not applying to Norwegian conditions.

Further work will be to test the NOSE nomenclature on INKOSYS, which is as mentioned earlier a pollutant register administered by the Norwegian Pollution Control Authority (SFT). The register

covers emission to air, water and waste from about 1000 plants. As a first step this will be done for the larger or most polluting plants only. For each plant we will, in cooperation with SFT, decide which pollutants (including waste and air) belongs to which NOSE headings. Such a splitting of different pollutants to different NOSE headings, will include the emissions from the plants in this work as well, as more technical knowledge will be available.

References

INKOSYS. Industrial discharges to water 1996. The Norwegian Pollution Control Authority.

NOSE, Nomenclature for sources of emissions. Draft manual. Document NOSE/97/7ver0.3.

Standard Industrial Classification. Official Statistics of Norway (1994). Statistics Norway

Appendix

Table 3. Emission components in the data set used for testing.

Abbreviation	Components
Tot N	Total Nitrogen
NH ₃	Ammonia
NH ₄ -N	Ammonium compounds
SS	Suspended dry matter
S	Sulphur
SO ₂	Sulphur dioxide
SO ₃ -S	Sulphite
SO ₄ -S	Sulphate
Tot P	Total phosphorus
K	Potassium
As	Arsenic
Cu	Copper
Ni	Nickel
Cd	Cadmium
Pb	Lead
Zn	Zinc
Tot Cr	Total chrome
Cr ⁶⁺	Chromium ion 6+
Cr ³⁺	Chromium ion 3+
Co	Cobalt
Sn	Tin
Ba	Barium
Fe	Iron
Mn	Manganese
Al	Aluminium
Ag	Silver
Au	Gold
Ti	Titanium
V	Vanadium
Mo	Molybdenum
F	Fluorine

Abbreviation	Components
Water	Water discharges
KOF-DI	Chemical oxygen use - dichromate methode
KOF	Chemical oxygen use
BOF7	Biological oxygen use
S-TS	Organic suspended matter
Fat	Fat
CH ₃ OH	Methanol
DOC	Dissolved organic carbon
TOC	Total organic carbon
F-HYD	Formaldehyde
A-ORG	Other organic compounds
AOX	Absorbable chloroorganic compounds
CH-HAL	Organic halon compounds
ORG-S	Organic solvents
CH-Cl	Chloroorganic compounds
Oil	Oil
H ₂ S	Dihydrogensulphide
CO	Carbon monoxide
Hg	Mercury
INORG	Other inorganic compounds
Tot CN	Total cyanide
CN-free	Cyanide free
Cl ₂	Chlorine gas
Dioxin	Dioxins
HCB	Hexachlorobenzen
EDC	1,2 dichloroethane
PAH	Polycyclic aromatic hydrocarbons
Tar	Tar
HCl	Hydrochloric acid

Table 4. Industrial discharges to water classified according to the NOSE Process List, 1996

NACE	NOSE-P	Tot N	NO ₃ -N	NH ₃	NH ₄ -N	SS	S	SO ₂	SO ₃ -S	SO ₄ -S	Tot P	KOF-DI	BOF7	KOF	S-TS	As	Cu	Ni	Cd
		tonnes	tonnes	tonnes	tonnes	tonnes	kg	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	kg	kg	kg	kg
13.1+13.2+13.20	1050201 Extraction of mineral ores	1				4204284	102885									552	40740	8587	9
14.3+14.5	1050202 Other (incl. asbestos prod.)					705785													
15 + 15.31	1050318 Yeast industry 10503xx Sweetening 1050320 Chicory, potatoes					153				213	2	991					786		
15.411	1050326 Fish processing 1070404 Fat, edible and non-edible oil extraction														114				
15.421+15.422	1050324 Fish processing 1070404 Fat, edible and non-edible oil extraction	4									2	1026						418	
15.7+15.89	10503xx Manufacture of animal feeds	350				8040					45	12190	70						
15.71	10503xx Manufacture of animal feeds	78				31					80	432	282		6				
17	1050401 Textile finishing 10504xx Spinning and weaving	0,6				9				6	0,3			247		0,1	106	1	1
17.1+17.2	1050401 Textile finishing 10504xx Spinning and weaving	0,5				12				53	8			351		0,2	34	0,2	0,01
18.3+19.1	1050501 Leather tanning 1050502 Treatment of skins and leathers	26				1147					0,07	224		130					
20.2	1050601 Chipboard	6				133					1,4	1906		0,1					
21	1050701 Paper pulp (kraft process) 1050702 Paper pulp (acid sulfite process) 1050703 Paper pulp (Neutral Sulphite Semi-Chemical process) 10507xx Production of paper and paperboard	329				2993					19	46780					7862		

		Tot N	NO ₃ -N	NH ₃	NH ₄ -N	SS	S	SO ₂	SO ₃ -S	SO ₄ -S	Tot P	KOF-DI	BOF7	KOF	S-TS	As	Cu	Ni	Cd
21.1	10507xx Production of paper and paperboard	40									7	7174		776	1406				
21.111+ 21.112		59				655					37	37566			3064				
	1050701 Paper pulp (kraft process)																		
	1050702 Paper pulp (acid sulfite process)																		
	1050703 Paper pulp (Neutral Sulphite Semi-Chemical process)																		
	10507xx Production of paper and paperboard																		
21.12+21.2 1+22.22		393				537					32	24016	1	4139	948		38	1	2
	1050706 Processing waste paper and paperboard																		
	10507xx Production of paper and paperboard																		
	10507xx Secondary paper production																		
	1070403 Printing industry																		
23.2	1050801 Petroleum products processing	0,5			25	35					2			284					
24		731		0,2	0,02	1	2			2638	31	94		227			168	347	1
	1050901 Sulphuric acid																		
	1050907 NKP fertiliser																		
	1050910 Titanium dioxide																		
	1050913 Chlorine production																		
	1050917 Pigment manufacture (inorganic pigments)																		
	1050920 1,2-dichloroethane																		
	1050921 Vinylchloride																		
	1050923 Polyethylen low density																		
	1050924 Polyethylen high density																		
	1050926 Polypropylen																		
	10509xx Production of acetic acid																		
	10509xx Production of methanol																		
	10510 Characteristic processes in the manufacture of rubber and plastic																		
	1090102 Incineration of industrial wastes (except flaring)																		

		Tot N	NO ₃ -N	NH ₃	NH ₄ -N	SS	S	SO ₂	SO ₃ -S	SO ₄ -S	Tot P	KOF-DI	BOF7	KOF	S-TS	As	Cu	Ni	Cd
24.1+24.15 +24.16	1060305 Natural gas cleaning 10510 Characteristic processes in the manufacture of rubber and plastic	1103				194					3	15		306					
	1050907 NKP fertiliser 1050902 Nitric acid 1050903 Ammonia 1050925 Polyvinylchloride 1070301 Polyester processing																		
24 131	1050912 Calcium carbid production 1051213 Silicium production	480				42227											209	1923	12
24.3	1070307 Paints manufacturing					0,0003						13		0,001					
24.4	1070306 Pharmaceutical products manufacturing	3			24	363					1	135							
24.51+24.6 1	10509xx Manufacture of soap and detergent 10509xx Manufacture of explosives	13	56						50	259		12							
24.6	1070315 Chemical products manufacturing or processing, other													2112					
25+25.21	10510 Characteristic processes in the manufacture of rubber and plastic products 1070304 Polystyren foaming					13					7	50							
25.24	10510 Characteristic processes in the manufacture of rubber and plastic products																		
26.1	1051103 Glass (decarbonizing) 1051105 Glass working					9								0,2					
26.2+26.4+ 26.61+35.1 11	No proper group	0,04				68410					0,2								
26.51+26.8	1051102 Cement (decarbonizing) 10511xx Concrete 10511xx Glass wool	0,3		0,4		9243					0,1								

		Tot N	NO ₃ -N	NH ₃	NH ₄ -N	SS	S	SO ₂	SO ₃ -S	SO ₄ -S	Tot P	KOF-DI	BOF7	KOF	S-TS	As	Cu	Ni	Cd
27.1+27.3	1051203 Pig iron tapping 1051205- Steel plants 07 1051212 Ferro alloys					388781				2,6							3	23	1
27.4+27.5+ 27.54+28.4	10514 Characteristic processes in recycling industries 10512xx <i>Manufacture of metal constructions/articles</i>					10					1212						1	2	0,01
27.421	1051211 Aluminium production (electrolysis)					1041		472									258	38	46
27.45	1051214 Magnesium production 1051215 Nickel production 10512xx Zinc production 10512xx Manufacture of precious metals										0,5					103	1301	2130	909
28.5	1050102 Galvanizing 1050105 Impregnation treatment (other than wood) 1050106 Pickling 1050107 Mechanical grinding 1050111 Laboratory processes	4								3,4	1,6	3					52	159	1
28.1+28.75 +29.3+31	1050106 Pickling 1050107 Mechanical grinding 1051301 Batteries manufacturing 10512xx <i>Manufacture of metal constructions/articles</i>	1									0,2						2	8	
40	10515 Characteristic processes in collection, purification and distribution of water					3				4					0,001				0,4

		Tot N	NO ₃ -N	NH ₃	NH ₄ -N	SS	S	SO ₂	SO ₃ -S	SO ₄ -S	Tot P	KOF-DI	BOF7	KOF	S-TS	As	Cu	Ni	Cd
60+74.81+ 75+90.00	1060601 Gas distribution networks, Pipelines 1070311 Adhesive, magnetic tapes, films and photographs (chemical products manufacturing or processing) 1050111 Laboratory processes 10514 Characteristic processes in recycling industries			1													0,1	0,1	0,03
	SUM	3623	56	2	49	5434108	102887	472	50	3180	1493	132626	353	8572	5539	655	51559	13637	982

NACE	NOSE-P	Pb	Zn	Tot Cr	Cr ⁶⁺	Cr ³⁺	Co	Sn	Ba	Fe	Mn	Al	Ag	Au	Ti	V	F	Water	Fat
		kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	tonnes	m ³	tonnes
13.1+13.2+13.20	1050201 Extraction of mineral ores	420	122950																
14.3+14.5	1050202 Other (incl. asbestos prod.)																18	25660	
15 + 15.31	1050318 Yeast industry 10503xx Sweetening 1050320 Chicory, potatoes																	1417722	
15.411	1050326 Fish processing 1070404 Fat, edible and non-edible oil extraction																		
15.421+5.422	1050324 Fish processing 1070404 Fat, edible and non-edible oil extraction																		77
15.7+15.89	10503xx Manufacture of animal feeds																	15300	
15.71	10503xx Manufacture of animal feeds																		28
17	1050401 Textile finishing 10504xx Spinning and weaving	13	45	58	0,3		0,3	0,3											13781
17.1+17.2	1050401 Textile finishing 10504xx Spinning and weaving	0,3	58	17	2		0,1	0,02											97833
18.3+19.1	1050501 Leather tanning 1050502 Treatment of skins and leathers			112		306													177132
20.2	1050601 Chipboard																		155466
21	1050701 Paper pulp (kraft process) 1050702 Paper pulp (acid sulfite process) 1050703 Paper pulp (Neutral Sulphite Semi-Chemical process) 10507xx Production of paper and paperboard																		
21.1	10507xx Production of paper and paperboard																		878520

		Pb	Zn	Tot Cr	Cr ⁶⁺	Cr ³⁺	Co	Sn	Ba	Fe	Mn	Al	Ag	Au	Ti	V	F	Water	Fat
21.111+ 21.112	1050701 Paper pulp (kraft process) 1050702 Paper pulp (acid sulfite process) 1050703 Paper pulp (Neutral Sulphite Semi-Chemical process) 10507xx <i>Production of paper and paperboard</i>																		
21.12+21.21 +22.22	1050706 Processing waste paper and paperboard 10507xx <i>Production of paper and paperboard</i> 10507xx <i>Secondary paper production</i> 1070403 Printing industry	9	66	1	0,2				4	589	791	2						11833	
23.2	1050801 Petroleum products processing																		
24	1050901 Sulphuric acid 1050907 NKP fertiliser 1050910 Titanium dioxide 1050913 Chlorine production 1050917 Pigment manufacture (inorganic pigments) 1050920 1,2-dichloroethane 1050921 Vinylchloride 1050923 Polyethylen low density 1050924 Polyethylen high density 1050926 Polypropylen 10509xx <i>Production of acetic acid</i> 10509xx <i>Production of methanol</i> 10510 Characteristic processes in the manufacture of rubber and plastic 1090102 Incineration of industrial wastes (except flaring)	10	752	10	0,3	932				294324	2422				260200	284		14329783	

		Pb	Zn	Tot Cr	Cr ⁶⁺	Cr ³⁺	Co	Sn	Ba	Fe	Mn	Al	Ag	Au	Ti	V	F	Water	Fat
24.1+24.15+ 24.16	1060305 Natural gas cleaning 10510 Characteristic processes in the manufacture of rubber and plastic 1050907 NKP fertiliser 1050902 Nitric acid 1050903 Ammonia 1050925 Polyvinylchloride 1070301 Polyester processing																	119706199	
24 131	1050912 Calcium carbid production 1051213 Silicium production	107	450							559								913283	
24.3	1070307 Paints manufacturing																	152586	
24.4	1070306 Pharmaceutical products manufacturing		494															71000	
24.51+24.61	10509xx <i>Manufacture of soap and detergent</i> 10509xx <i>Manufacture of explosives</i>																	8267	
24.6	1070315 Chemical products manufacturing or processing, other																	650000	
25+25.21	10510 Characteristic processes in the manufacture of rubber and plastic products 1070304 Polystyren foaming																	51154	
25.24	10510 Characteristic processes in the manufacture of rubber and plastic products																	60395	
26.1	1051103 Glass (decarbonizing) 1051105 Glass working	5															0,5	206138	
26.2+26.4+2 6.61+35.111	No proper group																	3064	
26.51+26.8	1051102 Cement (decarbonizing) 10511xx <i>Concrete</i> 10511xx <i>Glass wool</i>																	1129812	

		Pb	Zn	Tot Cr	Cr ⁶⁺	Cr ³⁺	Co	Sn	Ba	Fe	Mn	Al	Ag	Au	Ti	V	F	Water	Fat
27.1+27.3	1051203 Pig iron tapping 1051205-07 Steel plants 1051212 Ferro alloys	26	7434	11	0,01					196900	1339	128200						14095673	
27.4+27.5+27.54+28.4	10514 Characteristic processes in recycling industries 10512xx Manufacture of metal constructions/articles	1	2	20	0,04	0,004	0,03			0,1	0,05	1348						2511851	
27.421	1051211 Aluminium production (electrolysis)	208	58	140													1202	527000000	
27.45	1051214 Magnesium production 1051215 Nickel production 10512xx Zinc production 10512xx Manufacture of precious metals	2867	36207				154			990			0,02					1775	
28.5	1050102 Galvanizing 1050105 Impregnation treatment (other than wood) 1050106 Pickling 1050107 Mechanical grinding 1050111 Laboratory processes	1	295	42	3	0,4		215		986	8	459	4	3			29	348387	3
28.1+28.75+29.3+31	1050106 Pickling 1050107 Mechanical grinding 1051301 Batteries manufacturing 10512xx Manufacture of metal constructions/articles	10	9	29	1	1		2		209		1					0,04	82117	
40	10515 Characteristic processes in collection, purification and distribution of water	3																	

		Pb	Zn	Tot Cr	Cr ⁶⁺	Cr ³⁺	Co	Sn	Ba	Fe	Mn	Al	Ag	Au	Ti	V	F	Water	Fat
60+74.81+ 75+90.00		0,2	1			0,1				17			0,1					15000	
	1060601 Gas distribution networks, Pipelines																		
	1070311 Adhesive, magnetic tapes, films and photographs (chemical products manufacturing or processing)																		
	1050111 Laboratory processes																		
	10514 Characteristic processes in recycling industries																		
	SUM	3680	168820	441	7	1239	154	217	4	494574	4560	130010	4	3	260200	284	1249	684129730	108

		CH ₃ OH	Phenol	DOC	TOC	F-HYD	A-org	AOX	CH-HAL	ORG-S	CH-CL	Oil	K	Mo	INORG	
NACE	NOSE-P	tonnes	kg	tonnes	tonnes	kg	tonnes	tonnes	kg	tonnes	kg	tonnes	tonnes	kg	tonnes	
13.1+13.2+13.20	1050201 Extraction of mineral ores															
14.3+14.5	1050202 Other (incl. asbestos prod.)															
15 + 15.31	1050318 Yeast industry 10503xx Sweetening 1050320 Chicory, potatoes															
15.411	1050326 Fish processing 1070404 Fat, edible and non-edible oil extraction															
15.421+15.422	1050324 Fish processing 1070404 Fat, edible and non-edible oil extraction	5														
15.7+15.89	10503xx Manufacture of animal feeds					493	268									
15.71	10503xx Manufacture of animal feeds				9											
17	1050401 Textile finishing 10504xx Spinning and weaving							0,1				9				
17.1+17.2	1050401 Textile finishing 10504xx Spinning and weaving							0,01				11				
18.3+19.1	1050501 Leather tanning 1050502 Treatment of skins and leathers															
20.2	1050601 Chipboard															
21	1050701 Paper pulp (kraft process) 1050702 Paper pulp (acid sulfite process) 1050703 Paper pulp (Neutral Sulphite Semi-Chemical process) 10507xx Production of paper and paperboard							157								

		CH ₃ OH	Phenol	DOC	TOC	F-HYD	A-org	AOX	CH-HAL	ORG-S	CH-CL	Oil	K	Mo	INORG
21.1	10507xx <i>Production of paper and paperboard</i>														
21.111+ 21.112	1050701 Paper pulp (kraft process) 1050702 Paper pulp (acid sulfite process) 1050703 Paper pulp (Neutral Sulphite Semi-Chemical process) 10507xx <i>Production of paper and paperboard</i>							49				14			
21.12+21.21+ 22.22	1050706 Processing waste paper and paperboard 10507xx <i>Production of paper and paperboard</i> 10507xx <i>Secondary paper production</i> 1070403 Printing industry							0,1							
23.2	1050801 Petroleum products processing		1800	12	31							7			
24	1050901 Sulphuric acid 1050907 NKP fertiliser 1050910 Titanium dioxide 1050913 Chlorine production 1050917 Pigment manufacture (inorganic pigments) 1050920 1,2-dichloroethane 1050921 Vinylchloride 1050923 Polyethylen low density 1050924 Polyethylen high density 1050926 Polypropylen 10509xx <i>Production of acetic acid</i> 10509xx <i>Production of methanol</i> 10510 Characteristic processes in the manufacture of rubber and plastic 1090102 Incineration of industrial wastes (except flaring)	6	79		37		76				6	0,1	26		235

		CH ₃ OH	Phenol	DOC	TOC	F-HYD	A-org	AOX	CH-HAL	ORG-S	CH-CL	Oil	K	Mo	INORG
24.1+24.15+24.16	1060305 Natural gas cleaning 10510 Characteristic processes in the manufacture of rubber and plastic 1050907 NKP fertiliser 1050902 Nitric acid 1050903 Ammonia 1050925 Polyvinylchloride 1070301 Polyester processing	159	30		21							0,4			210
24 131	1050912 Calcium carbid production 1051213 Silicium production														
24.3	1070307 Paints manufacturing														
24.4	1070306 Pharmaceutical products manufacturing							60		129					1054
24.51+24.61	10509xx Manufacture of soap and detergent 10509xx Manufacture of explosives							47							
24.6	1070315 Chemical products manufacturing or processing, other				37										
25+25.21	10510 Characteristic processes in the manufacture of rubber and plastic products 1070304 Polystyren foaming											0,002			
25.24	10510 Characteristic processes in the manufacture of rubber and plastic products				1										
26.1	1051103 Glass (decarbonizing) 1051105 Glass working		2050			2640						0,1			2
26.2+26.4+26.61+35.111	No proper group				0,5							1			
26.51+26.8	1051102 Cement (decarbonizing) 10511xx Concrete 10511xx Glass wool		13		7										

		CH ₃ OH	Phenol	DOC	TOC	F-HYD	A-org	AOX	CH-HAL	ORG-S	CH-CL	Oil	K	Mo	INORG
27.1+27.3	1051203 Pig iron tapping 1051205- Steel plants 07 1051212 Ferro alloys											40			
27.4+27.5+ 27.54+28.4	10514 Characteristic processes in recycling industries <i>10512xx Manufacture of metal constructions/articles</i>											4		6	
27.421	1051211 Aluminium production (electrolysis)				26							0,2			
27.45	1051214 Magnesium production 1051215 Nickel production 10512xx Zinc production 10512xx Manufacture of precious metals								107						
28.5	1050102 Galvanizing 1050105 Impregnation treatment (other than wood) 1050106 Pickling 1050107 Mechanical grinding 1050111 Laboratory processes	0,4			0,1							3			
28.1+28.75+2 9.3+31	1050106 Pickling 1050107 Mechanical grinding 1051301 Batteries manufacturing <i>10512xx Manufacture of metal constructions/articles</i>											0,4		1	1
40	10515 Characteristic processes in collection, purification and distribution of water											0,03			

		CH ₃ OH	Phenol	DOC	TOC	F-HYD	A-org	AOX	CH-HAL	ORG-S	CH-CL	Oil	K	Mo	INORG
60+74.81+			633		52							5			
75+90.00															
	1060601														
	1070311														
	1050111														
	10514														
	SUM	170	4605	12	222	3133	451	207	107	129	6	95	26	7	1501

NACE	NOSE-P	H ₂ S kg	CO tonnes	Hg kg	Tot CN kg	CN-free kg	Cl ₂ tonnes	Dioxin g	HCB tonnes	EDC tonnes	PAH tonnes	Tar kg	HCl kg
13.1+13.2+13.20	1050201 Extraction of mineral ores												
14.3+14.5	1050202 Other (incl. asbestos prod.)												
15 + 15.31	1050318 Yeast industry 10503xx Sweetening 1050320 Chicory, potatoes												
15.411	1050326 Fish processing 1070404 Fat, edible and non-edible oil extraction												
15.421+15.422	1050324 Fish processing 1070404 Fat, edible and non-edible oil extraction												
15.7+15.89	10503xx Manufacture of animal feeds												
15.71	10503xx Manufacture of animal feeds												
17	1050401 Textile finishing 10504xx Spinning and weaving			0,07									
17.1+17.2	1050401 Textile finishing 10504xx Spinning and weaving			0,02									
18.3+19.1	1050501 Leather tanning 1050502 Treatment of skins and leathers	268											
20.2	1050601 Chipboard												
21	1050701 Paper pulp (kraft process) 1050702 Paper pulp (acid sulfite process) 1050703 Paper pulp (Neutral Sulphite Semi-Chemical process) 10507xx Production of paper and paperboard												
21.1	10507xx Production of paper and paperboard												

		H ₂ S	CO	Hg	Tot CN	CN-free	Cl ₂	Dioxin	HCB	EDC	PAH	Tar	HCl
21.111+21.112	1050701 Paper pulp (kraft process) 1050702 Paper pulp (acid sulfite process) 1050703 Paper pulp (Neutral Sulphite Semi-Chemical process) 10507xx <i>Production of paper and paperboard</i>												
21.12+21.21+22.22	1050706 Processing waste paper and paperboard 10507xx <i>Production of paper and paperboard</i> 10507xx <i>Secondary paper production</i> 1070403 Printing industry		0,3	0,003									
23.2	1050801 Petroleum products processing	1120			476		4						
24	1050901 Sulphuric acid 1050907 NKP fertiliser 1050910 Titanium dioxide 1050913 Chlorine production 1050917 Pigment manufacture (inorganic pigments) 1050920 1,2-dichloroethane 1050921 Vinylchloride 1050923 Polyethylen low density 1050924 Polyethylen high density 1050926 Polypropylen 10509xx <i>Production of acetic acid</i> 10509xx <i>Production of methanol</i> 10510 Characteristic processes in the manufacture of rubber and plastic 1090102 Incineration of industrial wastes (except flaring)			4			3	0,1	4E-05	0,01			

		H ₂ S	CO	Hg	Tot CN	CN-free	Cl ₂	Dioxin	HCB	EDC	PAH	Tar	HCl
24.1+24.15+ 24.16	1060305 Natural gas cleaning 10510 Characteristic processes in the manufacture of rubber and plastic 1050907 NKP fertiliser 1050902 Nitric acid 1050903 Ammonia 1050925 Polyvinylchloride 1070301 Polyester processing			0,07									304688
24 131	1050912 Calcium carbid production 1051213 Silicium production			4	57000						2		
24.3	1070307 Paints manufacturing												
24.4	1070306 Pharmaceutical products manufacturing												
24.51+24.61	10509xx Manufacture of soap and detergent 10509xx Manufacture of explosives												
24.6	1070315 Chemical products manufacturing or processing, other												
25+25.21	10510 Characteristic processes in the manufacture of rubber and plastic products 1070304 Polystyren foaming												
25.24	10510 Characteristic processes in the manufacture of rubber and plastic products												
26.1	1051103 Glass (decarbonizing) 1051105 Glass working												
26.2+26.4+ 26.61+35.111	No proper group												
26.51+26.8	1051102 Cement (decarbonizing) 10511xx Concrete 10511xx Glass wool												

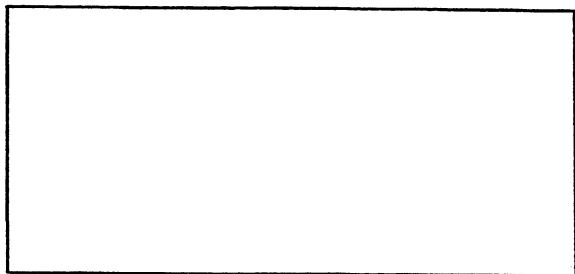
		H ₂ S	CO	Hg	Tot CN	CN-free	Cl ₂	Dioxin	HCB	EDC	PAH	Tar	HCl
27.1+27.3	1051203 Pig iron tapping 1051205-07 Steel plants 1051212 Ferro alloys		0,03	1							0,1		
27.4+27.5+ 27.54+28.4	10514 Characteristic processes in recycling industries 10512xx <i>Manufacture of metal constructions/articles</i>			0,002									
27.421	1051211 Aluminium production (electrolysis)										7	6132	
27.45	1051214 Magnesium production 1051215 Nickel production 10512xx Zinc production 10512xx Manufacture of precious metals			6				2	0,002				
28.5	1050102 Galvanizing 1050105 Impregnation treatment (other than wood) 1050106 Pickling 1050107 Mechanical grinding 1050111 Laboratory processes				5	3							
28.1+28.75+ 29.3+31	1050106 Pickling 1050107 Mechanical grinding 1051301 Batteries manufacturing 10512xx <i>Manufacture of metal constructions/articles</i>												
40	10515 Characteristic processes in collection, purification and distribution of water			1			280						

		H ₂ S	CO	Hg	Tot CN	CN-free	Cl ₂	Dioxin	HCB	EDC	PAH	Tar	HCl
60+74.81+75+ 90.00				3E-06									
	1060601 Gas distribution networks, Pipelines												
	1070311 Adhesive, magnetic tapes, films and photographs (chemical products manufacturing or processing)												
	1050111 Laboratory processes												
	10514 Characteristic processes in recycling industries												
	SUM	1388	0,3	15	57481	3	287	2	0,002	0,01	10	6132	304688

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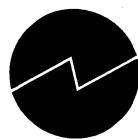
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