

**27<sup>th</sup> Voorburg Group Meeting on Services  
Statistics**

Warsaw, Poland  
October 1-5, 2012

**Sector Paper: Waste Management and  
Remediation Services**

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The views expressed in this paper are those of the author and do not necessarily represent the position of the U.S. Census Bureau or any other organization with whom the author may be affiliated.

## **1.0 Introduction**

ISIC Divisions 37-39, broadly covering waste management and remediation activities, are areas of growing interest in many countries. There is a wide range of environmental regulation in place throughout the world. A material that is regulated as hazardous in one country might not be regulated at all in another. Mandatory recycling rules, landfill shortages, and other conditions in each country result in differences in data content even when using the same international classifications. Differing mixes of public and private enterprises also provide waste management and remediation services.

This paper includes the experiences of the United States and Sweden when measuring turnover/output and the experiences of Korea, UK, and France for Services Producer Price Indices presented at the 26<sup>th</sup> Meeting of the Voorburg Group in Newport, Wales. The standard format for sector papers includes a discussion of classification, a discussion of turnover statistics, and a discussion of SPPIs.

Although the Group concluded that there are too many outstanding questions to develop a definitive set of best practices, the sector paper format is being applied to summarize the discussions and to provide a consistent framework for information.

## **2.0 Classification**

Households, businesses and governmental units consume waste management and remediation services. Private businesses and government entities provide waste management services. Regardless of the type of provider, the services are the same although they present different measurement challenges. The Voorburg Group reviewed ISIC Rev 4, NAICS United States 2007, JSIC, NACE Rev 2, and ANZSIC to compare the industry treatments. On the product side, the Group reviewed the CPC Ver. 2, the CPA, ANZSPC, and provisional NAPCS products from the United States. Appendix 2 includes a listing of the different industry classifications reviewed and Appendix 3 shows the detailed product classifications. The sections below summarize the findings.

### **2.1 Industry Classification**

The industry classifications all covered approximately the same activities but with varying levels of detail from a low of 5 industries to a high of 17. While the content was similar, the arrangement and organization differed between the classifications. For example,

- Septic tank services – ISIC sewerage, NAICS other waste management services, JSIC domestic waste disposal
- Aggregations exist for solid waste collection vs. solid waste treatment and disposal for ISIC, NACE, NAICS and ANZSIC

- JSIC broken down by domestic vs. industrial waste collection and treatment
- ISIC and NACE include a class for dismantling of wrecks, JSIC includes an industry for dead domestic animal disposal services.

The differences in classification support the Voorburg Group decision to cover ISIC 37-39 together because national and regional differences make it hard to compare data below that aggregated level in many countries. Several of the presentations noted a significant overlap between establishments classified in water treatment and sewerage. In many cases, combined municipal entities provide both water and sewerage services. Countries may wish to approach turnover for these activities in a combined effort if local conditions indicate that there is substantial overlap.

## **2.2 Product Classification**

The product classifications had even greater variations in the level of detail included for waste management activities. The number of detailed products ranged from 9 to 128. The level of detail differences did not always agree. For example, one product classification might have had considerable detail for remediation activities while another had considerable detail for different types of waste.

- CPC focuses on the waste management services only and includes no detail for recyclable materials. The CPA focuses on the services provided.
- CPA includes a large number of products for the waste materials, recyclable materials, and secondary metals resulting from reprocessing.
- NAPCS focuses on the services as well and includes a strong focus on various aspects of remediation services from assessment services, planning services, clean-up services, to monitoring services for remediation projects

The differences in the content of the product classifications pointed out the need to better understand the outputs of the waste management industries. There are services provided but there is also a growing source of recyclable materials that can offset service fees or augment total revenue.

## **2.3 Other relevant classification information**

Based on the discussions at the meeting, the question of goods vs. services was raised with the Technical Subgroup of the Expert Group on International Social and Economic Classifications (TSG) during the review of the CPC. The CPA treatment identifies the goods as either waste products or secondary raw materials. There was not complete agreement that waste and secondary raw materials were the only categories of tangible outputs. To use the example of aluminum recycling, there are most likely three distinct groupings or stages. Aluminum cans are

collected (either via can deposits and central collection or via curbside recycling programs). The cans are then crushed and bundled for sale to secondary aluminum processors. These cans are not waste but they are also not yet a secondary raw input. There can be multiple transactions from recyclable materials collection businesses to sorting businesses, to wholesalers of recyclable materials, and to processors. While some of these transactions are margin activities, others involve processing and the treatment and the basis for measurement is not as clear.

The TSG has not resolved the treatment in the CPC but the work of the Voorburg Group did raise the issue to the forefront of discussion. The most recent communications indicate that there may be no changes because the Harmonized System does not make a distinction between waste and recyclable materials and the goods products are defined in the CPC based on the HS.

### 3.0 Turnover Statistics

#### 3.1 Data Availability

Turnover data for waste management activities was broadly available based on the country responses to the detailed status report circulated and compiled by the Voorburg Group prior to the meeting in Wales. Although data availability varied by ISIC 2-digit, 75% to 85% of the countries responding had turnover data available at some level of detail. Most were at the industry level but a minority also included some sub-industry product detail. Table 1 includes a breakout by ISIC 2-digits of the number of countries that reported available turnover statistics. Industry-by-industry data are available in Appendix 1.

**Table 1: Availability of turnover information, 2011**

ISIC 4		Annual	Monthly/Quarterly	Product
37	Sewerage	18	8	6
38	Waste collection, treatment and disposal activities; materials recovery	19	9	6
39	Remediation activities and other waste management services	17	6	5

Source: Voorburg Group Detailed Status Report Summary, 2011. There were 23 country responses to this survey.

#### 3.2 Data Collection

Data for waste management are collected using both sample surveys and censuses. Respondents to the detailed status report indicated that turnover data is also obtained from tax authorities, input/output estimates and other sources.

When primary data collections are used, they often include inquiries on other variables including employment, payroll, expenses, capital expenditures, and other variables of interest. Data produced more frequently than annual almost universally uses a sample survey methodology.

### **3.3 Data Issues**

When developing estimates of turnover for waste management activities, there are a number of data issues that must be considered. In many countries, a large proportion of waste management activities are performed by public entities rather than private businesses. Business surveys will not necessarily provide a complete picture of the activity. The variation can be by activity or by municipality. The United States noted that municipalities often perform waste management activities for single-family housing while private entities frequently provided waste management services for multifamily housing and businesses. However, even that general observation is subject to great variability. Providers can often switch from public to private via outsourcing. This can lead to inaccurate growth trends in output data if all providers are not in scope. Therefore, a complete picture of waste management activities will require data from the appropriate institutional sectors in each country.

There is also considerable overlap in production for companies operating in ISIC 37-39. If attempting to provide product coverage, data across ISIC divisions might be necessary. There was also considerable overlap between ISIC divisions 36 and 37. Full coverage at the product level would then require survey coverage of the entire ISIC Section E.

Finally, there are unanswered questions about the most appropriate measurement of outputs in this industry. While municipal activities are often estimated based on expenses or tax payments, there is some ambiguity in what taxes provide for when tax bills are not broken down into line items but rather go toward a general fund. There is also a mix of services and tangible goods, particularly in the case of recyclable materials. Both revenue streams must be accounted for but there is not a common understanding of how the goods component should be measured. Various industry and product classifications do not always have the appropriate detail. For example, the CPC has no detail for recyclable materials in waste management, the CPA includes numerous products to capture the value of recyclable materials (gross output) and NAPCS has lines for reselling services (margin activities). It is not clear if a margin or gross output approach should be used for the goods side of the equation. If a gross output measurement is used, it implies production. If a margin measurement is used, it implies the purchase and resale of goods. There are often no purchase transactions but rather estimates of the cost to collect and value of resulting recyclable materials when contracting for services.

### **3.4 Recommended Approaches**

Due to the outstanding questions on measurement and coverage, the recommended approaches included in the table below are preliminary and generalized. The recommended approaches assume that public entities are engaged in waste management activities at a nontrivial level.

Category	Data Source	Level of Detail Collected	Frequency	Cost	Comments
Best	Survey/Census	Industry turnover <u>and</u> product turnover detail;	Sub-annual collection (monthly or quarterly)	<ul style="list-style-type: none"> <li>- Most expensive</li> <li>- Largest response burden</li> </ul>	<ul style="list-style-type: none"> <li>- Cross industry product collection will provide most comprehensive service product coverage.</li> <li>- Collect from both private and public entities</li> <li>- Consider class of customer or additional product breakdowns to distinguish between intermediate and final demand</li> <li>- Timely data</li> </ul>
Good	Survey/Census	Industry detail <u>only</u>	Sub-annual	<ul style="list-style-type: none"> <li>- Expensive</li> <li>- High response burden</li> </ul>	<ul style="list-style-type: none"> <li>- Industry detail may not be sufficient to delineate sources of revenue.</li> <li>- Collect from both public and private entities</li> <li>- No total product data</li> <li>- Timely data</li> </ul>
Minimum	Administrative (tax data, industry association data etc.,)	Industry detail <u>only</u>	Annual	<ul style="list-style-type: none"> <li>- Least expensive</li> <li>- Little or no respondent burden</li> </ul>	<ul style="list-style-type: none"> <li>- Administrative sources often do not include public entities, particularly if using tax data</li> <li>- Incomplete picture of the activities if public entities are excluded</li> <li>- Least timely</li> </ul>

## 4.0 SPPI

### 4.1 Data Availability

Although there was relatively good turnover coverage for waste management activities, there was substantially less SPPI coverage. Please note, in the area of ISIC Division 37, several countries indicated that the area was covered by the PPI rather than the SPPI. Those reports are included in industry price index the coverage numbers by ISIC 2-digits below. Industry-by-industry details are available in Appendix 1.

**Table 2. Availability of Price Indices, 2011**

ISIC Rev. 4	Countries with Price Index Coverage
37	7
38	4-9 (depending on the Industry)
39	3

Source: Voorburg Group Detailed Status Report Summary, 2011. There were 23 country responses to this survey.

### 4.2 Source of SPPI Data

The source of price data presents a significant hurdle in many cases. Household and municipal waste collection is sometimes handled by localities with their own capital and labor, but other times contracted out on a long-term basis to private industry participants. Household and municipal waste treatment and disposal includes the same inconsistencies. This mix varies between and within countries making the most appropriate source of data hard to pinpoint. Business waste management services were more consistently provided by private enterprises using negotiated contracts based on the type and volume of waste.

The presenters noted a variety of sources for data including local government units, private enterprises, and trade associations. They also noted that regulations can play a major role in pricing. Often, when the price is determined by regulation, a less frequent phone survey is all that is required to find out if the legal prices have changed.

All three presenters noted that the practices used in ISIC 37-39 varied considerably and the most appropriate source of data depended on the market characteristics of the particular industry and the level of regulatory oversight and control.

### 4.3 Target Coverage

There are several different institutional sectors that are targets for coverage in waste management. First, there are governmental units that provide waste management services. The

services provided by governmental units can include collection and disposal of non-hazardous waste or recyclable materials but also can include landfills, incinerators, and other separate disposal facilities that perform no collection. It is important to note that there are cases where the governmental unit is responsible for provision of services but contracts out the services to a private entity rather than using their own capital and labor. In this case, the transaction between the government and the private contractor is of interest to the SPPI. When government uses its own resources for collection, the transaction between the government and the client is the target. If a governmental unit operates the disposal facility, the transactions between private waste management companies and other users of the disposal facility are within scope.

For private enterprises, all transactions should be considered within scope of an SPPI for waste management services.

Most participants indicated that there are different providers specializing in municipal waste collection, commercial waste collection, specialized waste management (clinical, biohazard, other hazardous materials). Each of these has different pricing structures and should be identified separately if possible and appropriate in a country.

There is reason to believe that the pricing trends are different. Large contracts between private companies and municipalities are often negotiated for multiple years. Individual contracts between household or commercial clients and private waste management companies can have more frequent changes.

#### **4.4 Pricing Method Used**

The pricing methods used varied based on the transaction types identified in the Target Coverage section above. For example, sewerage services that were highly regulated or government provided and subject to price change once a year were priced only once a year. Reported prices were carried forward to subsequent months or quarters as unchanged.

For services that are frequently repeated transactions, actual transaction prices should be used. It is not uncommon for commercial waste management services to be provided on a per container basis rather than a regularly scheduled collection basis. Similar repeated transactions are common for waste disposal fees at landfills or incinerators and are often based on the weight or volume of material that is being disposed.

In the area of household waste collection, there is often no direct transaction for waste collection. When a government provides household waste collection as part of general government activities, there is no price per ton or other standard unit of measure than can be priced. One of the participants offered an alternative approach of measuring the price of a collection hour as a proxy when unit measures are not readily available. Under this approach, the price of a collection hour could include the operating cost of the truck and two (or the required number of) collectors.

Increasingly, governments are moving toward a “pay-as-you-throw” method where a defined weight or volume can be tracked. If a government contracts out the actual waste collection services to a private entity, the contract price should be measured.

#### 4.5 Weights

Development of weights for an SPPI once again is highly dependent on the market structure within a country. With a substantial governmental presence, coverage of output is needed for revenue from private enterprises and expense data from governments when there is not actual transaction data available. The mini-presentation from the United States noted that the employment in government entities engaged in waste management represented almost 40% of total employment providing waste management services:

##### Waste Management and Remediation (including sewerage)

Private employer establishments:	22,202
Employees in private establishments:	393,179
Receipts/revenue from private employers:	\$76,924,944,000 (USD)
Non-employer establishments:	20,886
Receipts/revenue from non-employer estabs:	\$ 1,677,620,000 (USD)
Local government employees in waste management:	249,847

Source: US Census Bureau data presented in Waste Management and Remediation Services, Turnover/Output Measures in the US, Voorburg Group, 2011

Another option is to use secondary source information such as the volume of waste produced or disposed of to estimate weights across institutional sectors.

#### 4.6 Main Issues in Price Measurement

One main issue for price measurement that was clear from the minipresentations is that there are multiple pricing mechanisms and different practices across the industries in waste management. A one size fits all approach will not be appropriate in most cases. Each industry should be reviewed and evaluated separately when designing statistics to measure prices.

#### 4.7 Recommended Approaches

There are still many open questions about the most appropriate approaches to price waste management services. Should only the services be priced? Should there be pricing for the transactions of recyclable materials as output transactions. If transactions for recyclable materials are to be priced, should they be measured as a margin or as a gross output? Despite these problems, a summary of approaches is included in the following table. It is by necessity incomplete.

Category	Pricing method	Data type in the survey and frequency	Quality and Accuracy	Cost
Best	Observed transaction prices. Prices of repeated services	Data are based on real transaction prices	<p>Advantages:</p> <p>Real transaction prices give an accurate price index that is representative for the industry</p> <p>Disadvantages:</p> <p>Repeat services can only be tracked for some waste management services, quantity may not be reportable in all cases.</p>	Relatively high. Much work is needed to maintain constant quality across transaction types and classes of customer.
Good	Model Pricing	Expert estimate. The data are fictitious prices estimated by the respondent	<p>Advantages:</p> <p>The quality of the service is held constant</p> <p>Disadvantages:</p> <p>Time consuming for the respondent</p>	High. Knowledge about the industry is essential. Cost would be lower for commodity services such as sewerage where a model is easier to specify and price change infrequent
Minimum	Tax payments by households, cost of municipal service provision	Average by client creates problems with developing volumes for national accounts, quality adjustment concerns with falling disposal quantity and constant or increasing cost to provide the service	<p>Advantages:</p> <p>Low cost</p> <p>Disadvantages:</p> <p>Hard to maintain fixed quantity and quality</p> <p>Could result in only partial coverage when there is a mix of public and private service providers</p>	Low.

## **5.0 Summary of Main Conclusions**

Each of the industries included under the aggregate of waste management should be looked at separately when developing turnover and price statistics. There are different transactions bases, record keeping practices, and sources of revenue. In general, the task appears to be less daunting for turnover statistics than for price statistics. At the aggregate level, revenue is available from private enterprises providing waste management services and a generally good estimate of government cost to provide services is available. Price statistics include additional complexity. In the case of repeated transactions from private entities, pricing is rather straightforward. When the service is provided by a government entity without specific transactions (for example, a service provided as part of an array of municipal services using general tax dollars) pricing will be much more complex.

Various regulations and market structures throughout the world make it difficult to provide any real best practices. As the value of recycled materials grows in the future, the outstanding questions related to the definition and appropriate measurement of the recyclable materials will become more important for both turnover statistics and price statistics. Additional guidance is needed from national accountants on the most appropriate treatment so that turnover and price statistics can be tailored to meet those needs. This paper highlights some of the practices and problems and should be used as background rather than a best practices recommendation from the Voorburg Group.

## Appendix 1 – Overview of international progress

<b>ISIC 3700</b>	a. PPI details >= CPC	0
	b. PPI details >= CPC soon	0
	c. Turnover details >= CPC	5
	d. Turnover details >= CPC soon	0
	e. Industry prices calculated	7
	f. Industry turnover collected	20
	1. Detailed turnover and prices well aligned	0
	2. Detailed turnover and prices well aligned soon	0
	3. Industry level turnover and prices aligned	6
	4. Industry level turnover and prices aligned soon	1
	5. Other - no industry coverage for prices and/or turnover, etc.	16
<b>ISIC 3811</b>	a. PPI details >= CPC	0
	b. PPI details >= CPC soon	0
	c. Turnover details >= CPC	4
	d. Turnover details >= CPC soon	0
	e. Industry prices calculated	9
	f. Industry turnover collected	19
	1. Detailed turnover and prices well aligned	0
	2. Detailed turnover and prices well aligned soon	0
	3. Industry level turnover and prices aligned	7
	4. Industry level turnover and prices aligned soon	0
	5. Other - no industry coverage for prices and/or turnover, etc.	16
<b>ISIC 3812</b>	a. PPI details >= CPC	0
	b. PPI details >= CPC soon	0
	c. Turnover details >= CPC	5
	d. Turnover details >= CPC soon	0
	e. Industry prices calculated	5
	f. Industry turnover collected	20
	1. Detailed turnover and prices well aligned	0
	2. Detailed turnover and prices well aligned soon	0
	3. Industry level turnover and prices aligned	4
	4. Industry level turnover and prices aligned soon	0
	5. Other - no industry coverage for prices and/or turnover, etc.	19

<b>ISIC 3821</b>	a. PPI details >= CPC	0
	b. PPI details >= CPC soon	0
	c. Turnover details >= CPC	5
	d. Turnover details >= CPC soon	0
	e. Industry prices calculated	6
	f. Industry turnover collected	20
	1. Detailed turnover and prices well aligned	0
	2. Detailed turnover and prices well aligned soon	0
	3. Industry level turnover and prices aligned	5
	4. Industry level turnover and prices aligned soon	0
	5. Other - no industry coverage for prices and/or turnover, etc.	18
<b>ISIC 3822</b>	a. PPI details >= CPC	0
	b. PPI details >= CPC soon	0
	c. Turnover details >= CPC	5
	d. Turnover details >= CPC soon	0
	e. Industry prices calculated	6
	f. Industry turnover collected	20
	1. Detailed turnover and prices well aligned	0
	2. Detailed turnover and prices well aligned soon	0
	3. Industry level turnover and prices aligned	6
	4. Industry level turnover and prices aligned soon	0
	5. Other - no industry coverage for prices and/or turnover, etc.	17
<b>ISIC 3830</b>	a. PPI details >= CPC	0
	b. PPI details >= CPC soon	0
	c. Turnover details >= CPC	7
	d. Turnover details >= CPC soon	0
	e. Industry prices calculated	4
	f. Industry turnover collected	19
	1. Detailed turnover and prices well aligned	0
	2. Detailed turnover and prices well aligned soon	0
	3. Industry level turnover and prices aligned	3
	4. Industry level turnover and prices aligned soon	0
	5. Other - no industry coverage for prices and/or turnover, etc.	20
<b>ISIC 3900</b>	a. PPI details >= CPC	0
	b. PPI details >= CPC soon	0

	c. Turnover details $\geq$ CPC	5
	d. Turnover details $\geq$ CPC soon	0
	e. Industry prices calculated	3
	f. Industry turnover collected	17
	1. Detailed turnover and prices well aligned	0
	2. Detailed turnover and prices well aligned soon	0
	3. Industry level turnover and prices aligned	2
	4. Industry level turnover and prices aligned soon	0
	5. Other - no industry coverage for prices and/or turnover, etc.	21

## **Appendix 2 – Overview of industry classification**

### **ISIC Rev. 4**

Division 37 Sewerage

3700 Sewerage

Division 38 Waste collection, treatment and disposal activities; materials recovery

381 Waste collection

3811 Collection of non-hazardous waste

3812 Collection of hazardous waste

382 Waste treatment and disposal

3821 Treatment and disposal of non-hazardous waste

3822 Treatment and disposal of hazardous waste

383 Materials recovery

3830 Materials recovery

Division 39 Remediation activities and other waste management services

390 Remediation activities and other waste management services

3900 Remediation activities and other waste management services

### **NACE Rev 2.0**

37 Sewerage

37.0 Sewerage

37.00 Sewerage

38 Waste collection, treatment and disposal activities; materials recovery

38.1 Waste collection

38.11 Collection of non-hazardous waste

38.12 Collection of hazardous waste

38.2 Waste treatment and disposal

38.21 Treatment and disposal of non-hazardous waste

38.22 Treatment and disposal of hazardous waste

38.3 Materials recovery

38.31 Dismantling of wrecks

38.32 Recovery of sorted materials

39 Remediation activities and other waste management services

39.0 Remediation activities and other waste management services

39.00 Remediation activities and other waste management services

## **JSIC**

363 SEWERAGE

3631 Sewerage treatment

3632 Sewer maintenance

88 WASTE DISPOSAL BUSINESS

880 ESTABLISHMENTS ENGAGED IN ADMINISTRATIVE OR ANCILLARY  
ECONOMIC ACTIVITIES

8800 Head offices primarily engaged in managerial operations

8809 Miscellaneous establishments engaged in administrative or ancillary economic activities

881 DOMESTIC WASTE DISPOSAL BUSINESS

8811 Night soil collecting and transporting business (

8812 Night soil processing business

8813 Treatment tank cleaning

8814 Treatment tank maintenance

8815 Waste collection transportation business

8816 Waste disposal business

8817 Public cleaning-related services offices (*Municipal offices*)\*

882 INDUSTRIAL WASTE DISPOSAL BUSINESS

8821 Industrial waste transport business

8822 Industrial waste disposal business

8823 Special controlled industrial waste transport business (*Hazardous*)\*

8824 Special controlled industrial waste disposal business (*Hazardous*)\*

889 MISCELLANEOUS WASTE DISPOSAL BUSINESS

8891 Dead domestic animal disposal business

8899 Waste treatment services, n.e.c.

## **ANZSIC 2006**

2812 Sewerage and Drainage Services

29 Waste Collection, Treatment and Disposal Services

291 Waste Collection Services

2911 Solid Waste Collection Services

- 2919 Other Waste Collection Services
- 292 Waste Treatment, Disposal and Remediation Services
- 2921 Waste Treatment and Disposal Services
- 2922 Waste Remediation and Materials Recovery

**NAICS United States 2007**

- 22132 Sewage Treatment Facilities
- 221320 Sewage Treatment Facilities

562 Waste Management and Remediation Services

5621 Waste Collection

- 56211 Waste Collection
- 562111 Solid Waste Collection
- 562112 Hazardous Waste Collection
- 562119 Other Waste Collection

5622 Waste Treatment and Disposal

- 56221 Waste Treatment and Disposal
- 562211 Hazardous Waste Treatment and Disposal
- 562212 Solid Waste Landfill
- 562213 Solid Waste Combustors and Incinerators
- 562219 Other Nonhazardous Waste Treatment and Disposal

5629 Remediation and Other Waste Management Services

- 56291 Remediation Services
- 562910 Remediation Services
- 56292 Materials Recovery Facilities
- 562920 Materials Recovery Facilities
- 56299 All Other Waste Management Services
- 562991 Septic Tank and Related Services
- 562998 All Other Miscellaneous Waste Management Services

## **Appendix 3 – Overview of product classification**

### **CPC Version 2.0**

#### **Division 94 Sewage and waste collection, treatment and disposal and other environmental protection services**

##### **941 Sewerage, sewage treatment and septic tank cleaning services**

- 94110 Sewerage and sewage treatment services
- 94120 Septic tank emptying and cleaning services

##### **942 Waste collection services**

- 9421 Collection services of hazardous waste
- 94211 Collection services of hazardous medical and other biohazardous waste
- 94212 Collection services of industrial hazardous waste (except medical and other biohazardous waste)
- 94219 Collection services of other hazardous waste
  
- 9422 Collection services of non-hazardous recyclable materials
- 94221 Collection services of non-hazardous recyclable materials, residential
- 94229 Collection services of non-hazardous recyclable materials, other
  
- 9423 General waste collection services
- 94231 General waste collection services, residential
- 94239 General waste collection services, other

##### **943 Waste treatment and disposal services**

- 9431 Waste preparation, consolidation and storage services
- 94311 Hazardous waste preparation, consolidation and storage services
- 94312 Ship-breaking and other dismantling of wrecks services
- 94313 Non-hazardous recyclable materials preparation, consolidation and storage services
- 94319 Other non-hazardous waste preparation, consolidation and storage services
  
- 9432 Hazardous waste treatment and disposal services
- 94321 Hazardous waste treatment services
- 94322 Hazardous waste disposal services
  
- 9433 Non-hazardous waste treatment and disposal services
- 94331 Sanitary landfill services, non-hazardous waste
- 94332 Other landfill services, non-hazardous waste
- 94333 Incineration of non-hazardous waste
- 94339 Other non-hazardous waste treatment and disposal services

##### **944 Remediation services**

- 9441 Site remediation and clean-up services
- 94411 Site remediation and clean-up services, air

- 94412 Site remediation and clean-up services, surface water
- 94413 Site remediation and clean-up services, soil and groundwater
  
- 94420 Containment, control and monitoring services and other site remediation services n.e.c.
  
- 94430 Building remediation services
  
- 94490 Other remediation services n.e.c.

**945 Sanitation and similar services**

- 94510 Sweeping and snow removal services
- 94590 Other sanitation services

**949 Other environmental protection services n.e.c.**

- 94900 Other environmental protection services n.e.c.

**CPA 2008**

**37 Sewerage services; sewage sludge**

- 37.0 Sewerage services; sewage sludge
- 37.00 Sewerage services; sewage sludge
- 37.00.1 Sewerage services
- 37.00.11 Sewage removal and treatment services
- 37.00.12 Treatment services of cesspools and septic tanks
- 37.00.2 Sewage sludge
- 37.00.20 Sewage sludge

**38 Waste collection, treatment and disposal services; materials recovery services**

- 38.1 Waste; waste collection services
- 38.11 Non-hazardous waste; collection services of non-hazardous waste
- 38.11.1 Collection services of non-hazardous recyclable waste
- 38.11.11 Collection services of non-hazardous recyclable waste
- 38.11.19 Collection services of non-hazardous recyclable waste
- 38.11.2 Collection services of non-hazardous non-recyclable waste
- 38.11.21 Collection services of non-hazardous non-recyclable waste, municipal
- 38.11.29 Collection services of non-hazardous non-recyclable waste, other
- 38.11.3 Non-recyclable non-hazardous waste, collected
- 38.11.31 Non-recyclable non-hazardous municipal waste
- 38.11.39 Other non-recyclable non-hazardous waste
- 38.11.4 Wrecks, for dismantling
- 38.11.41 Vessels and other floating structures, for breaking up
- 38.11.49 Wrecks, other than vessels and floating structures, for dismantling

- 38.11.5 Other recyclable non-hazardous waste, collected
- 38.11.51 Glass waste
- 38.11.52 Paper and paperboard waste
- 38.11.53 Used pneumatic tyres of rubber
- 38.11.54 Other rubber waste
- 38.11.55 Plastic waste
- 38.11.56 Textile waste
- 38.11.57 Leather waste
- 38.11.58 Non-hazardous metal waste
- 38.11.59 Other non-hazardous recyclable waste, n.e.c.
- 38.11.6 Services of transfer facilities for non-hazardous waste
- 38.11.61 Services of transfer facilities for non-hazardous recyclable waste
- 38.11.69 Services of transfer facilities for other non-hazardous waste
- 38.12 Hazardous waste; collection services of hazardous waste
- 38.12.1 Collection services of hazardous waste
- 38.12.11 Collection services of hazardous medical and other biohazardous waste
- 38.12.12 Collection services of other hazardous industrial waste
- 38.12.13 Collection services of hazardous municipal waste
- 38.12.2 Hazardous waste, collected
- 38.12.21 Spent (irradiated) fuel elements (cartridges) of nuclear reactors
- 38.12.22 Pharmaceutical waste
- 38.12.23 Other medical hazardous waste
- 38.12.24 Hazardous chemical waste
- 38.12.25 Waste oils
- 38.12.26 Hazardous metal waste
- 38.12.27 Waste and scrap of primary cells, primary batteries and electric accumulators
- 38.12.29 Other hazardous waste
- 38.12.3 Services of transfer facilities for hazardous waste
- 38.12.30 Services of transfer facilities for hazardous waste
- 38.2 Waste treatment and disposal services
- 38.21 Treatment and disposal services of non-hazardous waste
- 38.21.1 Non-hazardous waste treatment for final disposal services
- 38.21.10 Non-hazardous waste treatment for final disposal services
- 38.21.2 Non-hazardous waste disposal services
- 38.21.21 Sanitary landfill services
- 38.21.22 Other landfill services
- 38.21.23 Incineration services of non-hazardous waste

- 38.21.29 Other non-hazardous waste disposal services
- 38.21.3 Waste organic solvents
- 38.21.30 Waste organic solvents
- 38.21.4 Ashes and residues from waste incineration
- 38.21.40 Ashes and residues from waste incineration
- 38.22 Treatment and disposal services of hazardous waste
  - 38.22.1 Nuclear and other hazardous waste treatment services
    - 38.22.11 Nuclear waste treatment services
    - 38.22.19 Other hazardous waste treatment services
  - 38.22.2 Nuclear and other hazardous waste disposal services
    - 38.22.21 Nuclear waste disposal services
    - 38.22.29 Other hazardous waste disposal services
- 38.3 Materials recovery services; secondary raw materials
  - 38.31 Dismantling services of wrecks
    - 38.31.1 Dismantling services of wrecks
      - 38.31.11 Shipbreaking services
      - 38.31.12 Dismantling services of wrecks, other than vessels and floating structures
  - 38.32 Sorted materials recovery services; secondary raw materials
    - 38.32.1 Sorted materials recovery services
      - 38.32.11 Sorted metal materials recovery services
      - 38.32.12 Sorted non-metal materials recovery services
    - 38.32.2 Metal secondary raw materials
      - 38.32.21 Secondary raw material of precious metals
      - 38.32.22 Secondary raw material of ferrous metals
      - 38.32.23 Secondary raw material of copper
      - 38.32.24 Secondary raw material of nickel
      - 38.32.25 Secondary raw material of aluminium
      - 38.32.29 Other metal secondary raw materials
    - 38.32.3 Non-metal secondary raw materials
      - 38.32.31 Secondary raw material of glass
      - 38.32.32 Secondary raw material of paper and paperboard
      - 38.32.33 Secondary raw material of plastic
      - 38.32.34 Secondary raw material of rubber
      - 38.32.35 Secondary raw material of textile
      - 38.32.39 Other non-metal secondary raw materials

### **39 Remediation services and other waste management services**

39.0	Remediation services and other waste management services
39.00	Remediation services and other waste management services
39.00.1	Remediation and clean-up services
39.00.11	Remediation and clean-up services, soil and groundwater
39.00.12	Remediation and clean-up services, surface water
39.00.13	Remediation and clean-up services, air
39.00.14	Building remediation services
39.00.2	Other remediation and specialised pollution control services
39.00.21	Site remediation containment, control and monitoring services and other site remediation services
39.00.22	Other remediation services Landmines (Clearing of...)
39.00.23	Other specialised pollution control services

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### **941 Sewage services**

94110	Sewage treatment services
94110.00	Sewage treatment services
94120	Tank emptying and cleaning services
94120.00	Tank emptying and cleaning services

### **942 Refuse disposal services**

9421	Non-hazardous waste collection, treatment and disposal services
94211	Non-hazardous waste collection services
94211.00	Non-hazardous waste collection services
94212	Non-hazardous waste treatment and disposal services
94212.00	Non-hazardous waste treatment and disposal services
9422	Hazardous waste collection, treatment and disposal services
94221	Hazardous waste collection services
94221.00	Hazardous waste collection services
94222	Hazardous waste treatment and disposal services
94222.00	Hazardous waste treatment and disposal services

### **943 Sanitation and similar services**

94310	Sweeping and snow removal services
94310.00	Sweeping and snow removal services
94390	Other sanitation services
94390.00	Other sanitation services

### **949 Other environmental protection services n.e.c.**

94900	Other environmental protection services n.e.c.
94900.00	Other environmental protection services n.e.c.

## **NAPCS United States (provisional)**

(third level product groups only – full list of detailed provisional products available at:

<http://www.census.gov/eos/www/napcs/napcstable.html>)

### **1 Non-hazardous waste management services**

#### **1.1 Collection services for non-hazardous waste and recyclable material**

- 1.1.1 Subcontracted collection services for non-hazardous waste and recyclable material
- 1.1.2 Residential collection services for non-hazardous waste and recyclable material
- 1.1.3 Non-residential collection services for non-hazardous waste and recyclable material
- 1.1.4 Collection services for non-hazardous construction and demolition waste
- 1.1.5 Destruction services for non-hazardous waste
- 1.1.9 Other collection services for non-hazardous waste

#### **1.2 Consolidation, storage, and preparation services for non-hazardous waste and recyclable material**

- 1.2.1 Transfer facility services for non-hazardous waste
- 1.2.2 Recovery and preparation services for non-hazardous recyclable material

#### **1.3 Transportation of non-hazardous waste and recyclable material by road**

- 1.3.1 Transportation of non-hazardous waste by road
- 1.3.2 Transportation of non-hazardous recyclable material by road

#### **1.4 Disposal services for non-hazardous waste**

- 1.4.1 Landfilling services for non-hazardous waste
- 1.4.2 Incineration disposal services for non-hazardous waste
- 1.4.3 Other disposal services for non-hazardous waste

#### **1.5 Operation, maintenance and closure services for non-hazardous waste disposal facilities**

- 1.5.1 Operation and maintenance services for non-hazardous waste disposal facilities
- 1.5.2 Closure services for a non-hazardous waste disposal facility

#### **1.9 Non-hazardous waste management services, nec.**

#### **1.10 Products related to non-hazardous waste management**

- 1.10.1 Non-hazardous waste brokerage services
- 1.10.2 Non-hazardous recyclable material brokerage services

- 1.10.3 Rental of non-hazardous waste management equipment
- 1.10.4 Reselling services for non-hazardous waste, retail and wholesale
- 1.10.5 Energy generation from non-hazardous waste
- 1.10.6 Recovered methane gas
- 1.10.7 Compost
- 1.10.8 Recyclable material recovered from a non-hazardous waste stream
- 1.10.9 New non-hazardous waste management equipment
- 1.10.10 Reselling services for new non-hazardous waste management equipment, retail and wholesale
- 1.10.11 Reselling services for used non-hazardous waste management equipment, retail and wholesale
- 1.10.12 Non-hazardous waste management consulting services
- 1.10.13 Road cleaning services
- 1.10.19 Products related to non-hazardous waste management, nec.

## **2 Hazardous waste management services**

### **2.1 Collection services for hazardous waste**

- 2.1.1 Subcontracted collection services for hazardous waste
- 2.1.2 Residential collection services for hazardous waste
- 2.1.3 Non-residential collection services for hazardous waste
- 2.1.4 Cleaning and removal services for hazardous waste holding facilities

### **2.2 Consolidation, storage, and preparation services for hazardous waste and recyclable material**

- 2.2.1 Transfer facility services for hazardous waste
- 2.2.2 Recovery and preparation services for hazardous waste recyclable material

### **2.3 Transportation of hazardous waste by road**

### **2.4 Treatment services for hazardous waste**

- 2.4.1 Treatment services for hazardous waste (organic solvents, solutions, and still bottoms)
- 2.4.2 Treatment services for hazardous waste (oils and greases, oily mixtures, and residues)
- 2.4.3 Treatment services for hazardous waste (heavy metal solutions, sludges, and residues)
- 2.4.4 Treatment services for hazardous waste (inorganic sludges, solutions and residues, excluding heavy metals)
- 2.4.5 Treatment services for hazardous waste (pesticide, herbicide, and fungicide wastes)

- 2.4.6 Treatment services for hazardous waste (polychlorinated biphenyls (PCB) wastes)
- 2.4.7 Treatment services for hazardous waste (biological-infectious waste)
- 2.4.8 Treatment services for hazardous waste (radioactive waste)
- 2.4.9 Treatment services for hazardous waste (used tires)
- 2.4.10 Treatment services for hazardous waste (used batteries)
- 2.4.19 Treatment services for other hazardous waste (excluding waste water)

## **2.5 Disposal services for hazardous waste**

- 2.5.1 Disposal services for hazardous waste, by confinement
- 2.5.9 Other disposal services for hazardous waste

## **2.6 Operation, maintenance and closure services for hazardous waste disposal facilities**

- 2.6.1 Operation and maintenance services for hazardous waste disposal facilities
- 2.6.2 Closure services for a hazardous waste disposal facility

## **2.9 Hazardous waste management services, nec.**

## **2.10 Products related to hazardous waste management**

- 2.10.1 Hazardous waste brokerage services
- 2.10.2 Rental of hazardous waste management equipment
- 2.10.3 Reselling services for hazardous waste, retail and wholesale
- 2.10.4 Energy generation from hazardous waste
- 2.10.5 Recyclable material recovered from a hazardous waste stream
- 2.10.6 Processed and/or treated recyclable material recovered from a hazardous waste stream
- 2.10.7 New hazardous waste management equipment
- 2.10.8 Reselling services for new hazardous waste management equipment, retail and wholesale
- 2.10.9 Reselling services for used hazardous waste management equipment, retail and wholesale
- 2.10.10 Hazardous waste management consulting services
- 2.10.11 Products related to hazardous waste management, nec.

## **3 Remediation services**

### **3.1 Site remediation services**

- 3.1.1 Site assessment services
- 3.1.2 Site remediation planning services
- 3.1.3 Site remediation clean-up services
- 3.1.4 Control, containment, and monitoring services for site remediation
- 3.1.9 Site remediation services, nec.

### **3.2 Building remediation services**

- 3.2.1 Building remediation services, asbestos contamination
- 3.2.2 Building remediation services, lead paint contamination
- 3.2.3 Building remediation services, radon contamination
- 3.2.9 Building remediation services, other contamination

### **3.3 Environmental emergency response services**

- 3.3.1 Environmental emergency response planning services
- 3.3.2 Environmental emergency response services, petroleum and oil-based spills
- 3.3.3 Environmental emergency response services, mine spills
- 3.3.9 Environmental emergency response services, nec.

### **3.9 Remediation services, nec.**

#### **3.10 Products related to remediation**

- 3.10.1 Recyclable material recovered from remediation activities
- 3.10.2 Rental of remediation equipment
- 3.10.3 Reselling services for new and used remediation equipment, retail and wholesale
- 3.10.4 Decommissioning services
- 3.10.9 Products related to remediation, nec.

## References:

UN International Standard Industrial Classification Rev.4

<http://unstats.un.org/unsd/cr/registry/isic-4.asp>

Japanese Standard Industry Classification, Revision 12. November 2007, accessed at:

<http://www.stat.go.jp/english/index/seido/sangyo/index07.htm>

NACE Revision 2 accessed at:

[http://epp.eurostat.ec.europa.eu/portal/page/portal/product\\_details/publication?p\\_product\\_code=KS-RA-07-015](http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KS-RA-07-015)

North American Industry Classification (NAICS) 2007 accessed at:

<http://www.census.gov/epcd/naics07/>

Central Product Classification (CPC) Version 2.0 accessed at:

<http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=25&Lg=1>

Classification of Products by Activity (CPA) 2008, Eurostat, accessed at:

<http://circa.europa.eu/irc/dsis/nacecpacon/info/data/en/cpa%202008%20structure.pdf>

North American Product Classification (NAPCS) accessed at:

<http://www.census.gov/eos/www/napcs/index.html>

## Mini-presentations

Turnover and Output for the Waste Management/Treatment Industries in Sweden, Johan Ahman,

accessed at <http://www.voorburggroup.org/Documents/2011%20Newport/Papers/2011%20-%2041.pdf>

Waste Management and Remediation Services, Turnover/Output Measures in the US, John Murphy, accessed at

<http://www.voorburggroup.org/Documents/2011%20Newport/Papers/2011%20-%2042.pdf>

Services Producer Price Index for Waste Management/Treatment, Aspasia Papa, UK, accessed at

<http://www.voorburggroup.org/Documents/2011%20Newport/Papers/2011%20-%2047.pdf>

SPPI for Sewerage and Waste Management Services in Korea, Yeonsuk Park, accessed at

<http://www.voorburggroup.org/Documents/2011%20Newport/Papers/2011%20-%2048.pdf>

SPPI on waste collection; waste treatment and disposal in France accessed at

<http://www.voorburggroup.org/Documents/2011%20Newport/Papers/2011%20-%2046.pdf>