

2005–2009 Report

# Pollutant Release and Transfer Register



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## FOREWORD

With this fifth Pollutant Release and Transfer Register Report, we are closing a new cycle that allowed us to consolidate a necessary and innovative system to exchange environmental information between State agencies. This, because starting next year we will publish a report that will include the emissions and transfers for the years 2010 and 2011, which will help us take the lead at the regional level, matching other countries that are part of the Organisation for Economic Co-operation and Development (OECD), by publishing with a time lag of just one year.

Another important element that marks the end of this cycle, is that this will be the last year in which stationary sources with emissions into the air will be unidentified. The name of the facility will also be published as of the next report, in accordance to the modification of Supreme Decree N° 138/2005 of the Ministry of Health. This progress shows the maturity reached by the industrial sector in its compliance with this obligation which, together with the incorporation of new technological tools developed by the Ministry of Health and the Ministry of the Environment, makes it possible to obtain the emissions from the facilities once they have been reported.

Some of the main novelties of this report are the air emissions data from stationary and mobile sources for the entire 2005-2009 period, which were processed using the latest updates in emission factors available at the national and international levels compiled in the "Methodological guide for estimating air emissions from stationary and mobile sources for the Pollutant Release and Transfer Register", published in 2009 by the former National Environmental Commission (CONAMA by its acronym in Spanish), along with the Ministry of Health and the

Transportation Planning Secretariat (SECTRA by its acronym in Spanish).

As a complementary measure, the PRTR (RETC by its acronym in Spanish) website ([www.retc.cl](http://www.retc.cl)) contains important innovations. The first one is that we have made available to all our users a new, simpler and more intuitive, search engine. In addition to this, all of the PRTR data bases can be downloaded in spreadsheets in Excel format, which, no doubt, will be of great help for the system's thousands of users. We have also made available a file in Keyhole Markup Language (KML) format, in order to enable the display of PRTR facilities on Google Earth; from this platform it is also possible to generate specific reports for each facility.

At the same time, as a member country of the OECD since May 2010, we have set up a PRTR website in English for foreign users who visit it.

Finally, we wish to highlight and give thanks because all of these progresses and achievements have been possible due to the combined work with the other public agencies that conform the central node of the PRTR: The Ministry of Health, the Ministry of Transportation and Telecommunications (Transportation Planning Secretariat, SECTRA), the Superintendence of Sanitation Services, the General Directorate of the Maritime Territory and Merchant Marine, the Internal Revenue Service, National Institute of Statistics and the public Postal Company of Chile.

MARÍA IGNACIA BENÍTEZ  
Minister of the Environment

## ACRONYMS

|            |                                                                                                                                    |
|------------|------------------------------------------------------------------------------------------------------------------------------------|
| ASIQUIM    | Chilean Chemical Industrial Trade Association (Asociación de la Industria Química )                                                |
| ASRM       | Sanitation Authority for the Metropolitan Region (Autoridad Sanitaria Región Metropolitana)                                        |
| CAS        | Chemical Abstracts Service (Division of the American Chemical Society)                                                             |
| CAS_Number | Numeric code assigned to chemical substances by the Chemical Abstracts Service                                                     |
| CNE        | National Energy Commission (Comisión Nacional de Energía)                                                                          |
| CONAF      | National Forestry Corporation (Corporación Nacional Forestal)                                                                      |
| CONAMA     | National Environmental Commission (Comisión Nacional del Medio Ambiente)                                                           |
| CONAMA RM  | National Environmental Commission for the Metropolitan Region (Comisión Nacional del Medio Ambiente – Región Metropolitana)        |
| CORFO      | Chilean Economic Development Agency (Corporación de Fomento de la Producción)                                                      |
| DGA        | General Water Directorate (Dirección General de Aguas)                                                                             |
|            | General Directorate of Maritime Territory and the Merchant Marine (Dirección General del Territorio Marítimo y de Marina Mercante) |
| ENIA       | Annual National Industry Survey (Encuesta Nacional Industrial Anual)                                                               |
| E. C.      | Ministry of the Environment of Canada                                                                                              |
| GIS        | Geographic Information Systems                                                                                                     |
| GNC        | National Coordination Group (Grupo Nacional Coordinador)                                                                           |
| INE        | National Institute of Statistics (Instituto Nacional de Estadísticas)                                                              |
| ISIC       | International Standard Industrial Classification (Código Industrial Internacional Uniforme)                                        |
| LIWs       | Liquid Industrial Wastes                                                                                                           |
| MMA        | Ministry of the Environment (Ministerio del Medio Ambiente)                                                                        |
| MIDEPLAN   | Ministry of Planning (Ministerio de Planificación)                                                                                 |
| MINSAL     | Ministry of Health (Ministerio de Salud)                                                                                           |
| MTT        | Ministry of Transportation and Telecommunications (Ministerio de Transportes y Telecomunicaciones)                                 |
| MODEM      | Mobile Source Emission Factor Model (Modelo de Cálculos de Emisiones Vehiculares)                                                  |
| MOP        | Ministry of Public Works (Ministerio de Obras Públicas)                                                                            |
| MINSEGPRES | Ministry General Secretariat of the Presidency (Ministerio Secretaría General de la Presidencia)                                   |
| MR         | Metropolitan Region                                                                                                                |
| ODS        | Ozone Depleting Substances                                                                                                         |
| OECD       | Organisation for Economic Co-operation and Development                                                                             |
| PRTR       | Pollutant Release and Transfer Register                                                                                            |
| SAG        | Agriculture and Livestock Service (Servicio Agrícola y Ganadero)                                                                   |
| SAIE       | Air Emissions Inventories Management System (Sistema de Administración de Inventarios de Emisiones Atmosféricas)                   |
| SEC        | Superintendence of Electricity and Fuels (Superintendencia de Electricidad y Combustibles)                                         |
| SECTRA     | Transportation Planning Secretariat (Secretaría de Planificación de Transporte)                                                    |
| SEIA / EIA | Environmental Impact Assessment System (Sistema de Evaluación de Impacto Ambiental)                                                |
| SEMAT      | Environment and Territory Secretariat, Ministry of Public Works                                                                    |
| SIGAA      | Georeferenced Environmental Aquatic Information System (Sistema de Información Georreferenciado Ambiental Acuático)                |
| SII        | Chilean Internal Revenue Service (Servicio de Impuestos Internos)                                                                  |
| SINCA      | National Air Quality Information System (Sistema de Información Nacional de Calidad del Aire)                                      |
| SISS       | Superintendence of Sanitation Services (Superintendencia de Servicios Sanitarios)                                                  |
| UNITAR     | United Nations Institute for Training and Research                                                                                 |
| USEPA      | United States Environmental Protection Agency                                                                                      |

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## I. INTRODUCTION

Since the United Nations Conference on Environment & Development (UNCED) and the adoption of Agenda 21, there has been a growing interest in the international community, as well as in each particular government, in creating Pollutant Release and Transfer Registers (PRTR) as a fundamental management tool in each nation.

Thus, there is currently ample international experience on the topic, with PRTR programs being implemented in most of the countries that are part of the Organisation for Economic Co-operation and Development (OECD), such as the Toxic Release Inventory (TRI) of the United States, the National Pollutant Release Inventory (NPRI) of Canada, National Pollutant Inventory (NPI) of Australia, and the PRTR of Mexico, among others.

At the same time, the United Nations Institute for Training and Research (UNITAR), in cooperation with the OECD, the World Health Organization (WHO), the United Nations Environment Programme (UNEP) and the United Nations Industrial Development Organization (UNIDO) have joined efforts to help developing countries introduce the PRTR as an effective environmental management tool.

### Implementation in Chile

In 2002, under the framework of the work program of the Canada- Chile Commission for Environment Cooperation, Chile initiated the evaluation process to incorporate the PRTR into environmental management. With this aim, a workshop was held with the participation of international experts who shared experiences from Canada, Mexico and other PRTR programs in the world. As a result of this workshop, the country recognized the need to develop the PRTR, thus generating the study "Situation and Feasibility Analysis to Establish a Pollutant Release and Transfer Register in Chile", which was carried out between March and May of 2003, with funds from Environment Canada, through the signature of a

memorandum of understanding between UNITAR, as implementing agency, and CONAMA (the predecessor of the Ministry of the Environment). This agreement was signed in December, 2002.

Based on the results of this study, the National Coordination Group (GNC by its acronym in Spanish) was created, composed of representatives of the public sector agencies with competence on the matter; the private sector; the organized civil society and academic sectors.

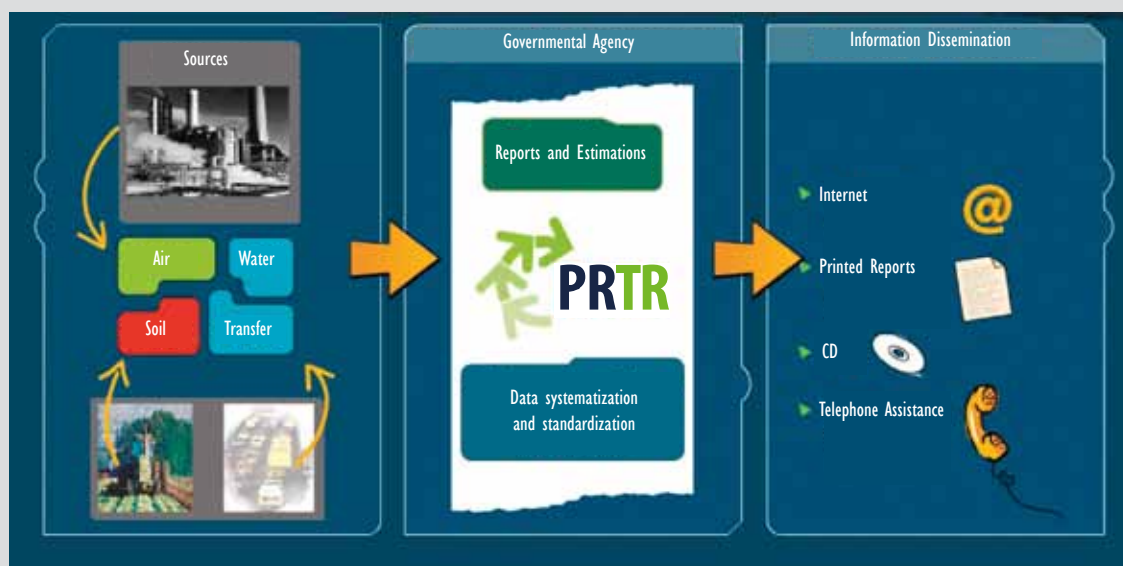
The results of this study can be summarized in two findings; the first one is the identification of the uses of the national PRTR and the second one is the evaluation of the available national infrastructure for the implementation of the PRTR in our country. These results were presented in a workshop held in June, 2003, along with other technical presentations delivered by representatives of the United States Environmental Protection Agency (USEPA), Environment Canada (E.C.) and UNITAR.

### Benefits of the PRTR

The benefits of the PRTR for the country are evident, since it provides a set of critical information for the prevention and control of pollution, answering questions such as: Where are the emissions or transfers of environmental importance generating?; What substances are being released or transferred and in what amounts? With this information, government authorities can set priorities for the reduction or elimination of emissions that are potentially harmful for human health and the environment.

On the other hand, the participation of Chile in important international agreements such as the Kyoto Protocol on greenhouse gases, the Montreal Protocol on ozone depleting substances, and the Stockholm Convention on persistent organic pollutants, implies important commitments and obligations, some of which have been complied with through this instrument, amongst which the most outstanding are the

**FIGURE I**  
**PRTR Operations Scheme**



Source: Own elaboration, MMA

periodic development and update of release inventories and/or the monitoring of hazardous chemical substances through their life cycle.

Likewise, in the future, the application of economic instruments such as tradable emission permits, both local and global (carbon bonds), will require a large amount of information on the emissions and the operation conditions of the emission sources for their management, which will be supported by the PRTR. In this regard, the information generated by the PRTR will allow the identification of business sectors for the application of these economic instruments.

It is worth noting that the creation of a national PRTR has also allowed to standardize the different sectorial data bases, making their information comparable. On the other hand, its implementation requires an equilibrium between the infrastructure available throughout the country and a standardization of the methodologies to estimate emissions, which is supporting the processes to generate regulations, establish emission baselines, develop

prevention and decontamination plans, determine the latent or saturated areas and verify the compliance with environmental standards. Likewise, the generation of integrated emissions data allows to improve our understanding of the environmental quality observed in the different components (air; water; etc.). For instance, it is possible to obtain chemical substances derived from air pollution sources when measuring the quality of a body of water; an analysis which was previously not easy to integrate because the information is administered by State agencies with sectorial objectives.

The generation of a single data base on the operation conditions of the sources is being promoted, since the launch of the PRTR, to satisfy the different sectorial information requirements. This will contribute to make progress with the implementation of a one-stop shop for reporting data, which has been widely recommended by international experts<sup>5</sup> who have supported the process to set up the PRTR in our country.

5 USEPA, E.C. and UNITAR.

Finally, the existence of a PRTR that is available to the public strengthens the citizen participation process and the community's "right to know", an aspect that is becoming more important throughout the world and which is being addressed by different conventions such as the AARHUS<sup>5</sup>.

In short, the PRTR beneficiaries include all of the sectors involved: Government, industry and general public. Their benefits can be summarized as follows:

### **Government**

It allows public institutions to have updated information for environmental management, which includes:

- Creating emission inventories (that are uniform and comparable), determining and obtaining the level of pollutant emissions in the different environmental components. This allows to rank emission sources by the magnitude of their emissions and thus prioritize measures to reduce them. In this context, the PRTR provides specific information required to develop and evaluate prevention and decontamination plans.
- Comparing the level of emissions in different time periods, in order to measure the degree of compliance with the objectives for reducing pollution, since emissions trend analyses can be performed by using indicators.
- Integrating the PRTR information with geographic information systems, which allows to identify areas of environmental interest, since it is possible to know the spatial distribution of emissions at the different levels of the country's territorial division.
- Determining the degree of compliance with current environmental regulations, supporting the process for generating new standards and evaluating inspection processes.

- Simplifying and rationalizing the procedures for delivering requested information. This is a benefit for both the State and the industrial sector.
- Coordinating environmental management in terms of pollutants release and transfers at the different State agencies involved, in accordance with the process to modernize it, thus making their actions more efficient.
- Facilitating the dissemination of information to the different interested institutions, such as other State agencies, companies and trade associations of the productive sectors.
- Promoting education and citizen participation.
- Influencing the modernization of the key economic sectors, particularly of those that make intensive use of environmental goods and services, as an environmental management tool.
- Facilitating the environmental impact evaluation processes of future industrial and non-industrial activities, since there is integrated information on emissions (baselines), geographical information, and waste disposal and/or treatment centers.
- Improving the management and transparency of the different State agencies.
- Supporting the State in the compliance with international agreements.

### **Industrial Sector**

Improving the degree of efficiency of current production processes, allowing a better use of the materials and energy, since leaks and other inefficiencies that increase emissions have been identified. Other benefits worth mentioning include:

- Supporting the implementation of environmental management systems and their certification, such as ISO 14000.
- Reducing production costs as a consequence of the implementation of cleaner alternatives and the reinstatement to the process of materials that are considered waste. This has also resulted in a reduction of emission levels derived from

5 AARHUS: Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters. Denmark, 25 of June of 1998, ratified on 29 of diciembre of 2004.

specific sources, according to the experience in other countries that have already implemented the PRTR.

- Reducing the emissions of specific and fugitive sources due to the introduction of changes such as: Use of alternative chemical substances, greater control of these and improvement in the efficiency of the equipment used in production processes.
- Proposing environmental impact mitigation actions or proposing adequate compensation actions, which improves the company-community-government relationship.
- Reducing the number of reports that the industry has to submit to the State.
- Improving technological exchange within and between the different companies.

### **Public**

In principle, people that are potentially exposed to the risks by pollutants should be ensured access to the minimum information that will allow them, or

help them, to choose appropriate courses of action, while also providing them with the possibility of making decisions. As a result of this, the following benefits can be obtained:

- Providing the public with relevant information for making decisions regarding the environment.
- Involving citizens in a more active manner in environmental management.
- Improving their quality of life through a greater understanding of their environmental surroundings.
- Providing reliable information through the media (press, radio and television), education institutions and research centers.
- Providing this information to health and safety institutions such as hospitals, fire fighters, police and others, which will allow them to act appropriately and swiftly in case of emergencies.
- Improving the information available for professors and researchers, whether for education or research.

## II. WHAT INFORMATION CAN BE OBTAINED FROM THE PRTR?

The Pollutant Release and Transfer Register (PRTR) is a public-access database aimed at collecting, compiling, organizing, conserving and disseminating information on emissions, waste and transfer of pollutants that are potentially harmful for human health and the environment, generated by industrial or non industrial activities or transferred for their valorization or disposal.

The data for Chile is collected from stationary (industrial) sources and mobile (transportation) sources. The Register covers releases into air and water; as well as hazardous wastes transported for treatment or final disposal.

Key features of the PRTR include the following:

- Regular collection of information on pollutant releases and transfers, obtained from the compliance with Chilean emissions standards, which make it possible to identify changes over time;

- The use of estimation methods (for example, use of material balances and estimation factors) to generate information on emissions and transfers;
- The use of common identifiers for chemical substances, facilities, and locations, to facilitate data comparison and increase;
- Information is digitalized, to help make its analysis easier;
- Information is disseminated in order to contribute to environmental management.

### 1. How is information collected?

The information fed into the PRTR is obtained from reports submitted in compliance to different sectorial regulations. In order to obtain this information and ensure its delivery to the PRTR, the Ministry of the Environment has signed cooperation agreements.

**FIGURE 2**  
**Sectorial Systems that Feed the PRTR**



Source: Own elaboration, MMA, 2010.

The particular demand for information that feeds the PRTR is related to:

**Air Component-Stationary Sources**

Direct measures to control pollution have been implemented since 1990, when a pollutant measurement system was set up in Santiago. The Atmospheric Prevention and Decontamination Plan for the Metropolitan Region (PPDA by its acronym in Spanish) was initiated in 1998.

The PPDA contains actions to control emissions by the industrial sector as well as from public and private transportation. It also includes contingency measures for days with pollution emergencies, incentives for the use of clean technology and improvements in fuel composition, among other actions. The PPDA was designed with an implementation deadline of 14 years and has been revised at least twice, in 2000 and 2005.

On the other hand, with the aim of recovering environmental quality levels in areas nearby mining

works, decontamination plans were implemented with a timeframe for reducing emissions and operational plans to protect the population from potential critical pollution emergencies.

Thus, a series of national and regional regulations has been created to allow making progress in environmental management. A unique feature of the PRTR is that it also reports on emissions of unregulated pollutants, which contributes to having broad information that can be accessed by different sectors of society.

The following table shows regulations for the entire country and for the Metropolitan Region, which facilitate collecting information for the PRTR and provide inputs for this document.

**–Ozone-Depleting Substances (ODS):**

Law N° 20.096 establishes controls on imports, production, and use of substances covered by the Montreal Protocol. This legal statute enforces compliance with international obligations undertaken

**TABLE I**  
**Regulations on Stationary Sources**

| National Coverage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Supreme Decree N° 185/1991 of the Ministry of Agriculture, Ministry of Mining, and Ministry of Health, which regulates the operation of facilities that emit sulphur dioxide, particulate matter, and/or arsenic throughout the territory of Chile, in quantities equal to or greater than 3 tons/day of sulphur dioxide, or 1 ton/day of particulate material. This Decree will also apply to all sources of emissions of sulphur dioxide or particulate material, located in saturated or latent zones.                                                                                                                                                                                                                                                                                                                |
| Decontamination plans in force as of the effective date of Supreme Decree N° 185/1991 from the Ministry of Agriculture, the Ministry of Mining, and the Ministry of Health:<br><br>a) Supreme Decree N° 252/1992, Ministry of Mining. “Las Ventanas” Industrial Complex (PM 10 and SO2).<br>b) Supreme Decree N° 180/1994, MINSEGPRES. “Hernán Videla Lira” Smelter – Paipote ENAMI (SO2).<br>c) Supreme Decree N° 81/1998, MINSEGPRES. Caletones Smelter (PM 10 and SO2).<br>d) Supreme Decree N° 164/1999, MINSEGPRES. María Elena and Pedro de Valdivia (PM 10).<br>e) Supreme Decree N° 179/1999, MINSEGPRES. Potrerillos Smelter of Codelco North’s Salvador Division (PM 10 and SO2).<br>f) Supreme Decree N° 206/2001, MINSEGPRES. Chuquicamata smelter of Codelco North’s Chuquicamata Division (PM 10 and SO2). |
| Supreme Decree N° 165/1999, MINSEGPRES. The Decree establishes Emission Standards for the purpose of regulating arsenic pollution discharged into the air.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |



(Table I continued)

### National Coverage

Supreme Decree N° 138/2005, MINSAL, applicable throughout the territory of Chile, which establishes the obligation for owners of stationary sources to declare emissions of the following areas, activities or types of source:

- Furnaces that produce steam and/or hot water
- Production of cellulose
- Primary and secondary smeltings
- Thermoelectric power plants
- Production of cement, lime or plaster
- Production of glass
- Production of ceramic products
- Iron and steel industry
- Petrochemicals
- Asphalt

S.D. N° 45/2007, MINSEGPRES, establishes Emission Standards for Incineration and Co-Incineration of Waste. (In force since October 5, 2007; existing facilities must comply with the emission standards set forth in this decree within a timeframe of no more than 3 years, starting on the date it came into force).

Supreme Decree N° 167/1999, MINSEGPRES. The Decree sets out Emission Standards for Nuisance Odors (Hydrogen Sulfide compounds and mercaptans: TRS gases) associated to the production of sulfate pulp.

### Metropolitan Region

Supreme Decree N° 4/1992, MINSAL. The Decree enacts Regulations on the Emission of Particulate Matter from fixed point and group sources in the Metropolitan Region.

Supreme Decree N° 1.583/1992, MINSAL. This statute establishes Particulate Matter Emission Standards for stationary point sources which emit over 1 ton/day of particulate matter in the Metropolitan Region.

Supreme Decree N° 58/2003, MINSEGPRES, which reformulates and updates the Atmospheric Decontamination and Prevention Plan (PPDA) for the Metropolitan Region and sets forth emission standards and/or the obligation to take measurements of stationary sources of the following pollutants:

- Carbon Monoxide, Regulation in force since 29/01/05.
- Sulphur Dioxide, Regulation in force since 29/01/05.
- Nitrogen oxides; the global and individual goal for reducing emissions from these sources by 2010 will be 50% of the total emissions released by them in 1997.

Resolution N° 15,027/1994, Metropolitan Environmental Health Service (SESMA by its acronym in Spanish). This Resolution creates the System for Reporting Emissions from Stationary Sources in the Metropolitan Region.

by Chile in terms of reducing the consumption of substances that deplete the ozone layer. It also strengthens mechanisms to allow public access to information concerning the environmental effects of these substances and of ultraviolet (UV) radiation.

#### **–Other Relevant Information - National Level:**

Organic Law N° 17.374 of the National Statistics Institute (INE by its acronym in Spanish) grants this institution the power to obtain information from both the public and the private sectors. In this context, the INE implemented the Annual National Industrial Survey (ENIA by its acronym in Spanish), which was then moved to the PRTR. This survey records data on fuel consumption and on production levels at all Chilean manufacturing facilities with 10 or more workers and allows estimating atmospheric emissions from all facilities which are not forced to submit reports under Supreme Decree N° 138/2005 MINSAL. It is important to point out that the data in this survey are protected by statistics secrecy regulations. Therefore, the results published by the PRTR may only be expressed as consolidated totals per economic activity.

#### ***Air Component: Diffuse Sources (Mobile)***

For diffuse sources, SECTRA - an agency of the Ministry of Transportation and Telecommunications (MINTRATEL)- developed the MODEM system for estimating vehicle emissions, which has been implemented in Chile's main cities and whose results have been incorporated into the PRTR. Starting in 2009, an alternative to the MODEM methodology was developed for those cities that do not have a transportation model. As a result, 10 other cities have been included in the PRTR, bringing the total to 27 cities with emission estimates.

#### ***Liquid Waste Component (Emissions)***

The SISS and the DIRECTEMAR (by its acronym in Spanish), according to their area of competence, already have adequate legislation that allows them to obtain information on emissions/discharges into marine, continental, surface, and ground waters. This

data makes it possible for the PRTR to report inventories of liquid waste at a national level. A list of the specific regulations is provided below:

- Supreme Decree N° 90/2000, MINSEGPRES, establishes Emission Standards for Regulating Pollutants associated to the discharge of liquid waste into marine and continental surface waters.
- Supreme Decree N° 46/2002, MINSEGPRES. The Decree establishes Emission Standards for Liquid Waste discharged into groundwater.
- Supreme Decree N° 80, MINSEGPRES. The Decree establishes Emissions Regulations for molybdenum and for sulfates in effluents discharged from tailings dams into the Caren stream.

#### ***Liquid Waste Component (Transfers)***

The SISS has the necessary legal instruments to obtain information on transfers discharged into sewerage systems. The specific regulation is presented below:

- Supreme Decree N° 609/1998, Ministry of Public Works (MOP), establishes Emission Standards for Pollutants associated to the discharge of liquid waste into sewerage systems.

#### ***Solid Waste Component (Transfers)***

Supreme Decree N° 148/2004, MINSAL which approves the Sanitary Regulations on Handling Hazardous Waste, sets forth the minimum sanitary and safety conditions required during the generation, holding, storage, transportation, reutilization, recycling, final disposal, and other forms of elimination of hazardous waste.

In Chapter VII concerning the Hazardous Waste Reporting and Monitoring System, this Regulation states that parties owning, holding, or processing hazardous waste are subject to a Reporting and Monitoring System of these residues, which is applicable



throughout Chile and whose purpose is to provide the Health Authorities with complete, updated, and timely information on such waste, from the moment it leaves the facility that emits or produces it, until it is received at the final disposal facility. In order to manage this information, the MINSAL, with the assistance of the former CONAMA (predecessor of the Ministry), developed an online System for Reporting and Monitoring Hazardous Waste (SIDREP).

### List of Pollutants Included

During the design stage of the PRTR, and under conditions defined by the GNC, an initial list was proposed of substances to be included in the system. This list included substances and parameters already specified in existing regulations and in international treaties and conventions signed by Chile. As a result, it covers a long list of pollutants and different types of physical parameters and parameters of bacteriological importance, which are applied mainly to pollution caused by liquid effluents.

The list of pollutants included in the PRTR is presented in Appendix N° 3.

## 2. Reporting Thresholds and Reporting Sectors

Table 2 presents the definition of reporting thresholds and the sectors which must report their emissions and releases of substances included in the PRTR. It is important to highlight that these thresholds are defined in current legislation.

### Validation of Information in the PRTR

Based on the GNC agreements, each sectorial agency, within the scope of its specific competence, has been responsible for ascertaining the validity of the information to be reported to the PRTR. Therefore, the Pollutant Release and Transfer Register and its central administration, have respected the technical criteria applied by each agency and has considered the information provided to be official. Furthermore, the technical criteria and the validation methods employed to check the validity of the data are the exclusive responsibility of each agency, in accordance with its legal mandate.

**TABLE 2**  
**PRTR Reporting Thresholds**

| NATIONAL           |             |                                                                                     |                                                                                                                                              |                                                                                                                                                                                                                                                                                                        |
|--------------------|-------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Institution        | Source      | Quantity                                                                            | Thresholds                                                                                                                                   | Sectors Involved                                                                                                                                                                                                                                                                                       |
| Ministry of Health | S.D. N° 138 | 2005: 939<br>2006: 1.863<br>2007: 2.286<br>2008: 3.055<br>2009: 3.807<br>Facilities | Industries with generating sets over 20KW and industrial boilers and heating with fuel energy consumption greater than 1 Mega Joule per hour | Paper and cellulose manufacturing<br><br>Primary and secondary foundries<br>Thermal power plants<br>Cement, lime and plaster manufacturing<br>Glass manufacturing<br>Ceramics manufacturing<br>Iron and Steel industry<br>Petrochemical industry<br>Asphalt manufacturing<br>Generator sets<br>Boilers |

(Table 2 continued)

| NATIONAL    |                                      |                                                                                                                                  |                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Institution | Source                               | Quantity                                                                                                                         | Thresholds                                                                                                                                                     | Sectors Involved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| AIR         | Ministry of Health                   | S.D. N° 138 y ENIA <sup>3</sup><br>2005: 123<br>2006: 73<br>2007: 176<br>2008: 90<br>2009: 101<br>Facilities                     | Equivalent to those defined in S.D. N° 138                                                                                                                     | Paper and cellulose manufacturing<br>Primary and secondary foundries<br>Thermal power plants<br>Cement, lime and plaster manufacturing<br>Glass manufacturing<br>Ceramics manufacturing<br>Iron and Steel industry<br>Petrochemical industry<br>Asphalt manufacturing<br>Generating sets<br>Boilers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|             | INE                                  | ENIA<br>2005: 1.680<br>2006: 649<br>2007: 1.323<br>2008: 1.245<br>2009: 1.234<br>Facilities                                      | Manufacturing industry with over 10 employees                                                                                                                  | Foodstuffs and drinks preparation.<br>Tobacco products preparation.<br>Textiles manufacturing.<br>Apparel manufacturing; fur booming and dying.<br>Leather tanning and booming; manufacture of suitcases, handbags and saddlery and footwear articles.<br>Wood production and manufacturing of wood and cork based products excluding furniture; manufacturing of articles made of straw and plaiting material.<br>Paper and paper products manufacturing.<br>Editing and printing and reproduction of recordings activities.<br>Manufacture of coke, byproducts of oil refining and nuclear fuel.<br>Manufacture of chemical substances and products.<br>Manufacture of rubber and plastic products.<br>Manufacture of other mineral non metallic products.<br>Manufacture of base metals.<br>Manufacture of metallic products, excluding machinery and equipment.<br>Manufacture of machinery and electronics n.e.c.<br>Manufacture of office, accounting and computing equipment.<br>Manufacture of machinery and electrical appliances n.e.c.<br>Manufacture of radio, TV and communication devices and equipment.<br>Manufacture of medical, optical and precision instruments and manufacture of watches.<br>Manufacture of motor vehicles, trailers and semi-trailers.<br>Manufacture of other kind of transport equipment.<br>Manufacture of furniture; manufacturing industries n.e.c.<br>Recycling. |
|             | Metropolitan Region Health Authority | S.D. N° 4 Resolución 15027<br>2005: 3.598<br>2006: 2.737 <sup>4</sup><br>2007: 4.058<br>2008: 4.058<br>2009: 6.242<br>Facilities | Industries with generating sets over 20KW, industrial boilers over 200.000 Kg. Joule/ hour and equipment with atmospheric burners over 500.000 Kg. Joule /hour | Stationary and specific sources within the Metropolitan Region. All sources designed to operate in a fixed place whose emissions are discharged through an exhaust or chimney, including all those sources mounted over portable vehicles to facilitate its transport.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

<sup>3</sup> This group corresponds to facilities reporting under Supreme Decree N° 138/2005 MINSAL, whose fuel consumption data was supplemented with data from the ENIA survey in order to estimate their emissions. In general, for the rest of the facilities reporting under Supreme Decree N° 138/2005 MINSAL, fuel consumption were equal to or greater than consumptions reported in the ENIA; therefore, they were not supplemented.

<sup>4</sup> The reduction in the amount of facilities in 2006, in contrast to those in 2005, is due to the fact that a large number of boilers (small) were not reported by the Health Authority as of 2006.

(Table 2 continued)

| NATIONAL    |                    |             |                                                                                                               |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                     |
|-------------|--------------------|-------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Institution | Source             | Quantity    | Thresholds                                                                                                    | Sectors Involved                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                     |
| WATER       | SECTRA             | MODEM       | 2005: 1.556.727<br>2006: 1.848.884<br>2007: 1.985.172<br>2008: 2.123.200<br>2009: 2.193.420<br>Motor vehicles | Structuring road urban network<br>(transportation modeling)                                                                                                                                                                                                                                                                                           | Private vehicles<br>Rent<br>Commercial<br>Light-duty Trucks<br>Medium sized trucks<br>Motorcycles<br>Rural and Interurban buses<br>Shared taxis<br>Tendered buses<br>Heavy-duty Trucks              |
|             | SISS               | S.D. N° 46  | 2005: no data<br>2006: 19<br>2007: 64<br>2008: 61<br>2009: 54<br>Facilities                                   | Facilities that qualify as Industrial Facility, according to the guide "Qualification as industrial facility". Technical Administrative procedures", adopted through Resolution N° 2.505 of 2003 by Superintendent of Sanitary Services SISS.                                                                                                         | Agriculture, hunting, forestry and fishery; Mining exploitation; Manufacturing industries; other generating liquid industrial waste                                                                 |
|             |                    | S.D. N° 90  | 2005: 47<br>2006: 440<br>2007: 759<br>2008: 716<br>2009: 676<br>Facilities                                    |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                     |
|             |                    | S.D. N° 609 | 2005: 1.264<br>2006: 1.537<br>2007: 1.786<br>2008: 1.629<br>2009: 2.138<br>Facilities                         |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                     |
|             |                    | S.D. N° 80  | 2008: 1<br>2009: 1<br>Facilities                                                                              |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                     |
|             | DIREC-TEMAR        | S.D. N° 90  | 2005: no data<br>2006: 9<br>2007: 69<br>2008: 47<br>2009: 64<br>Facilities                                    |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                     |
| WASTE       | Ministry of Health | SIDREP      | 2005: no data<br>2006: 167<br>2007: 656<br>2008: 1164<br>2009: 1.472<br>Facilities                            | According to MINSAL Supreme Decree N° 148/03 adopting the Sanitary regulation over handling of hazardous waste, Title VII of the Declaration and Control System of Hazardous Waste, Art. 84, the transport of Hazardous Waste over 6 kg of acute toxic waste and 2 tons of Hazardous Waste that presents any other type of hazard should be reported. | Agriculture, hunting, forestry and fishery; mine exploitation (excluding massive mining waste); Manufacturing industries; Other activities generating hazardous waste as defined in the regulation. |

### ***Legal Aspects of the Dissemination of Information***

In accordance to what was set forth in the national proposal for implementation of the PRTR and its action plan<sup>5</sup>, data on pollutant release and transfer subject to standards will be nominated, therefore generating sources will be specifically identified. On the other hand, unregulated release and transfers will not be identified. As a result, information for them will be presented to the community as a compilation.

### **3. COMPLETION OF THE 2011 WORK AGENDA**

Important methodological progress was made during this year in the air component, processing all data from stationary and mobile sources between 2005 and 2009, with the same estimation methodology and including all measurements made by facilities, thus allowing an adequate comparison of the data with historical series.

A new search engine system has been implemented in the PRTR website ([www.retc.cl](http://www.retc.cl)) that allows to display data in a friendly way and to download them in Excel format.

The display of emitting facilities on Google Earth was also implemented.

A public consultation was carried out on the regulation of the Pollutant Release and Transfer Register. The PRTR one-stop shop is launched, including during this first phase the reports on storage of hazardous substances (D.S N° 78/2010 MINSAL), the DIRECTEMAR Inspection Booth (S.D. N° 90/2000 MINSEGPRES), and the National Solid Waste Reporting System (SINADER).

A study was carried out to move forward with a methodology to estimate emissions of persistent organic pollutants included in the Stockholm Convention into the water and soil.

The PRTR website was translated to English.

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5 Approved by Agreement N° 277 of the board of directors of CONAMA on 23 of June of 2005.

### III. GENERAL OVERVIEW OF THE POLLUTANT RELEASE AND TRANSFER REGISTER BY 2009

The following Table shows release and transfers for each of the pollutants included in the PRTR:

| TOTAL ON-SITE AND OFF-SITE EMISSIONS |                                                      |            |              |                        |                  |
|--------------------------------------|------------------------------------------------------|------------|--------------|------------------------|------------------|
| CASE NUMBER                          | POLLUTANT                                            | Air t/year | Water t/year | Water Transfers t/year | Waste (*) t/year |
|                                      | Residual mineral oils unfit for intended use         |            |              |                        | 42,465.00        |
|                                      | Oils and fats                                        |            | 30,938.37    | 5,700.83               |                  |
| 7783-06-4                            | Sulphurated hydrogen / hydrogen sulfide (or TRS)     |            |              |                        |                  |
| 309-00-2                             | Aldrin                                               |            |              |                        |                  |
| 7429-90-5                            | Aluminum                                             |            | 198.55       | 3.77                   |                  |
| 7440-38-2                            | Arsenic                                              | 6.62       | 47.47        | 0.03                   |                  |
|                                      | Arsenic, arsenic compounds                           |            |              |                        | 36,024.28        |
| 71-43-2                              | Benzene                                              | 166.34     | 0.00         |                        |                  |
|                                      | Beryllium compounds                                  |            |              |                        | 1.70             |
| 1336-36-3                            | Polychlorinated biphenyl (PCB)                       |            |              |                        |                  |
| 7440-42-8                            | Boron                                                |            | 68.86        | 0.54                   |                  |
| 75-27-4                              | Bromochloromethane, Appendix C, Group III            |            |              |                        |                  |
| 74-83-9                              | Methyl bromide, Appendix E, Group I                  |            |              |                        |                  |
| 7440-43-9                            | Cadmium                                              |            | 6.70         | 0.22                   |                  |
|                                      | Cadmium, Cadmium compounds                           |            |              |                        | 137.07           |
|                                      | Catalyzers used                                      |            |              |                        | 489.53           |
|                                      | Fully halogenated CFCs (others), Appendix B, Group I |            |              |                        |                  |
| 57-12-5                              | Cyanide                                              |            | 7.99         | 0.75                   |                  |

(Table 3 continued)

| TOTAL ON-SITE AND OFF-SITE EMISSIONS |                                                            |            |              |                        |                  |
|--------------------------------------|------------------------------------------------------------|------------|--------------|------------------------|------------------|
| CASE NUMBER                          | POLLUTANT                                                  | Air t/year | Water t/year | Water Transfers t/year | Waste (*) t/year |
|                                      | Non-organic cyanides                                       |            |              |                        | 186.75           |
|                                      | Organic cyanides                                           |            |              |                        | 0.05             |
| 57-74-9                              | Chlordane                                                  |            |              |                        |                  |
|                                      | Chlorofluorocarbons (CFCs), Appendix A, Group I            |            |              |                        |                  |
|                                      | Chlorides                                                  |            | 154,105.00   |                        |                  |
| 7440-50-8                            | Copper                                                     |            | 35.74        | 2.39                   |                  |
| 1317-38-0                            | Copper, copper compounds                                   |            |              |                        | 1,014.31         |
|                                      | Antimony compounds                                         |            |              |                        | 5.05             |
|                                      | Hexavalent chromium compounds                              |            |              |                        | 47,011.53        |
|                                      | Mercury compounds                                          |            |              |                        | 196.95           |
|                                      | Lead compounds                                             |            |              |                        | 7,622.97         |
|                                      | Selenium compounds                                         |            |              |                        | 89.61            |
| 1314-13-2                            | Zinc compounds                                             |            |              |                        | 5.08             |
|                                      | Non-organic flourine compounds, excluding calcium flourine |            |              |                        | 12.96            |
|                                      | Phosphorus organic compounds                               |            |              |                        | 12.45            |
|                                      | Volatile Organic Compounds                                 | 49,445.39  |              |                        |                  |
|                                      | Organohalogen compounds                                    |            |              |                        | 5.66             |
| 18540-29-9                           | Hexavalent chromium                                        |            | 5.05         | 2.06                   |                  |
| 7440-47-3                            | Total Chromium                                             |            | 1.26         | 8.38                   |                  |
|                                      | Any substance in the polychlorinated dibenzofurans group   |            |              |                        |                  |
| 50-29-3                              | DDT (1,1,1-Trichloro-2,2-bis(4-chlorophenyl) ethane)       |            |              |                        |                  |

(Table 3 continued)

| TOTAL ON-SITE AND OFF-SITE EMISSIONS |                                                                                                 |                |              |                        |                  |
|--------------------------------------|-------------------------------------------------------------------------------------------------|----------------|--------------|------------------------|------------------|
| CASE NUMBER                          | POLLUTANT                                                                                       | Air t/year     | Water t/year | Water Transfers t/year | Waste (*) t/year |
|                                      | Polychlorinated dibenzofurans (PCDF)                                                            |                |              |                        |                  |
|                                      | Polychlorinated dibenzodioxins (PCDF)                                                           |                |              |                        |                  |
|                                      | Polychlorinated dibenzodioxins and furan (PCDD/F)                                               | 0,0000324      |              |                        |                  |
| 60-57-1                              | Dieldrin                                                                                        |                |              |                        |                  |
| 7446-09-5                            | Sulphur dioxide (SO <sub>2</sub> )                                                              | 712,728.94     |              |                        |                  |
| 124-38-9                             | Carbon dioxide (CO <sub>2</sub> )                                                               | 114,454.344,40 |              |                        |                  |
| 10102-44-0                           | Nitrogen dioxide (NO <sub>2</sub> )                                                             |                |              |                        |                  |
| 72-20-8                              | Endrin                                                                                          |                |              |                        |                  |
|                                      | Polluted containers and vessels that have contained one or more compounds listed in Category II |                |              |                        | 4,815.58         |
| 7440-31-5                            | Tin                                                                                             |                | 21.38        |                        |                  |
|                                      | Esters                                                                                          |                |              |                        |                  |
| 108-95-2                             | Phenols, phenolic compounds, including chlorophenols                                            |                |              |                        | 14.61            |
| 16984-48-8                           | Fluorides                                                                                       |                | 95.64        |                        |                  |
| 7723-14-0                            | Total Phosphorus                                                                                |                | 6,771.88     | 764.82                 |                  |
|                                      | Halons, Appendix A, Group II                                                                    |                |              |                        |                  |
| 76-44-8                              | Heptachlor                                                                                      |                |              |                        |                  |
| 118-74-1                             | Hexachlorobenzene                                                                               |                |              |                        |                  |
|                                      | Sulphur hexafluoride (SF <sub>6</sub> )                                                         |                |              |                        |                  |
|                                      | Hydrobromofluorocarbons (HBFC), Appendix C, Group II                                            |                |              |                        |                  |
|                                      | Stable hydrocarbons                                                                             |                | 2,323.87     | 47.69                  |                  |
|                                      | Total hydrocarbons                                                                              | 3,588.96       | 1,469.77     | 478.77                 |                  |



(Table 3 continued)

| TOTAL ON-SITE AND OFF-SITE EMISSIONS |                                                                 |            |              |                        |                  |
|--------------------------------------|-----------------------------------------------------------------|------------|--------------|------------------------|------------------|
| CASE NUMBER                          | POLLUTANT                                                       | Air t/year | Water t/year | Water Transfers t/year | Waste (*) t/year |
|                                      | Volatile hydrocarbons                                           |            | 78.33        | 3.74                   |                  |
|                                      | Hydrochlorofluorocarbons (HCFCs), Appendix C, Group I           |            |              |                        |                  |
|                                      | Hydrofluorocarbons (HFC)                                        |            |              |                        |                  |
| 15438-31-0                           | Iron / dissolved iron                                           |            | 54.28        | 0.05                   |                  |
| 7439-96-5                            | Manganese                                                       |            | 212.57       | 1.44                   |                  |
|                                      | Discarded medicines, drugs and pharmaceutical products          |            |              |                        | 603.93           |
| 7439-97-6                            | Mercury                                                         | 3.26       | 0.75         | 0.10                   |                  |
|                                      | Carbonyl metals                                                 |            |              |                        | 61.11            |
| 74-82-8                              | Methane (CH <sub>4</sub> )                                      | 1,374.05   |              |                        |                  |
|                                      | Methylchloroform (1,1,1-trichloroethane), Appendix B, Group III |            |              |                        |                  |
|                                      | Mixes and emulsions of oil and water or hydrocarbons and water  |            |              |                        | 22,413.42        |
| 2385-85-5                            | Mirex                                                           |            |              |                        |                  |
| 7439-98-7                            | Molybdenum                                                      |            | 38.78        |                        |                  |
| 630-08-0                             | Carbon monoxide                                                 | 396,122.34 |              |                        |                  |
|                                      | Particulate Matter (PM)                                         | 204,556.61 |              |                        |                  |
|                                      | PM 10                                                           | 86,282.53  |              |                        |                  |
|                                      | PM 2.5                                                          | 43,323.44  |              |                        |                  |
| 7440-02-0                            | Nickel                                                          |            | 6.76         | 4.28                   |                  |
|                                      | Nitrite plus Nitrate (and Nox)                                  |            | 28.06        |                        |                  |
| 7664-41-7                            | Ammoniacal nitrogen (or NH <sub>3</sub> )                       | 17,587.49  | 333.25       | 2,679.21               |                  |

(Table 3 continued)

| TOTAL ON-SITE AND OFF-SITE EMISSIONS |                                                                                                                                 |            |              |                        |                  |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------------|--------------|------------------------|------------------|
| CASE NUMBER                          | POLLUTANT                                                                                                                       | Air t/year | Water t/year | Water Transfers t/year | Waste (*) t/year |
|                                      | Total Kjeldahl Nitrogen                                                                                                         |            | 27,700.87    | 0.56                   |                  |
|                                      | NOx                                                                                                                             | 243,314.20 |              |                        |                  |
|                                      | Ozono                                                                                                                           |            |              |                        |                  |
| 87-86-5                              | Pentachlorophenol /PCP                                                                                                          |            | 0.44         |                        |                  |
|                                      | Perfluorocarbons (PFC)                                                                                                          |            |              |                        |                  |
| 7439-92-1                            | Lead                                                                                                                            | 1.04       | 9.93         | 0.56                   |                  |
|                                      | Asbestos dust and/or fibres, excluding waste from cement-asbestos based construction materials                                  |            |              |                        | 385.20           |
|                                      | Tarred waste resulting from refining, distillation or any pyrolytic treatment                                                   |            |              |                        | 4,260.55         |
|                                      | Explosive waste                                                                                                                 |            |              |                        | 10.59            |
|                                      | Hospital waste                                                                                                                  |            |              |                        | 420.55           |
|                                      | Waste containing cyanides, resulting from thermal treatment and tempering activities                                            |            |              |                        | 71.57            |
|                                      | Waste resulting from selective collection or segregation of residential solid waste that has at least one hazard characteristic |            |              |                        | 1,033.46         |
|                                      | Waste resulting from the manufacturing, preparation and use of chemicals for wood preservation                                  |            |              |                        | 65.83            |
|                                      | Waste resulting from the manufacturing, preparation and use of biocide products, phitopharmaceutical products and pesticides    |            |              |                        | 129.52           |

(Table 3 continued)

| TOTAL ON-SITE AND OFF-SITE EMISSIONS |                                                                                                                   |            |              |                        |                  |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------|--------------|------------------------|------------------|
| CASE NUMBER                          | POLLUTANT                                                                                                         | Air t/year | Water t/year | Water transfers t/year | Waste (*) t/year |
|                                      | Waste resulting from the production and preparation of pharmaceutical products                                    |            |              |                        | 381.72           |
|                                      | Waste resulting from the production, preparation and use of organic solvents                                      |            |              |                        | 2,078.79         |
|                                      | Waste resulting from the manufacturing, preparation and use of chemicals and materials for photography            |            |              |                        | 684.12           |
|                                      | Waste resulting from the production, preparation and use of resins, latex, plasticizer or glues and adhesives     |            |              |                        | 3,525.33         |
|                                      | Waste resulting from the production, preparation and use of inks, dyes, pigments, paints, lacquers or varnishes   |            |              |                        | 2,924.86         |
|                                      | Waste resulting from the surface treatment of metals and plastics                                                 |            |              |                        | 8,907.01         |
|                                      | Waste resulting from waste disposal and treatment operations, such as sludges, filters, dust, etc.                |            |              |                        | 90,936.94        |
| 7782-49-2                            | Selenium                                                                                                          |            | 1.33         |                        |                  |
|                                      | Acidic solutions or acids in solid form                                                                           |            |              |                        | 41,241.03        |
|                                      | Basic solutions or bases in solid form.                                                                           |            |              |                        | 3,832.50         |
|                                      | Halogenated organic solvents                                                                                      |            |              |                        | 1,683.66         |
|                                      | Organic solvents, excluding halogenated solvents                                                                  |            |              |                        |                  |
|                                      | SO <sub>2</sub>                                                                                                   |            |              |                        |                  |
|                                      | Soils or materials resulting from earthworks in sites contaminated by one of the components listed in Category II |            |              |                        | 5,199.19         |
|                                      | Sulphates                                                                                                         |            | 139,941.11   | 7,801.02               |                  |
|                                      | Sulphides                                                                                                         |            |              |                        |                  |

(Table 3 continued)

| TOTAL ON-SITE AND OFF-SITE EMISSIONS |                                                                                                                                                                             |                       |                   |                        |                   |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------|------------------------|-------------------|
| CASE NUMBER                          | POLLUTANT                                                                                                                                                                   | Air t/year            | Water t/year      | Water transfers t/year | Waste (*) t/year  |
|                                      | Active substances in Methylene blue                                                                                                                                         |                       |                   |                        |                   |
|                                      | Residual chemical substances, non-identified or new, resulting from research and development or teaching activities whose effects for humans or the environment are unknown |                       |                   |                        | 10,129.53         |
|                                      | Substances and waste containing, or contaminated by, polychlorinated biphenyl (PCB), polychlorinated terphenyl (PCT) or polybrominated biphenyl (PBB)                       |                       |                   |                        | 14.43             |
|                                      | Thallium, thallium compounds                                                                                                                                                |                       |                   |                        | 10.65             |
|                                      | Tellurium, tellurium compounds                                                                                                                                              |                       |                   |                        | 0.10              |
|                                      | Tetrachloroethene                                                                                                                                                           |                       | 2.21              |                        |                   |
|                                      | Carbon tetrachloride, Appendix B, Group II                                                                                                                                  |                       |                   |                        |                   |
| 108-88-3                             | Toluene / methylbenzene / Toluole / Phenylmethane                                                                                                                           | 84.82                 | 4.07              |                        |                   |
| 8001-35-2                            | Toxaphene                                                                                                                                                                   |                       |                   |                        |                   |
|                                      | Trichloromethane                                                                                                                                                            |                       | 5.48              |                        |                   |
|                                      | Xylene                                                                                                                                                                      |                       | 4.07              |                        |                   |
| 7440-66-6                            | Zinc                                                                                                                                                                        |                       |                   |                        |                   |
|                                      | <b>Total</b>                                                                                                                                                                | <b>104,154,132.16</b> | <b>364,519.81</b> | <b>17,501.22</b>       | <b>276,151.98</b> |

NR: Not Reported.

(\*) SIDREP transfers contain more than one associated waste, in this case only single instance waste transfers were considered.

## 1. Air Emissions

### *National Inventory of Main Air Pollutants*

**IMAGE I**

**Emissions from Stationary Sources**



The following table shows the inventory categories used to obtain emissions reported to the PRTR:

**TABLE 4**

**List of Stationary Sources Inventory Categories included in the PRTR**

| GROUP                               | SUB-GROUP          | CATEGORY       | SUBCATEGORY                              | INVENTORY LINE OF BUSINESS                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------|--------------------|----------------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| STATIONARY, AREAL AND OTHER SOURCES | STATIONARY SOURCES | Combustion     | Specific External Combustion             | <ul style="list-style-type: none"> <li>• Electricity Generation</li> <li>• Industrial Boilers</li> <li>• Heating Boilers</li> </ul>                                                                                                                                                                                                                                                                                                                                                                     |
|                                     |                    |                | Internal Combustion                      | <ul style="list-style-type: none"> <li>• Electrode Groups</li> <li>• Graphic Arts Industry (Drying Processes)</li> <li>• Internal Combustion Engines</li> <li>• Gas-powered Turbines</li> </ul>                                                                                                                                                                                                                                                                                                         |
|                                     |                    | Waste Disposal | Commercial/Institutional                 | <ul style="list-style-type: none"> <li>• Incineration of medical waste</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                     |                    |                | Industrial                               | <ul style="list-style-type: none"> <li>• Incineration.</li> <li>• Open Burns.</li> <li>• Thermal Treatment.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                  |
|                                     |                    |                | Municipal                                | <ul style="list-style-type: none"> <li>• Incineration</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                     |                    | Processes      | Secondary Metal Industry                 | <ul style="list-style-type: none"> <li>• Molybdenum</li> <li>• Iron and Steel Products</li> <li>• Copper and Bronze Products</li> <li>• Zinc Products</li> <li>• Aluminum Products</li> <li>• Lead Products</li> <li>• Surface Treatments</li> </ul>                                                                                                                                                                                                                                                    |
|                                     |                    |                | Mineral Products Industry                | <ul style="list-style-type: none"> <li>• Primary Production of Copper</li> <li>• Primary Production of Gold</li> <li>• Production of Glass and Frits</li> <li>• Production of Bricks</li> <li>• Production, storage and transportation of clays</li> <li>• Production of cement</li> <li>• Production of lime</li> <li>• Production of gypsum</li> <li>• Manufacturing of ceramic products</li> <li>• Manufacturing of asphalt mixes</li> <li>• Arid Management</li> <li>• Asbestos Products</li> </ul> |
|                                     |                    |                | Chemical Industry                        | <ul style="list-style-type: none"> <li>• Chemical industry</li> <li>• Manufacturing of plastic products</li> <li>• Manufacturing of tires</li> </ul>                                                                                                                                                                                                                                                                                                                                                    |
|                                     |                    |                | Wood and Paper Industry                  | <ul style="list-style-type: none"> <li>• Manufacturing and recycling of paper</li> <li>• Manufacturing of wood products and furniture</li> </ul>                                                                                                                                                                                                                                                                                                                                                        |
|                                     |                    |                | Food, Agriculture and Livestock Industry | <ul style="list-style-type: none"> <li>• Grain Processing</li> <li>• Bakeries</li> <li>• Animal slaughterhouses</li> <li>• Fruit dehydration</li> <li>• Food production</li> </ul>                                                                                                                                                                                                                                                                                                                      |

**TABLE 5**

**List of Mobile Sources Inventory Categories included in the PRTR**

| GROUP | SUB-GROUP              | CATEGORY            | SUBCATEGORY                                                                                                    | INVENTORY LINE OF BUSINESS                                                                                                                                                                                                                                                                        |
|-------|------------------------|---------------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | ON-ROAD MOBILE SOURCES | Light-duty Vehicles | <b>Private Vehicles</b><br>(sedan and station wagon)                                                           | <ul style="list-style-type: none"> <li>• Private Vehicles Type 1 Category</li> <li>• Private Vehicles Type 2 Category</li> <li>• Non-Catalytic Private Vehicles</li> <li>• Private Vehicles Others</li> </ul>                                                                                     |
|       |                        |                     | <b>Rental Vehicles</b><br>(Basic Taxis)                                                                        | <ul style="list-style-type: none"> <li>• Rental Vehicles Type 1 Category</li> <li>• Rental Vehicles Type 2 Category</li> <li>• Non-Catalytic Rental Vehicles</li> <li>• Rental Vehicles Others</li> </ul>                                                                                         |
|       |                        |                     | <b>Commercial Vehicles</b><br>(Jeeps, private and commercial pick-up trucks, commercial van and passenger van) | <ul style="list-style-type: none"> <li>• Commercial Vehicles Type 1 Category</li> <li>• Commercial Vehicles Type 2 Category</li> <li>• Non-Catalytic Commercial Vehicles</li> <li>• Commercial Vehicles Type 1 Diesel</li> <li>• Commercial Vehicles Type 2 Diesel</li> </ul>                     |
|       |                        |                     | Motorcycles                                                                                                    | <ul style="list-style-type: none"> <li>• Two-Stroke Conventional Motorcycles</li> <li>• Type 1 Two-Stroke Motorcycles</li> <li>• Four-Stroke Conventional Motorcycles</li> <li>• Type 1 Four-Stroke Motorcycles</li> </ul>                                                                        |
|       |                        |                     | Shared Taxis                                                                                                   | <ul style="list-style-type: none"> <li>• Type 1 Catalytic Shared Taxis</li> <li>• Type 2 Catalytic Shared Taxis</li> <li>• Non-Catalytic Shared Taxis</li> </ul>                                                                                                                                  |
|       |                        | Trucks              | Light-duty Trucks                                                                                              | <ul style="list-style-type: none"> <li>• Conventional Diesel Light-duty Trucks</li> <li>• Type 1 Diesel Light-duty Trucks</li> <li>• Type 2 Diesel Light-duty Trucks</li> <li>• Type 3 Diesel Light-duty Trucks</li> </ul>                                                                        |
|       |                        |                     | Medium-duty Trucks                                                                                             | <ul style="list-style-type: none"> <li>• Conventional Diesel Medium-duty Trucks</li> <li>• Type 1 Diesel Medium-duty Trucks</li> <li>• Type 2 Diesel Medium-duty Trucks</li> <li>• Type 3 Diesel Medium-duty Trucks</li> </ul>                                                                    |
|       |                        |                     | Heavy-duty Trucks                                                                                              | <ul style="list-style-type: none"> <li>• Conventional Diesel Heavy-duty Trucks</li> <li>• Type 1 Diesel Heavy-duty Trucks</li> <li>• Type 2 Diesel Heavy-duty Trucks</li> <li>• Type 3 Diesel Heavy-duty Trucks</li> </ul>                                                                        |
|       |                        | Buses               | Tendered Buses                                                                                                 | <ul style="list-style-type: none"> <li>• Conventional Diesel Urban Tendered Buses</li> <li>• Type 1 Diesel Urban Tendered Buses</li> <li>• Type 2 Diesel Urban Tendered Buses</li> </ul>                                                                                                          |
|       |                        |                     | Rural and Interurban Buses                                                                                     | <ul style="list-style-type: none"> <li>• Conventional Diesel Interurban Buses</li> <li>• Type 1 Diesel Interurban Buses</li> <li>• Type 2 Diesel Interurban Buses</li> <li>• Conventional Diesel Rural Buses</li> <li>• Type 1 Diesel Rural Buses</li> <li>• Type 2 Diesel Rural Buses</li> </ul> |
|       |                        |                     | Commercial                                                                                                     | <ul style="list-style-type: none"> <li>• Private Buses</li> </ul>                                                                                                                                                                                                                                 |

Source: RETC.

The statistics presented below show emissions in 2009 from both stationary and mobile sources. Air pollutants have been classified as criteria pollutants and non-criteria pollutants. Criteria pollutants have been identified as harmful for human health and well-being. They are called criteria pollutants because they were assessed in air quality evaluations published in documents in the United States<sup>6</sup>, in order to establish permissible limits to protect the environment and human health and well-being.

The term “criteria pollutants” has currently been adopted by many countries. Guidelines and standards have been developed for each criteria pollutant. The guidelines are recommendations on exposure levels to air pollutants aimed at reducing risks or protecting people and the environment from harmful effects. In response to these exposure levels, standards have been established setting maximum allowed concentrations of air pollutants released during a specific period; these threshold values are designed with a margin for risk protection and are intended to protect human health and the environment.

The criteria pollutants are:

- a) Sulfur Dioxide (SO<sub>2</sub>)
- b) Nitrogen Dioxide (NO<sub>2</sub>)
- c) Particulate Matter (PM)
- d) Carbon Monoxide (CO)
- e) Ozone (O<sub>3</sub>)
- f) Lead (Pb)

The PRTR records emissions of five criteria pollutants. Only ozone is not currently included.

### ***Statistics from Stationary Sources***

The result of air pollution emission inventories for stationary sources, based on the reports submitted in accordance to S.D. N° 138/2005 MINSAL, are presented below together with the inclusion of emissions estimates derived from inventories available at the Ministry of the Environment; statistics are shown since the first report in 2005 up to the report for 2009.

The following tables show air emissions from stationary sources between 2005 and 2009 by pollutant per region of the country.

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<sup>6</sup> Source: National Ecology Institute (INE by its acronym in Spanish), México.



**IMAGE 2**

**Emissions from Stationary Sources**



**TABLE 6**

**National Inventory of Air Pollution Emissions from Reports of S.D. N° 138/2005 MINSAL and estimates from MMA inventories 2005-2009. Values in Tons/Year**

| Region                                         | PM 10         |               |               |               |               | PM 2.5        |               |               |               |               |
|------------------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
|                                                | 2005          | 2006          | 2007          | 2008          | 2009          | 2005          | 2006          | 2007          | 2008          | 2009          |
| Arica and Parinacota Region                    | 42            | 50            | 71            | 60            | 210           | 37            | 43            | 60            | 50            | 87            |
| Tarapacá Region                                | 517           | 842           | 1.046         | 975           | 1.551         | 413           | 494           | 674           | 865           | 963           |
| Antofagasta Region                             | 7.039         | 13.589        | 13.688        | 14.360        | 16.854        | 4.636         | 10.749        | 10.997        | 11.476        | 13.033        |
| Atacama Region                                 | 2.762         | 4.669         | 5.633         | 8.577         | 8.148         | 1.746         | 2.322         | 2.882         | 4.335         | 4.064         |
| Coquimbo Region                                | 38            | 41            | 74            | 219           | 175           | 24            | 28            | 49            | 81            | 73            |
| Valparaíso Region                              | 2.541         | 2.346         | 3.037         | 3.008         | 3.966         | 1.804         | 1.526         | 1.883         | 2.167         | 2.819         |
| Libertador Gral. Bernardo O'Higgins Region     | 1.868         | 2.531         | 3.737         | 4.072         | 5.399         | 1.525         | 1.979         | 2.642         | 2.544         | 3.140         |
| Maule Region                                   | 1.339         | 1.608         | 1.567         | 1.752         | 1.697         | 1.097         | 1.189         | 1.188         | 1.307         | 1.672         |
| Biobío Region                                  | 7.840         | 18.324        | 20.424        | 20.130        | 20.433        | 5.039         | 8.066         | 8.745         | 8.619         | 8.913         |
| La Araucanía Region                            | 862           | 881           | 1.080         | 1.156         | 1.315         | 729           | 712           | 887           | 1.005         | 910           |
| Los Ríos Region                                | 335           | 273           | 283           | 278           | 372           | 253           | 123           | 130           | 202           | 204           |
| Región de Los Lagos                            | 565           | 741           | 937           | 1.034         | 1.674         | 368           | 491           | 659           | 637           | 818           |
| Aisén del Gral. Carlos Ibáñez del Campo Region | 24            | 41            | 117           | 312           | 364           | 10            | 21            | 73            | 119           | 152           |
| Magallanes and Chilean Antarctic Region        | 220           | 231           | 350           | 265           | 767           | 217           | 295           | 323           | 255           | 764           |
| Santiago Metropolitan Region (*)               | 1.119         | 1.603         | 1.635         | 1.646         | 1.756         | 859           | 1.387         | 1.448         | 1.456         | 1.493         |
| <b>Country Total</b>                           | <b>27.110</b> | <b>47.768</b> | <b>53.680</b> | <b>57.842</b> | <b>64.681</b> | <b>18.759</b> | <b>29.426</b> | <b>32.639</b> | <b>35.119</b> | <b>39.103</b> |

Source: MINSAL y CENMA, 2009.

(\*) MINSAL did not provide information of the emissions derived from stationary sources for the years 2008 and 2009 for the Metropolitan Region. The reports according to S.D. N° 138/2005 MINSAL are partial at the time of the elaboration of this document. Most of the facilities reported in paper. The data for 2009 were obtained from the projection of GDP growth rates. The Gross Domestic Product statistics by region were used, as informed by the Central Bank of Chile on its website, specifically in their National Report for the 2003-2009 period.

**TABLE 7**
**National Inventory of Air Pollution Emissions from Reports of S.D. N° 138/2005 MINSAL and estimates from MMA inventories 2005-2009. Values in Tons/Year**

| Region                                         | CO            |               |               |               |               | COV          |              |              |              |              |
|------------------------------------------------|---------------|---------------|---------------|---------------|---------------|--------------|--------------|--------------|--------------|--------------|
|                                                | 2005          | 2006          | 2007          | 2008          | 2009          | 2005         | 2006         | 2007         | 2008         | 2009         |
| Arica and Parinacota Region                    | 58            | 60            | 121           | 376           | 919           | 14           | 16           | 20           | 69           | 43           |
| Tarapacá Region                                | 1,070         | 1,175         | 1,621         | 1,844         | 3,125         | 358          | 370          | 465          | 613          | 627          |
| Antofagasta Region                             | 1,841         | 2,067         | 2,140         | 2,498         | 4,356         | 1,069        | 1,048        | 1,054        | 1,908        | 1,547        |
| Atacama Region                                 | 3,302         | 2,894         | 3,039         | 3,143         | 2,305         | 38           | 66           | 92           | 136          | 139          |
| Coquimbo Region                                | 76            | 152           | 523           | 1,353         | 2,520         | 3            | 4            | 39           | 164          | 297          |
| Valparaíso Region                              | 2,476         | 1,941         | 2,104         | 5,055         | 6,102         | 818          | 945          | 1,135        | 1,107        | 1,256        |
| Libertador Gral. Bernardo O'Higgins Region     | 615           | 607           | 612           | 1,897         | 3,212         | 15           | 96           | 267          | 288          | 474          |
| Maule Region                                   | 5,253         | 7,906         | 7,334         | 7,516         | 8,230         | 75           | 113          | 118          | 269          | 253          |
| Biobío Region                                  | 16,044        | 36,339        | 34,681        | 32,961        | 32,960        | 408          | 746          | 683          | 817          | 801          |
| La Araucanía Region                            | 1,975         | 2,018         | 1,692         | 3,338         | 5,532         | 125          | 142          | 95           | 166          | 175          |
| Los Ríos Region                                | 1,373         | 934           | 1,049         | 813           | 1,138         | 23           | 16           | 21           | 201          | 241          |
| Los Lagos Region                               | 889           | 1,006         | 1,573         | 4,190         | 6,099         | 15           | 161          | 195          | 291          | 385          |
| Aisén del Gral. Carlos Ibáñez del Campo Region | 120           | 183           | 425           | 745           | 1,044         | 39           | 51           | 92           | 276          | 144          |
| Magallanes and Chilean Antarctic Region        | 1,654         | 1,443         | 1,795         | 1,615         | 2,029         | 115          | 93           | 89           | 90           | 33           |
| Santiago Metropolitan Region (*)               | 4,503         | 4,257         | 4,054         | 4,090         | 4,309         | 290          | 399          | 798          | 923          | 1,723        |
| <b>Country Total</b>                           | <b>41,248</b> | <b>62,983</b> | <b>62,765</b> | <b>71,434</b> | <b>83,881</b> | <b>3,403</b> | <b>4,265</b> | <b>5,164</b> | <b>7,319</b> | <b>8,138</b> |

Source: MINSAL y CENMA, 2009.

(\*) MINSAL did not provide information of the emissions derived from stationary sources for the years 2008 and 2009 for the Metropolitan Region. The reports according to S.D. N° 138/2005 MINSAL are partial at the time of the elaboration of this document. Most of the facilities reported in paper. The data for 2009 were obtained from the projection of GDP growth rates. The Gross Domestic Product statistics by region were used, as informed by the Central Bank of Chile on its website, specifically in their National Report for the 2003-2009 period.

**TABLE 8**

**National Inventory of Air Pollution Emissions from Reports of S.D. N° 138/2005 MINSAL and estimates from MMA inventories 2005-2009. Values in Tons/Year**

| Region                                         | SO <sub>2</sub> |                |                |                |                | NO <sub>x</sub> |               |                |                |                |
|------------------------------------------------|-----------------|----------------|----------------|----------------|----------------|-----------------|---------------|----------------|----------------|----------------|
|                                                | 2005            | 2006           | 2007           | 2008           | 2009           | 2005            | 2006          | 2007           | 2008           | 2009           |
| Arica and Parinacota Region                    | 632             | 622            | 754            | 650            | 1,025          | 338             | 345           | 299            | 437            | 438            |
| Tarapacá Region                                | 3,508           | 9,301          | 12,589         | 23,395         | 25,280         | 9,662           | 10,297        | 12,261         | 12,820         | 16,900         |
| Antofagasta Region                             | 176,648         | 198,926        | 205,599        | 217,008        | 242,253        | 17,552          | 20,491        | 26,530         | 33,486         | 35,718         |
| Atacama Region                                 | 90,076          | 92,364         | 98,455         | 119,677        | 105,381        | 7,603           | 8,226         | 11,402         | 29,642         | 29,886         |
| Coquimbo Region                                | 768             | 1,067          | 1,030          | 1,539          | 3,649          | 161             | 268           | 586            | 4,314          | 7,196          |
| Valparaíso Region                              | 30,643          | 44,310         | 45,115         | 65,881         | 64,761         | 5,796           | 7,866         | 11,091         | 16,078         | 18,372         |
| Libertador Gral. Bernardo O'Higgins Region     | 120,441         | 118,830        | 119,368        | 159,860        | 160,597        | 1,474           | 1,608         | 2,199          | 4,836          | 4,895          |
| Maule Region                                   | 7,345           | 7,482          | 5,733          | 5,842          | 5,699          | 3,893           | 4,045         | 4,064          | 5,521          | 5,802          |
| Biobío Region                                  | 25,740          | 40,096         | 44,662         | 43,944         | 44,893         | 17,013          | 20,389        | 21,791         | 26,827         | 28,950         |
| La Araucanía Region                            | 1,510           | 1,937          | 2,012          | 3,886          | 3,914          | 1,181           | 2,003         | 2,148          | 2,331          | 2,892          |
| Los Ríos Region                                | 1,189           | 1,092          | 1,637          | 2,962          | 3,166          | 307             | 230           | 316            | 2,993          | 3,555          |
| Los Lagos Region                               | 4,026           | 5,074          | 5,559          | 8,227          | 18,196         | 590             | 1,353         | 3,279          | 7,005          | 11,625         |
| Aisén del Gral. Carlos Ibáñez del Campo Region | 108             | 135            | 124            | 204            | 342            | 527             | 685           | 1,182          | 2,645          | 2,978          |
| Magallanes and Chilean Antarctic Region        | 440             | 646            | 686            | 781            | 936            | 2,694           | 2,190         | 2,493          | 2,559          | 2,604          |
| Santiago Metropolitan Region (*)               | 17,561          | 23,576         | 30,507         | 31,402         | 32,143         | 3,364           | 6,892         | 8,742          | 9,225          | 9,211          |
| <b>Country total</b>                           | <b>480,636</b>  | <b>545,457</b> | <b>573,829</b> | <b>685,258</b> | <b>712,238</b> | <b>72,153</b>   | <b>86,888</b> | <b>108,383</b> | <b>160,717</b> | <b>181,022</b> |

Source: MINSAL y CENMA, 2009.

(\*) MINSAL did not provide information of the emissions derived from stationary sources for the years 2008 and 2009 for the Metropolitan Region. The reports according to S.D. N° 138/2005 MINSAL are partial at the time of the elaboration of this document. Most of the facilities reported in paper. The data for 2009 were obtained from the projection of GDP growth rates. The Gross Domestic Product statistics by region were used, as informed by the Central Bank of Chile on its website, specifically in their National Report for the 2003-2009 period.

**TABLE 8**

**National Inventory of Air Pollution Emissions from Reports of S.D. N° 138/2005 MINSAL and estimates from MMA inventories 2005-2009. Values in Tons/Year**

| Region                                         | SO <sub>2</sub> |                |                |                |                | NO <sub>x</sub> |               |                |                |                |
|------------------------------------------------|-----------------|----------------|----------------|----------------|----------------|-----------------|---------------|----------------|----------------|----------------|
|                                                | 2005            | 2006           | 2007           | 2008           | 2009           | 2005            | 2006          | 2007           | 2008           | 2009           |
| Arica and Parinacota Region                    | 632             | 622            | 754            | 650            | 1,025          | 338             | 345           | 299            | 437            | 438            |
| Tarapacá Region                                | 3,508           | 9,301          | 12,589         | 23,395         | 25,280         | 9,662           | 10,297        | 12,261         | 12,820         | 16,900         |
| Antofagasta Region                             | 176,648         | 198,926        | 205,599        | 217,008        | 242,253        | 17,552          | 20,491        | 26,530         | 33,486         | 35,718         |
| Atacama Region                                 | 90,076          | 92,364         | 98,455         | 119,677        | 105,381        | 7,603           | 8,226         | 11,402         | 29,642         | 29,886         |
| Coquimbo Region                                | 768             | 1,067          | 1,030          | 1,539          | 3,649          | 161             | 268           | 586            | 4,314          | 7,196          |
| Valparaíso Region                              | 30,643          | 44,310         | 45,115         | 65,881         | 64,761         | 5,796           | 7,866         | 11,091         | 16,078         | 18,372         |
| Libertador Gral. Bernardo O'Higgins Region     | 120,441         | 118,830        | 119,368        | 159,860        | 160,597        | 1,474           | 1,608         | 2,199          | 4,836          | 4,895          |
| Maule Region                                   | 7,345           | 7,482          | 5,733          | 5,842          | 5,699          | 3,893           | 4,045         | 4,064          | 5,521          | 5,802          |
| Biobío Region                                  | 25,740          | 40,096         | 44,662         | 43,944         | 44,893         | 17,013          | 20,389        | 21,791         | 26,827         | 28,950         |
| La Araucanía Region                            | 1,510           | 1,937          | 2,012          | 3,886          | 3,914          | 1,181           | 2,003         | 2,148          | 2,331          | 2,892          |
| Los Ríos Region                                | 1,189           | 1,092          | 1,637          | 2,962          | 3,166          | 307             | 230           | 316            | 2,993          | 3,555          |
| Los Lagos Region                               | 4,026           | 5,074          | 5,559          | 8,227          | 18,196         | 590             | 1,353         | 3,279          | 7,005          | 11,625         |
| Aisén del Gral. Carlos Ibáñez del Campo Region | 108             | 135            | 124            | 204            | 342            | 527             | 685           | 1,182          | 2,645          | 2,978          |
| Magallanes and Chilean Antarctic Region        | 440             | 646            | 686            | 781            | 936            | 2,694           | 2,190         | 2,493          | 2,559          | 2,604          |
| Santiago Metropolitan Region (*)               | 17,561          | 23,576         | 30,507         | 31,402         | 32,143         | 3,364           | 6,892         | 8,742          | 9,225          | 9,211          |
| <b>Country total</b>                           | <b>480,636</b>  | <b>545,457</b> | <b>573,829</b> | <b>685,258</b> | <b>712,238</b> | <b>72,153</b>   | <b>86,888</b> | <b>108,383</b> | <b>160,717</b> | <b>181,022</b> |

Source: MINSAL and CENMA, 2009.

(\*) The MINSAL did not provide information of the emissions derived from stationary sources for the years 2008 and 2009 for the Metropolitan Region. The reports according to Supreme Decree N° 138/2005 MINSAL are partial at the time of the elaboration of this document. Most of the facilities reported in paper. The data for 2009 were obtained from the projection of GDP growth rates. The Gross Domestic Product statistics by region were used, as informed by the Central Bank of Chile on its web site, specifically in their National Report for the 2003 - 2009 period.

**TABLE 9**
**National Inventory of Air Pollution Emissions from Reports of S.D. N° 138/2005 MINSAL and estimates from MMA inventories 2005-2009. Values in Tons/Year**

| Region                                     | PCDD/F (g) |       |       |       |       | Hg (kg) |        |        |        |        |
|--------------------------------------------|------------|-------|-------|-------|-------|---------|--------|--------|--------|--------|
|                                            | 2005       | 2006  | 2007  | 2008  | 2009  | 2005    | 2006   | 2007   | 2008   | 2009   |
| Arica and Parinacota Region                | 0.01       | 0.01  | 0.03  | 0.01  | 0.01  | 0.03    | 1.51   | 2.06   | 1.82   | 1.86   |
| Tarapacá Region                            | 0.17       | 3.22  | 4.06  | 0.13  | 0.80  | 0.55    | 87.92  | 105.47 | 106.75 | 680.39 |
| Antofagasta Region                         | 3.84       | 4.03  | 0.26  | 10.41 | 11.20 | 445.77  | 453.81 | 348.76 | 707.23 | 780.50 |
| Atacama Region                             | 1.89       | 3.30  | 3.76  | 0.99  | 1.01  | 1.59    | 263.12 | 302.70 | 91.27  | 102.38 |
| Coquimbo Region                            | 0.12       | 0.02  | 0.06  | 0.01  | 0.02  | 0.00    | 42.74  | 4.69   | 6.17   | 6.54   |
| Valparaíso Region                          | 20.37      | 20.86 | 16.18 | 12.70 | 13.08 | 47.01   | 464.78 | 334.07 | 574.92 | 533.84 |
| Libertador Gral. Bernardo O'Higgins Region | 2.01       | 0.07  | 2.87  | 2.83  | 3.07  | 8.78    | 399.15 | 399.30 | 406.59 | 414.93 |

| Region                                         | PCDD/F (g) |           |           |           |           | Hg (kg)    |              |              |              |              |
|------------------------------------------------|------------|-----------|-----------|-----------|-----------|------------|--------------|--------------|--------------|--------------|
|                                                | 2005       | 2006      | 2007      | 2008      | 2009      | 2005       | 2006         | 2007         | 2008         | 2009         |
| Maule Region                                   | 1.22       | 1.40      | 1.09      | 1.09      | 1.17      | 17.13      | 40.00        | 30.58        | 37.76        | 39.18        |
| Biobío Region                                  | 3.98       | 3.62      | 0.93      | 0.75      | 1.21      | 124.10     | 335.07       | 267.43       | 371.46       | 375.03       |
| La Araucanía Region                            | 0.15       | 2.62      | 0.06      | 0.16      | 0.27      | 4.95       | 8.01         | 6.63         | 5.62         | 8.45         |
| Los Ríos Region                                | 0.25       | 0.12      | 0.13      | 0.02      | 0.04      | 0.71       | 3.79         | 3.67         | 5.54         | 5.43         |
| Los Lagos Region                               | 0.10       | 0.18      | 0.14      | 0.09      | 0.26      | 16.75      | 75.30        | 46.61        | 51.31        | 104.61       |
| Aisén del Gral. Carlos Ibáñez del Campo Region | 0.00       | 0.00      | 0.01      | 0.01      | 0.01      | 1.47       | 0.60         | 1.14         | 0.74         | 0.63         |
| Región de Magallanes y de la Antártica Chilena | 0.13       | 0.10      | 0.08      | 0.06      | 0.04      | 0.11       | 27.32        | 1.83         | 0.19         | 4.94         |
| Región Metropolitana de Santiago (*)           | 0.17       | 0.18      | 0.19      | 0.20      | 0.21      | 33.90      | 76.34        | 169.50       | 192.09       | 202.39       |
| <b>Country Total</b>                           | <b>34</b>  | <b>40</b> | <b>30</b> | <b>29</b> | <b>32</b> | <b>703</b> | <b>2,279</b> | <b>2,024</b> | <b>2,559</b> | <b>3,261</b> |

source: MINSAL y CENMA, 2009.

(\*) The MINSAL did not provide information of the emissions derived from stationary sources for the years 2008 and 2009 for the Metropolitan Region. The reports according to Supreme Decree N° 138/2005 MINSAL are partial at the time of the elaboration of this document. Most of the facilities reported in paper. The data for 2009 were obtained from the projection of GDP growth rates. The Gross Domestic Product statistics by region were used, as informed by the Central Bank of Chile on its web site, specifically in their National Report for the 2003 - 2009 period.

## 2. SHARE BY SECTOR OR PRODUCTIVE ACTIVITY

Emissions from stationary sources (on-site) are presented below, by inventory category, for the entire country in 2009, for the PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub> and SO<sub>2</sub> pollutants, showing the sector with the greatest contribution to emissions.

**FIGURE 3**

### **Total On-Site Air Emissions (Stationary Sources) by Industrial Sector (ISIC 3), Country Total, 2009**

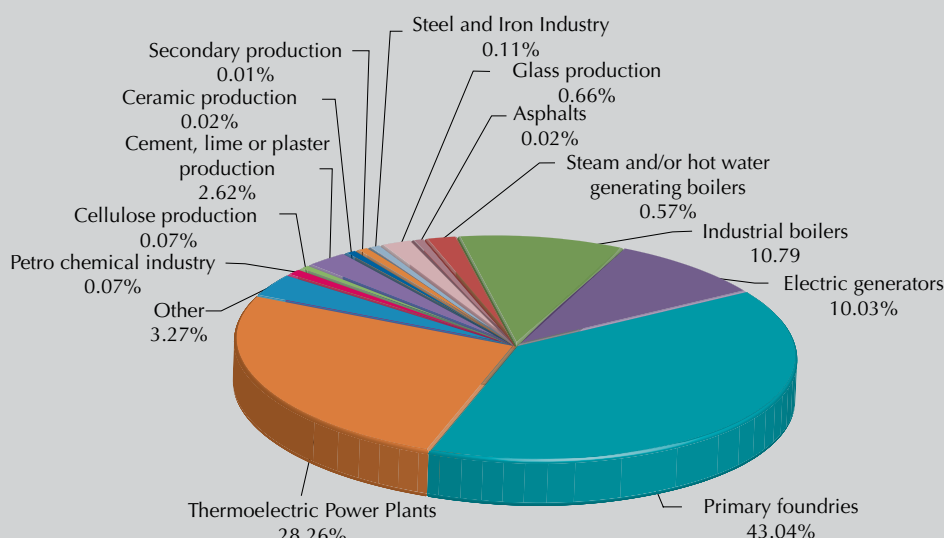


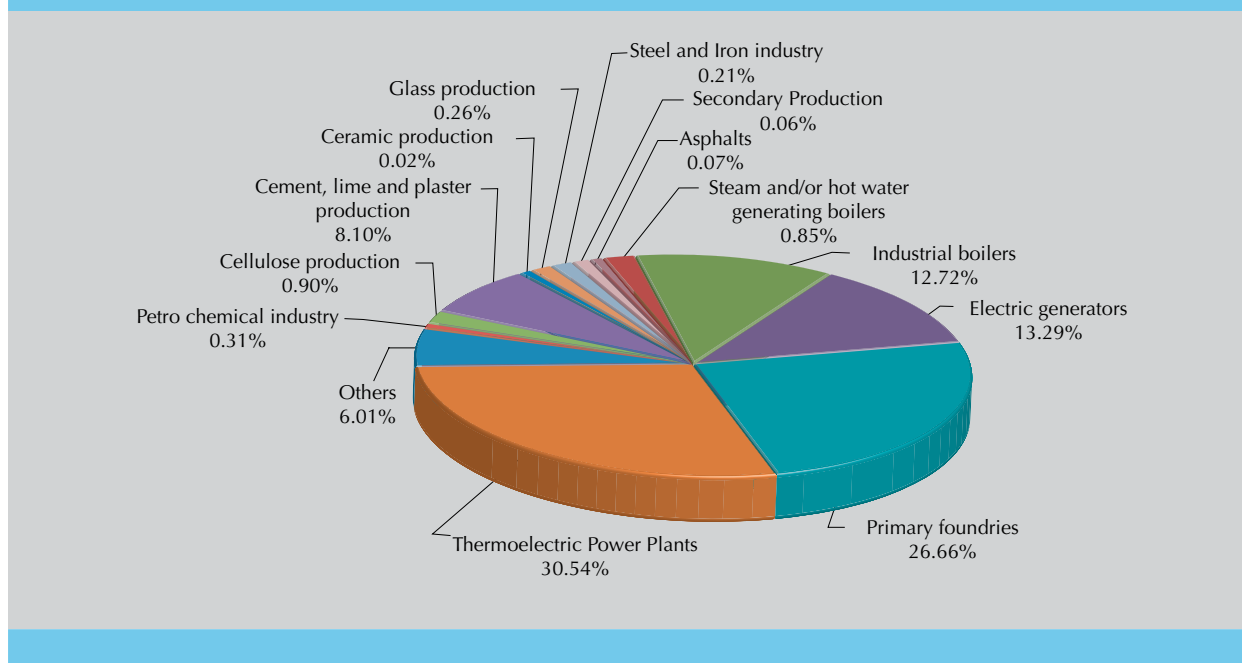
Figure 3 shows that the categories with the greatest share of emissions are “Primary Foundries”, “Thermoelectric Power Plants”, “Industrial Boilers”, “Cement, Lime and Gypsum Production”, “Steam and/or Hot Water Generation Boilers” and “Groups electrogens”, totalling a share of 96% of the total emissions for the entire country. This justifies the emphasis on the development of regulations that have been created for different emitting sectors. A draft bill is being reviewed for the foundries sector that will regulate polluting emissions from Copper foundries –particularly those associated to sulfur oxide, nitrogen, arsenic and fine particulate matter– and will drastically reduce current levels. This regulation is

a first, since there is no other legislation that expressly regulates pollutants released by these facilities. To this date, these are only controlled by decontamination plans.

For thermoelectric power plants, a regulation was recently approved through S.D. N° 13, MMA, 2011 and a draft bill is being prepared with a standard for foundries. Regarding the cement sector, it is regulated by S.D. N° 45 MINSEGPRES, 2007, which “Establishes Emission Standards for Incineration and Co-Incineration” and regulates facilities with cement furnaces, rotating lime furnaces and forestry facilities that use treated forest biomass.

Figures 4, 5, 6 and 7 present emissions by category, for the PM 10, PM 2.5, NO<sub>x</sub> and SO<sub>2</sub> pollutants:

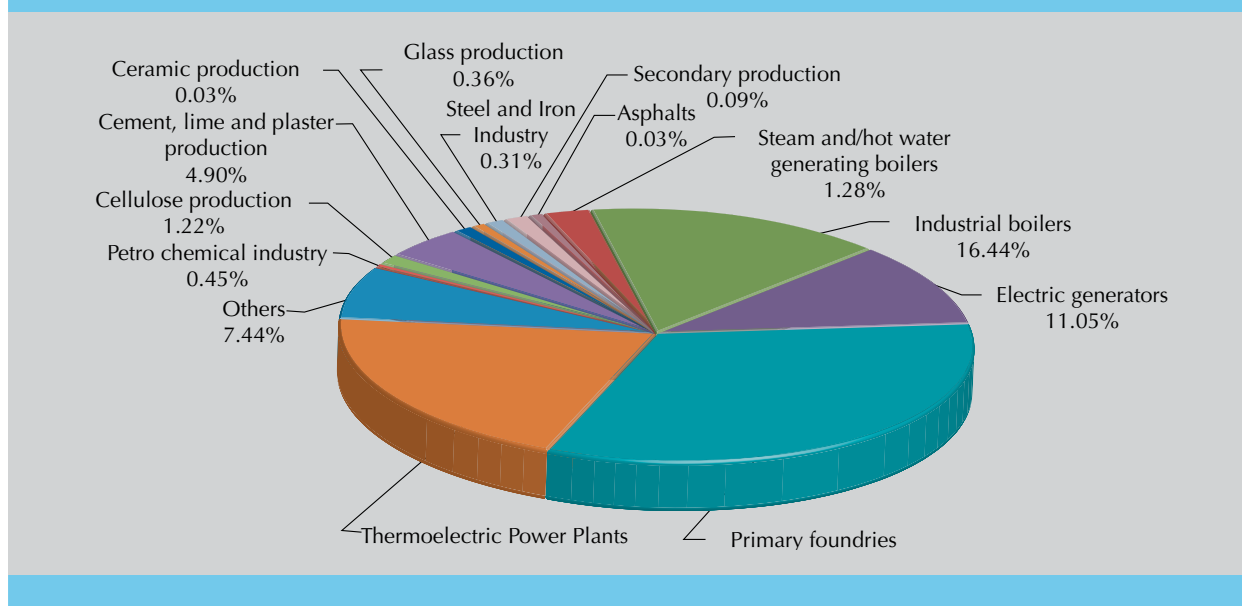
**FIGURE 4**  
**On-Site PM 10 Air Emissions (Stationary Sources) by Sector, Country Total, 2009**



Source: MINSAL, 2009.

Methodology: "Guía metodológica para la estimación de emisiones atmosféricas de fuentes fijas y móviles en el Registro de Emisiones y Transferencias de Contaminantes, CONAMA, MINSAL, SECTRA 2009".

**FIGURE 5**  
**On-Site PM 2.5 Air Emissions (Stationary Sources) by Sector, Country Total, 2009**



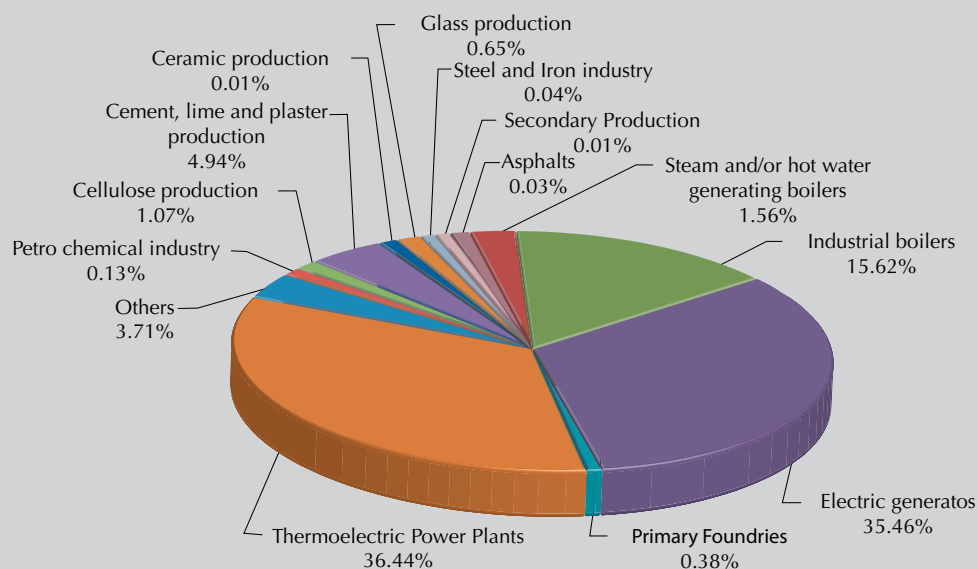
Source: MINSAL, 2009.

Methodology: "Guía metodológica para la estimación de emisiones atmosféricas de fuentes fijas y móviles en el Registro de Emisiones y Transferencias de Contaminantes, CONAMA, MINSAL, SECTRA 2009".



**FIGURE 6**

**On-Site NO<sub>x</sub> Air Emissions (Stationary Sources) by Sector, Country Total, 2009**

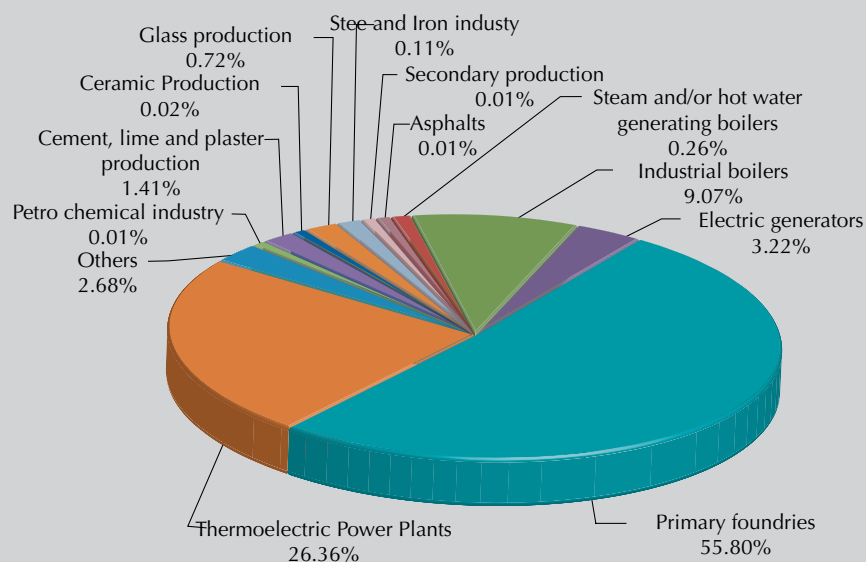


Source: MINSAL, 2009

Methodology: "Guía metodológica para la estimación de emisiones atmosféricas de fuentes fijas y móviles en el Registro de Emisiones y Transferencias de Contaminantes, CONAMA, MINSAL, SECTRA 2009".

**FIGURE 7**

**On-Site SO<sub>2</sub> Air Emissions (Stationary Sources) by Sector, Country Total, 2009**



Source: MINSAL, 2009.

Methodology: "Guía metodológica para la estimación de emisiones atmosféricas de fuentes fijas y móviles en el Registro de Emisiones y Transferencias de Contaminantes, CONAMA, MINSAL, SECTRA 2009".

**IMAGE 3****The 10 Facilities with the Largest Share of Particulate Matter Emissions in the Metropolitan Region, 2009**

Image 3 shows the share of the 10 companies with the largest amount of Particulate Matter (PM) emissions in the Metropolitan Region in 2009. The information with identification is sourced from S.D. N° 4/1992, MINSAL, which establishes Particulate Matter Emissions for specific and group stationary sources in the Metropolitan Region.

***Statistics of Mobile Sources in the Largest Cities of Chile***

A summary is presented below with the estimated total emissions for 27 Chilean cities, including the 17 cities for which SECTRA has a transportation model, and for which it has been possible to create inventories of emissions since the first PRTR report. In addition, 10 new cities have been included for the

2005-2009 period, which were estimated by means of a simplified methodology.

As for the methodology used by SECTRA in the 17 cities which have a transportation model, the methodology consists of calculating emissions from vehicle traffic on the basis of models of vehicle traffic flow rates. In other words, the data on the level of activity comes from simulations performed in transportation models which include several variables that affect traffic in a city, such as: Land use, population size, types of economic activity, number of vehicles, road grid capacity, etc. These flow scenarios for the different cities are drawn up by SECTRA every five years. Current scenarios are for 2005 and 2010.

**IMAGE 4****Emissions from Mobile Sources**

The simulated vehicle flow scenarios are subsequently supplemented by vehicle counts performed in cities, and by data from various vehicle technologies and specific vehicle fleets by zones. This produces estimates of atmospheric emissions in each city.

Vehicle flows for intermediate years are interpolated. Therefore, they are an approximation to the modeled estimates calculated for scenarios every five years. Because of this, emissions reported for intermediate scenarios should be viewed simply as a trend, and not as an estimate that is directly comparable with the basic scenarios used to create the interpolations.

As for the 10 cities estimated with the simplified methodology, the values in the emissions inventories are based on the average kilometers and velocities reported for each type of vehicle in the 17 cities which have transportation models, and these values are used jointly with statistics on each city's number of vehicles - obtained from the INE and from vehicle

technical revision plants - to obtain emission values. In this simplified methodology, just as in the methodology used by SECTRA, vehicles are classified depending on their import classification, making it possible to use the same type of emissions factor in both methodologies.

Regarding the results obtained by means of the simplified methodology, these are based on the results of the SECTRA methodology, and therefore can only be taken as reference values.

It is important to point out that in the case of the inventories for the years 2005 and 2006, the composition of the vehicle fleets in each of the 17 cities was determined on the basis of information from specific vehicle counts available to SECTRA. Starting with the third report, the compositions of vehicle fleets are determined solely on the basis of data from technical revision plants and vehicle registrations, which are updated annually, unlike the vehicle counts, which correspond to specific campaigns. In

general terms, this change in the methodology will affect the tendency when emissions are compared with those of previous years.

Starting this year, the entire historical series was reprocessed using the MODEM: Mobile Source Emission Factor Model (MODEM 5.0) with COPERT IV emission factors.

The composition of the vehicle fleet by type of vehicles in the entire country is presented below for each of the 27 cities considered in the 2009 study:

Figure 9 shows the kilometers driven by type of vehicle at a national level, for each of the 17 cities considered in the 2009 MODEM.

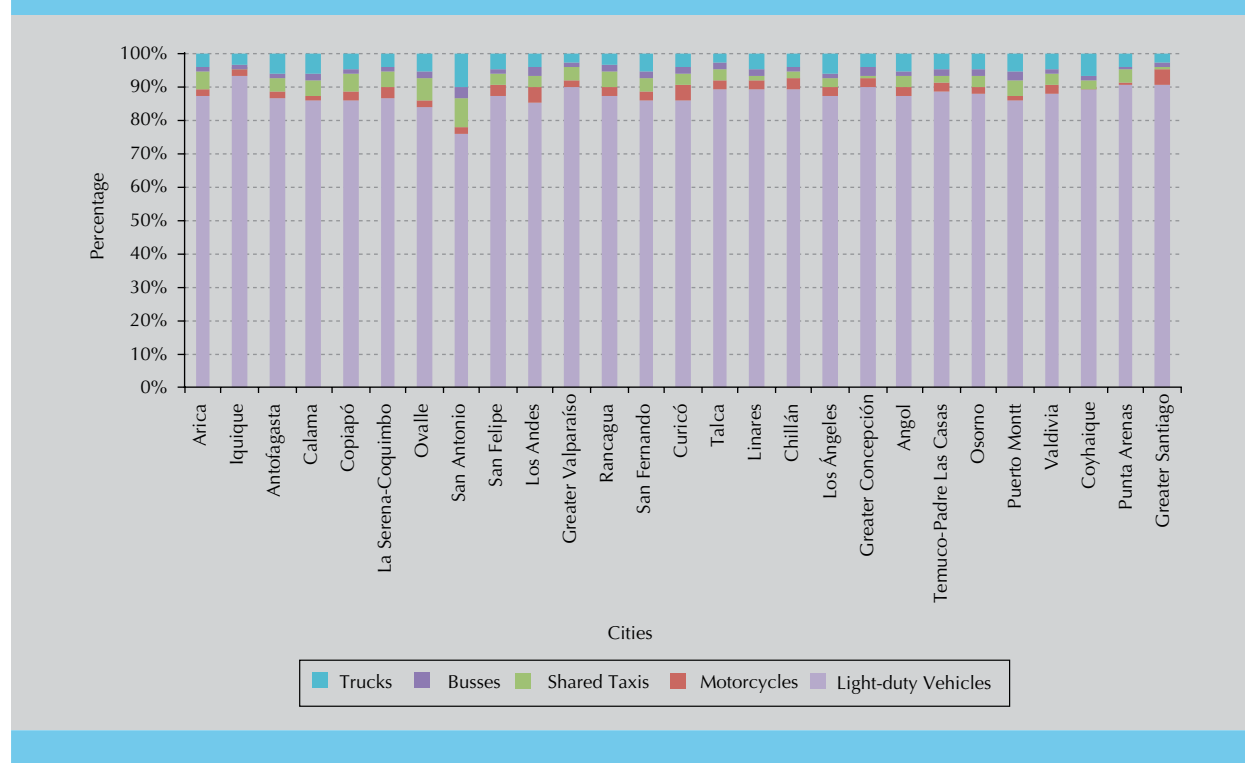
Figure 10 shows emissions in each of the 27 cities for the PM<sub>10</sub>, COV, NO<sub>x</sub> and SO<sub>2</sub> pollutants:

The following tables (10, 11, 12 and 13) present total emissions by region, using 2005-2009 scenarios for the 27 cities.

It is worth noting that SECTRA has two scenarios calibrated in each city, years 2005 and 2010. To generate the intermediate scenarios, they apply growth factors to the travel generation matrix and then they ran the transportation simulation once again (assignment of travels to the network) using as a basis the matrix projected for the year of interest.

For the transportation network that will be used they take the closest one to the available scenario. For 2006 and 2007 they used the road network for the year 2005 and in the case of 2008 and 2009 they used the road network for 2010.

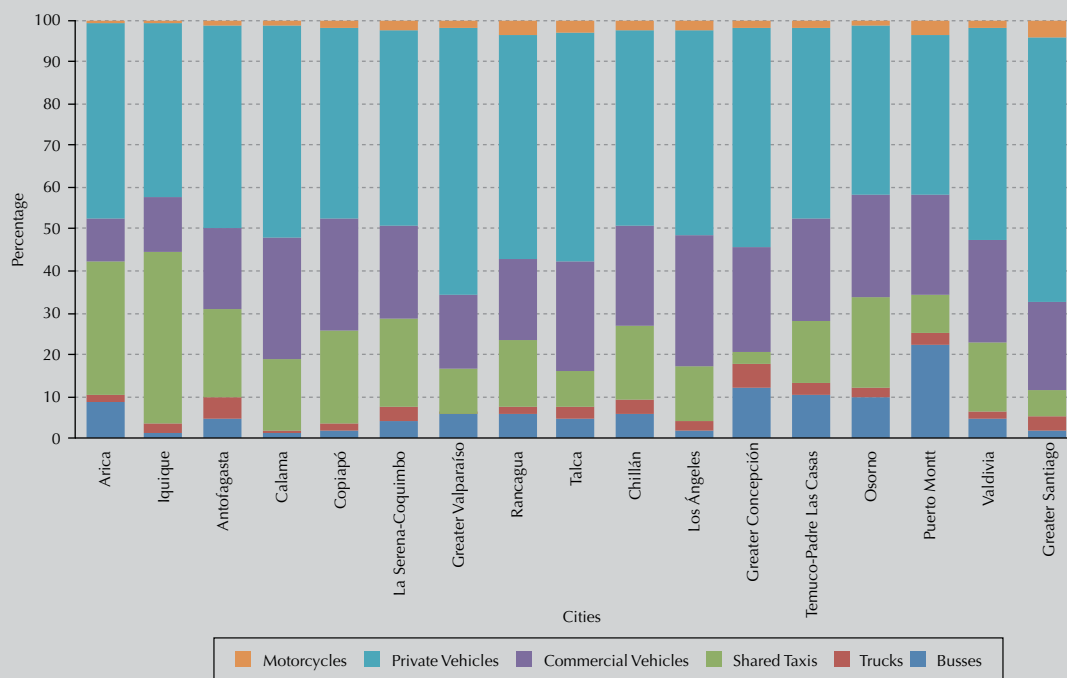
**FIGURE 8**  
**Vehicle Fleet Composition, 27 cities, 2009**



Source: INE, 2009.

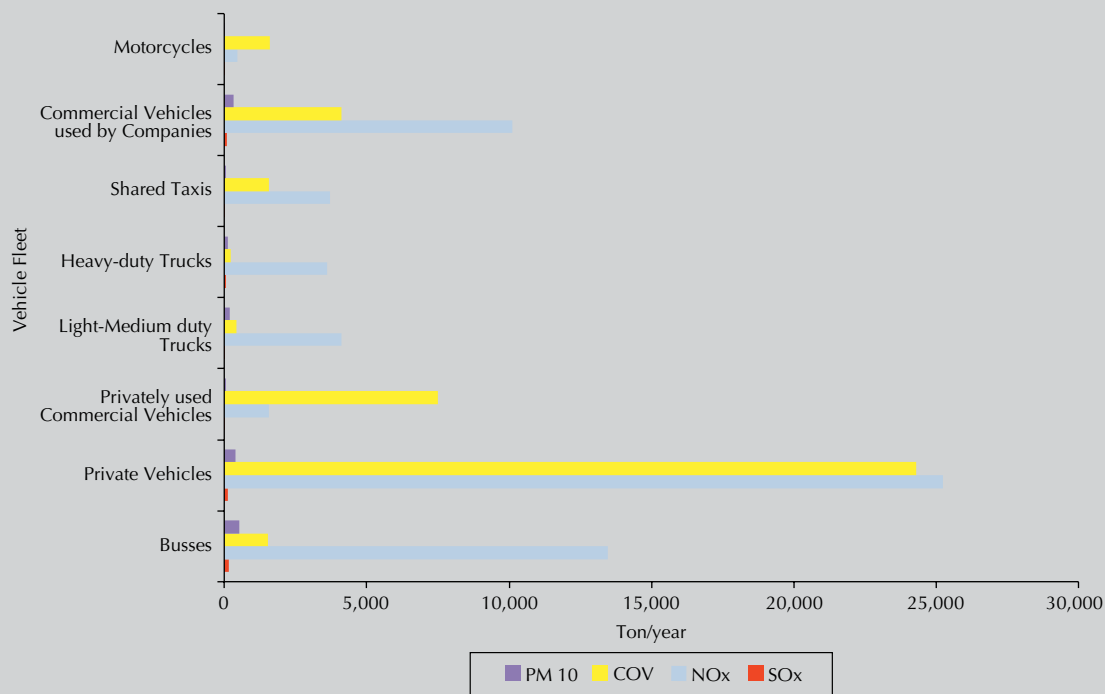
**FIGURE 9**

**Traveled Kilometers by Vehicle Category, 17 cities MODEM, 2009**



**FIGURE 10**

**Emissions by Vehicle Category, 27 cities, 2009**



Source: SECTRA y MMA, 2009.



**TABLE 10**

**Total Emissions from On-Road Mobile Sources, 2005-2009, in 27 cities (17 cities with the Transportation Model and 10 cities Estimated using the Simplified Methodology). Values in Tons/Year**

| City               | PM 10 |       |       |       |       | PM 2.5 |       |       |       |       |
|--------------------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|
|                    | 2005  | 2006  | 2007  | 2008  | 2009  | 2005   | 2006  | 2007  | 2008  | 2009  |
| Arica              | 431   | 556   | 612   | 494   | 481   | 96     | 117   | 139   | 121   | 118   |
| Iquique            | 1,231 | 1,014 | 933   | 502   | 410   | 202    | 177   | 173   | 118   | 77    |
| Antofagasta        | 670   | 1,036 | 1,024 | 964   | 980   | 121    | 179   | 178   | 162   | 169   |
| Calama             | 278   | 298   | 356   | 251   | 332   | 51     | 54    | 64    | 48    | 63    |
| Copiapó            | 189   | 177   | 176   | 176   | 192   | 41     | 34    | 34    | 33    | 39    |
| La Serena-Coquimbo | 626   | 755   | 789   | 751   | 635   | 120    | 139   | 173   | 135   | 127   |
| Ovalle             | 372   | 327   | 388   | 413   | 414   | 53     | 47    | 56    | 59    | 59    |
| Gran Valparaíso    | 1,096 | 983   | 1,065 | 976   | 986   | 230    | 202   | 287   | 193   | 196   |
| San Felipe         | 244   | 223   | 259   | 289   | 276   | 35     | 32    | 37    | 41    | 40    |
| Los Andes          | 213   | 203   | 276   | 273   | 278   | 31     | 29    | 40    | 39    | 40    |
| San Antonio        | 222   | 205   | 245   | 282   | 289   | 32     | 29    | 35    | 40    | 41    |
| Gran Santiago (*)  | 4,535 | 4,474 | 7,527 | 7,251 | 7,720 | 1,182  | 1,262 | 1,546 | 1,341 | 1,669 |
| Rancagua           | 211   | 234   | 225   | 315   | 513   | 42     | 46    | 45    | 58    | 97    |
| San Fernando       | 234   | 216   | 238   | 264   | 278   | 34     | 31    | 34    | 38    | 40    |
| Curicó             | 410   | 387   | 440   | 496   | 508   | 59     | 55    | 63    | 71    | 73    |
| Talca              | 176   | 223   | 247   | 246   | 323   | 37     | 54    | 60    | 57    | 82    |
| Linares            | 303   | 277   | 323   | 369   | 390   | 44     | 40    | 46    | 53    | 56    |
| Chillán            | 391   | 316   | 310   | 308   | 360   | 80     | 61    | 60    | 58    | 74    |
| Gran Concepción    | 1,791 | 1,983 | 1,961 | 1,959 | 2,104 | 400    | 449   | 456   | 424   | 446   |
| Los Ángeles        | 124   | 85    | 171   | 149   | 153   | 25     | 19    | 33    | 30    | 33    |
| Angol              | 151   | 141   | 182   | 168   | 201   | 22     | 20    | 26    | 24    | 29    |
| Temuco-PLC         | 445   | 633   | 762   | 733   | 681   | 89     | 125   | 158   | 141   | 133   |
| Valdivia           | 222   | 224   | 222   | 219   | 215   | 45     | 45    | 46    | 44    | 43    |

(Table 10 continued)

| City                 | PM 10         |               |               |               |               | PM 2.5       |              |              |              |              |
|----------------------|---------------|---------------|---------------|---------------|---------------|--------------|--------------|--------------|--------------|--------------|
|                      | 2005          | 2006          | 2007          | 2008          | 2009          | 2005         | 2006         | 2007         | 2008         | 2009         |
| Osorno               | 556           | 581           | 430           | 420           | 453           | 107          | 114          | 98           | 88           | 88           |
| Puerto Montt         | 394           | 363           | 681           | 825           | 1,373         | 66           | 64           | 113          | 144          | 235          |
| Coyhaique            | 275           | 260           | 319           | 306           | 313           | 40           | 37           | 46           | 44           | 45           |
| Punta Arenas         | 421           | 592           | 760           | 767           | 742           | 60           | 85           | 109          | 110          | 106          |
| <b>Country Total</b> | <b>16,209</b> | <b>16,767</b> | <b>20,921</b> | <b>20,167</b> | <b>21,600</b> | <b>3,343</b> | <b>3,547</b> | <b>4,155</b> | <b>3,715</b> | <b>4,220</b> |

Source: SECTRA y MMA, 2009.

(\*) La variación de emisiones de polvo en el Gran Santiago se debe a la concentración del transporte pesado en ciertas calles, siendo el polvo muy sensible al peso vehicular.

**TABLE 11**

**Total Emissions from On-Road Mobile Sources, 2005-2009, in 27 cities (17 cities with the Transportation Model and 10 cities Estimated using the Simplified Methodology). Values in Tons/Year/year**

| City               | SO <sub>2</sub> |      |      |      |      | NO <sub>x</sub> |        |        |        |        |
|--------------------|-----------------|------|------|------|------|-----------------|--------|--------|--------|--------|
|                    | 2005            | 2006 | 2007 | 2008 | 2009 | 2005            | 2006   | 2007   | 2008   | 2009   |
| Arica              | 23              | 7    | 9    | 9    | 11   | 1,064           | 1,209  | 1,375  | 1,346  | 1,317  |
| Iquique            | 43              | 22   | 16   | 20   | 9    | 1,413           | 1,738  | 1,745  | 1,791  | 2,083  |
| Antofagasta        | 60              | 29   | 21   | 18   | 22   | 1,289           | 1,498  | 1,576  | 1,485  | 1,515  |
| Calama             | 23              | 14   | 8    | 8    | 11   | 775             | 819    | 930    | 824    | 980    |
| Copiapó            | 21              | 7    | 4    | 4    | 6    | 577             | 506    | 507    | 487    | 650    |
| La Serena-Coquimbo | 49              | 24   | 21   | 15   | 22   | 1,270           | 1,340  | 1,264  | 1,289  | 1,629  |
| Ovalle             | 3               | 3    | 4    | 4    | 4    | 279             | 292    | 376    | 403    | 407    |
| Gran Valparaíso    | 165             | 66   | 55   | 39   | 41   | 4,843           | 4,470  | 4,196  | 4,456  | 4,716  |
| San Felipe         | 2               | 2    | 3    | 3    | 3    | 186             | 193    | 259    | 273    | 262    |
| Los Andes          | 2               | 3    | 3    | 3    | 4    | 242             | 267    | 358    | 358    | 392    |
| San Antonio        | 5               | 5    | 7    | 7    | 7    | 379             | 388    | 471    | 537    | 540    |
| Gran Santiago      | 103             | 115  | 115  | 142  | 146  | 29,013          | 32,346 | 28,831 | 29,320 | 30,819 |

(Table 11 continued)

| City                 | SO <sub>2</sub> |            |            |            |            | NO <sub>x</sub> |               |               |               |               |
|----------------------|-----------------|------------|------------|------------|------------|-----------------|---------------|---------------|---------------|---------------|
|                      | 2005            | 2006       | 2007       | 2008       | 2009       | 2005            | 2006          | 2007          | 2008          | 2009          |
| Rancagua             | 26              | 12         | 7          | 8          | 13         | 868             | 951           | 893           | 850           | 1,186         |
| San Fernando         | 2               | 2          | 2          | 3          | 3          | 170             | 194           | 248           | 270           | 284           |
| Curicó               | 3               | 4          | 5          | 6          | 6          | 338             | 382           | 477           | 534           | 536           |
| Talca                | 21              | 9          | 10         | 10         | 11         | 722             | 1,042         | 1,019         | 1,032         | 1,350         |
| Linares              | 3               | 3          | 4          | 4          | 4          | 256             | 273           | 364           | 373           | 383           |
| Chillán              | 29              | 8          | 6          | 7          | 8          | 674             | 659           | 619           | 592           | 717           |
| Gran Concepción      | 261             | 126        | 89         | 88         | 95         | 5,315           | 6,544         | 6,048         | 6,343         | 6,667         |
| Los Ángeles          | 14              | 6          | 5          | 5          | 6          | 552             | 527           | 638           | 624           | 786           |
| Angol                | 1               | 1          | 1          | 1          | 1          | 117             | 125           | 176           | 113           | 173           |
| Temuco-PLC           | 41              | 19         | 16         | 15         | 12         | 992             | 1,274         | 1,448         | 1,408         | 1,368         |
| Valdivia             | 16              | 7          | 6          | 5          | 5          | 506             | 525           | 505           | 508           | 517           |
| Osorno               | 15              | 5          | 7          | 6          | 5          | 582             | 659           | 807           | 770           | 629           |
| Puerto Montt         | 6               | 10         | 8          | 15         | 22         | 581             | 614           | 675           | 1,079         | 1,480         |
| Coyhaique            | 2               | 2          | 3          | 3          | 3          | 171             | 205           | 259           | 251           | 254           |
| Punta Arenas         | 4               | 5          | 7          | 8          | 8          | 315             | 540           | 618           | 628           | 639           |
| <b>Country Total</b> | <b>942</b>      | <b>516</b> | <b>444</b> | <b>455</b> | <b>491</b> | <b>53,487</b>   | <b>59,580</b> | <b>56,681</b> | <b>57,943</b> | <b>62,279</b> |

Source: SECTRA y MMA, 2009.

Nota: La disminución de emisiones de SO<sub>2</sub> en algunas ciudades, a excepción del Gran Santiago, se debe a la entrada en vigencia del S.D. N° 133 y S.D. N° 319 del Ministerio de Economía, que regula el contenido de azufre en el diesel y gasolina, los cuales estipulan la obligación de ir bajando gradualmente su contenido a partir del año 2005.



**TABLE 12**

**Total Emissions from On-Road Mobile Sources, 2005-2009, in 27 cities (17 cities with the Transportation Model and 10 cities Estimated using the Simplified Methodology). Values in Tons/Year Transportation Model and 10 cities Estimated using the Simplified Methodology) tons/year**

| City                   | CO     |         |         |         |         | NH <sub>3</sub> |      |      |      |      |
|------------------------|--------|---------|---------|---------|---------|-----------------|------|------|------|------|
|                        | 2005   | 2006    | 2007    | 2008    | 2009    | 2005            | 2006 | 2007 | 2008 | 2009 |
| Arica                  | 6,998  | 7,169   | 6,290   | 6,918   | 4,561   | 7               | 9    | 9    | 13   | 8    |
| Iquique                | 9,942  | 12,181  | 9,874   | 8,808   | 13,537  | 25              | 25   | 25   | 24   | 41   |
| Antofagasta            | 5,355  | 5,759   | 6,023   | 6,096   | 5,616   | 31              | 32   | 30   | 34   | 31   |
| Calama                 | 5,352  | 5,767   | 6,088   | 5,645   | 6,062   | 24              | 26   | 25   | 23   | 28   |
| Copiapó                | 3,666  | 3,245   | 3,257   | 3,188   | 4,101   | 9               | 10   | 9    | 9    | 12   |
| La Serena-Coquimbo (*) | 5,219  | 5,880   | 4,307   | 6,105   | 7,558   | 24              | 26   | 18   | 26   | 36   |
| Ovalle                 | 737    | 756     | 992     | 1,046   | 1,022   | 3               | 3    | 4    | 4    | 4    |
| Gran Valparaíso (*)    | 21,007 | 22,497  | 16,756  | 22,139  | 21,304  | 122             | 130  | 98   | 124  | 119  |
| San Felipe             | 459    | 501     | 601     | 695     | 646     | 2               | 2    | 3    | 3    | 3    |
| Los Andes              | 463    | 526     | 748     | 721     | 714     | 2               | 2    | 3    | 3    | 3    |
| San Antonio            | 442    | 484     | 615     | 740     | 744     | 2               | 2    | 3    | 3    | 3    |
| Gran Santiago          | 64,037 | 203,572 | 163,866 | 175,512 | 178,741 | 844             | 823  | 921  | 943  | 996  |
| Rancagua               | 4,473  | 4,675   | 4,671   | 4,315   | 5,315   | 17              | 17   | 16   | 16   | 26   |
| San Fernando           | 452    | 486     | 593     | 693     | 700     | 2               | 2    | 2    | 3    | 3    |
| Curicó                 | 903    | 989     | 1,183   | 1,374   | 1,374   | 4               | 4    | 4    | 5    | 5    |
| Talca (*)              | 4,311  | 9,166   | 6,520   | 6,604   | 8,536   | 13              | 10   | 17   | 17   | 15   |
| Linares                | 624    | 669     | 866     | 1,046   | 1,091   | 2               | 2    | 3    | 3    | 3    |
| Chillán (*)            | 2,956  | 5,030   | 4,123   | 3,707   | 4,198   | 8               | 6    | 8    | 8    | 9    |
| Gran Concepción        | 17,184 | 23,588  | 19,841  | 23,067  | 22,836  | 61              | 85   | 71   | 88   | 93   |
| Los Ángeles            | 3,834  | 4,491   | 4,494   | 4,266   | 5,697   | 9               | 8    | 9    | 9    | 13   |
| Angol                  | 342    | 379     | 512     | 469     | 527     | 1               | 1    | 2    | 2    | 2    |
| Temuco-PLC             | 5,166  | 5,967   | 5,386   | 5,356   | 6,595   | 13              | 14   | 13   | 13   | 17   |

(Table 12 continued)

| City                 | CO             |                |                |                |                | NH <sub>3</sub> |              |              |              |              |
|----------------------|----------------|----------------|----------------|----------------|----------------|-----------------|--------------|--------------|--------------|--------------|
|                      | 2005           | 2006           | 2007           | 2008           | 2009           | 2005            | 2006         | 2007         | 2008         | 2009         |
| Valdivia             | 2,786          | 2,794          | 2,533          | 2,602          | 2,722          | 8               | 10           | 7            | 8            | 9            |
| Osorno               | 1,486          | 1,593          | 1,983          | 2,604          | 2,149          | 4               | 4            | 5            | 6            | 5            |
| Puerto Montt         | 3,011          | 3,191          | 2,157          | 3,377          | 3,705          | 11              | 12           | 7            | 11           | 12           |
| Coyhaique            | 423            | 485            | 602            | 592            | 593            | 2               | 2            | 3            | 3            | 3            |
| Punta Arenas         | 691            | 1,552          | 1,606          | 1,585          | 1,529          | 3               | 7            | 6            | 6            | 6            |
| <b>Country Total</b> | <b>172,320</b> | <b>333,391</b> | <b>276,488</b> | <b>299,269</b> | <b>312,170</b> | <b>1,256</b>    | <b>1,275</b> | <b>1,321</b> | <b>1,406</b> | <b>1,506</b> |

Source: SECTRA y MMA, 2009.

(\*) Las oscilaciones de las emisiones de Monóxido de Carbono para algunas ciudades se deben a la variación de la información de entrada del modelo de emisiones, aportado por las salidas de los modelos de transportes proporcionados por SECTRA.

**TABLE 13**

**Total Emissions from On-Road Mobile Sources, 2005-2009, in 27 cities (17 cities with the Transportation Model and 10 cities Estimated using the Simplified Methodology). Values in Tons/Year**

| City               | PCDD/F (g) |           |           |           |           | Hg (kg)   |           |           |           |           |
|--------------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                    | 2005       | 2006      | 2007      | 2008      | 2009      | 2005      | 2006      | 2007      | 2008      | 2009      |
| Arica              | 0.0000169  | 0.0000196 | 0.0000221 | 0.0000204 | 0.0000227 | 0.0002019 | 0.0002256 | 0.0002546 | 0.0002791 | 0.0002161 |
| Iquique            | 0.0000292  | 0.0000330 | 0.0000370 | 0.0000462 | 0.0000146 | 0.0004738 | 0.0005223 | 0.0005520 | 0.0005850 | 0.0007710 |
| Antofagasta        | 0.0000233  | 0.0000241 | 0.0000245 | 0.0000155 | 0.0000262 | 0.0004403 | 0.0004584 | 0.0004710 | 0.0005463 | 0.0005845 |
| Calama             | 0.0000147  | 0.0000159 | 0.0000180 | 0.0000156 | 0.0000203 | 0.0003384 | 0.0003639 | 0.0003982 | 0.0003709 | 0.0004905 |
| Copiapó            | 0.0000134  | 0.0000098 | 0.0000094 | 0.0000078 | 0.0000122 | 0.0001678 | 0.0001657 | 0.0001656 | 0.0001757 | 0.0002718 |
| La Serena-Coquimbo | 0.0000236  | 0.0000264 | 0.0000368 | 0.0000224 | 0.0000400 | 0.0003610 | 0.0003839 | 0.0003621 | 0.0004145 | 0.0006453 |
| Ovalle             | 0.0000034  | 0.0000035 | 0.0000047 | 0.0000053 | 0.0000054 | 0.0000532 | 0.0000546 | 0.0000702 | 0.0000795 | 0.0000836 |
| Gran Valparaíso    | 0.0000820  | 0.0000799 | 0.0001153 | 0.0000774 | 0.0000811 | 0.0015865 | 0.0016415 | 0.0015427 | 0.0017665 | 0.0018131 |
| San Felipe         | 0.0000024  | 0.0000026 | 0.0000034 | 0.0000039 | 0.0000039 | 0.0000381 | 0.0000398 | 0.0000508 | 0.0000603 | 0.0000598 |
| Los Andes          | 0.0000025  | 0.0000028 | 0.0000040 | 0.0000042 | 0.0000046 | 0.0000352 | 0.0000386 | 0.0000567 | 0.0000591 | 0.0000623 |
| San Antonio        | 0.0000034  | 0.0000035 | 0.0000043 | 0.0000050 | 0.0000052 | 0.0000394 | 0.0000419 | 0.0000546 | 0.0000667 | 0.0000713 |

(Table 13 continued)

| City                 | PCDD/F (g)       |                  |                  |                  |                  | Hg (kg)          |                  |                  |                  |                  |
|----------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                      | 2005             | 2006             | 2007             | 2008             | 2009             | 2005             | 2006             | 2007             | 2008             | 2009             |
| Gran Santiago        | 0.0005439        | 0.0006214        | 0.0006467        | 0.0006181        | 0.0006828        | 0.0118276        | 0.0139376        | 0.0141630        | 0.0162055        | 0.0177228        |
| Rancagua             | 0.0000148        | 0.0000153        | 0.0000156        | 0.0000157        | 0.0000228        | 0.0002693        | 0.0002757        | 0.0002802        | 0.0002903        | 0.0004428        |
| San Fernando         | 0.0000023        | 0.0000025        | 0.0000031        | 0.0000036        | 0.0000040        | 0.0000350        | 0.0000369        | 0.0000453        | 0.0000531        | 0.0000577        |
| Curicó               | 0.0000044        | 0.0000049        | 0.0000065        | 0.0000080        | 0.0000084        | 0.0000623        | 0.0000672        | 0.0000836        | 0.0000990        | 0.0001062        |
| Talca                | 0.0000139        | 0.0000197        | 0.0000209        | 0.0000220        | 0.0000275        | 0.0002055        | 0.0002895        | 0.0002909        | 0.0003126        | 0.0003916        |
| Linares              | 0.0000032        | 0.0000034        | 0.0000044        | 0.0000052        | 0.0000057        | 0.0000414        | 0.0000449        | 0.0000581        | 0.0000698        | 0.0000765        |
| Chillán              | 0.0000102        | 0.0000119        | 0.0000126        | 0.0000124        | 0.0000147        | 0.0001502        | 0.0001850        | 0.0001825        | 0.0001877        | 0.0002232        |
| Gran Concepción      | 0.0000818        | 0.0001075        | 0.0001111        | 0.0001022        | 0.0001064        | 0.0010469        | 0.0014162        | 0.0013339        | 0.0015082        | 0.0016904        |
| Los Ángeles          | 0.0000105        | 0.0000135        | 0.0000121        | 0.0000119        | 0.0000167        | 0.0001597        | 0.0001526        | 0.0001790        | 0.0001809        | 0.0002681        |
| Angol                | 0.0000017        | 0.0000018        | 0.0000024        | 0.0000020        | 0.0000026        | 0.0000213        | 0.0000227        | 0.0000313        | 0.0000305        | 0.0000397        |
| Temuco-PLC           | 0.0000192        | 0.0000190        | 0.0000229        | 0.0000207        | 0.0000137        | 0.0002555        | 0.0002781        | 0.0002838        | 0.0002993        | 0.0003341        |
| Valdivia             | 0.0000077        | 0.0000081        | 0.0000107        | 0.0000087        | 0.0000093        | 0.0001524        | 0.0001589        | 0.0001489        | 0.0001612        | 0.0001825        |
| Osorno               | 0.0000068        | 0.0000069        | 0.0000212        | 0.0000134        | 0.0000096        | 0.0000818        | 0.0000823        | 0.0001557        | 0.0001807        | 0.0001354        |
| Puerto Montt         | 0.0000088        | 0.0000102        | 0.0000081        | 0.0000162        | 0.0000237        | 0.0001725        | 0.0001880        | 0.0001261        | 0.0002291        | 0.0002834        |
| Coyhaique            | 0.0000025        | 0.0000028        | 0.0000042        | 0.0000043        | 0.0000045        | 0.0000358        | 0.0000407        | 0.0000526        | 0.0000541        | 0.0000581        |
| Punta Arenas         | 0.0000042        | 0.0000073        | 0.0000117        | 0.0000119        | 0.0000117        | 0.0000620        | 0.0001171        | 0.0001297        | 0.0001383        | 0.0001408        |
| <b>Country Total</b> | <b>0.0009505</b> | <b>0.0010769</b> | <b>0.0011936</b> | <b>0.0011001</b> | <b>0.0012003</b> | <b>0.0183147</b> | <b>0.0212299</b> | <b>0.0215230</b> | <b>0.0244038</b> | <b>0.0272230</b> |

Source: SECTRA and MMA, 2009.

### 3. Liquid Waste Emission Statistics

This section presents data on emissions based on SISS's application of Supreme Decree No. 90/2000, MINSEGPRES, which regulates discharges into ocean and continental surface waters.

**TABLE 14**  
**Total Emissions S.D. N° 90/2000,**  
**MINSEGPRES, which Regulates**  
**Discharges into Marine and Continental**  
**Surface Waters, 2009**

| Pollutants          | Emission t/year |
|---------------------|-----------------|
| Oils and fats       | 30,877.19       |
| Aluminum            | 188.97          |
| Arsenic             | 1.10            |
| Boron               | 62.05           |
| Cadmium             | 1.23            |
| Cyanide             | 7.97            |
| Chlorides           | 126,065.94      |
| Copper              | 6.35            |
| Hexavalent chromium | 5.04            |
| Chrome              | 1.26            |
| Tin                 | 21.38           |
| Fluorides           | 79.61           |
| Phosphorus          | 6,771.88        |
| Stable hydrocarbons | 2,323.87        |
| Total hydrocarbons  | 1,469.77        |

<sup>7</sup> Note: Includes the emissions derived from the application of the S.D. N° 80/2005 MINSEGPRES that establishes the emission standard for molybdenum and sulphates of the effluents discharged from the tailings into the Carén stream.

| Pollutants              | Emission t/year |
|-------------------------|-----------------|
| Volatile hydrocarbonss  | 78.33           |
| Iron                    | 50.68           |
| Manganese               | 206.03          |
| Mercury                 | 0.68            |
| Molybdenum              | 3.36            |
| Nickel                  | 6.73            |
| Nitrite plus Nitrate    | 4.55            |
| Ammoniacal nitrogen     | 333.25          |
| Total Kjeldahl Nitrogen | 27,661.86       |
| Lead                    | 6.16            |
| Selenium                | 1.33            |
| Sulfates                | 43,563.26       |
| Sulfur                  | 58.27           |
| Tetrachloroethene       | 2.21            |
| Toluene                 | 4.06            |
| Trichloromethane        | 5.47            |
| Xylene                  | 4.07            |
| Zinc                    | 12.18           |

Source: SISS y DIRECTEMAR, 2009.

The following table shows emissions from the SISS's application of S.D. N° 46/2002, MINSEGPRES, which regulates discharges into groundwater:

**TABLE 15**  
**Total Emissions S.D. N° 46/2002,**  
**MINSEGPRES, which Regulates**  
**Discharges into Groundwater, 2009**

| Pollutants              | Emission t/year |
|-------------------------|-----------------|
| Oils and Fats           | 61.18           |
| Aluminium               | 9.58            |
| Arsenic                 | 46.36           |
| Boron                   | 6.81            |
| Cadmium                 | 5.46            |
| Cyanide                 | 0.02            |
| Chlorides               | 28,039.06       |
| Copper                  | 29.39           |
| Hexavalent chromium     | 0.02            |
| Fluorides               | 16.03           |
| Iron                    | 3.61            |
| Manganese               | 6.54            |
| Mercury                 | 0.07            |
| Molybdenum              | 0.43            |
| Nickel                  | 0.03            |
| Nitrite plus Nitrate    | 23.51           |
| Total Kjeldahl Nitrogen | 39.01           |
| Lead                    | 3.77            |
| Selenium                | 0.00            |
| Sulfates                | 6,435.27        |
| Sulfides                | 0.15            |
| Tetrachloroethene       | 0.00            |
| Toluene                 | 0.00            |
| Trichloromethane        | 0.01            |
| Xylene                  | 0.00            |
| Zinc                    | 23.79           |

Source: SISS, 2009.

#### 4. Share by Sector or Productive Activity

Figure 11 shows total emissions from stationary sources (on-site) for the entire country, classified by economic activity, into marine and continental surface waters:

Figure 12 shows the number of facilities and pipelines reported by the SISS according to S.D. N° 46/2002, MINSEGPRES, S.D. N° 90/2000, MINSEGPRES, and S.D. N° 609/98 MOP for the 2005-2009 period.

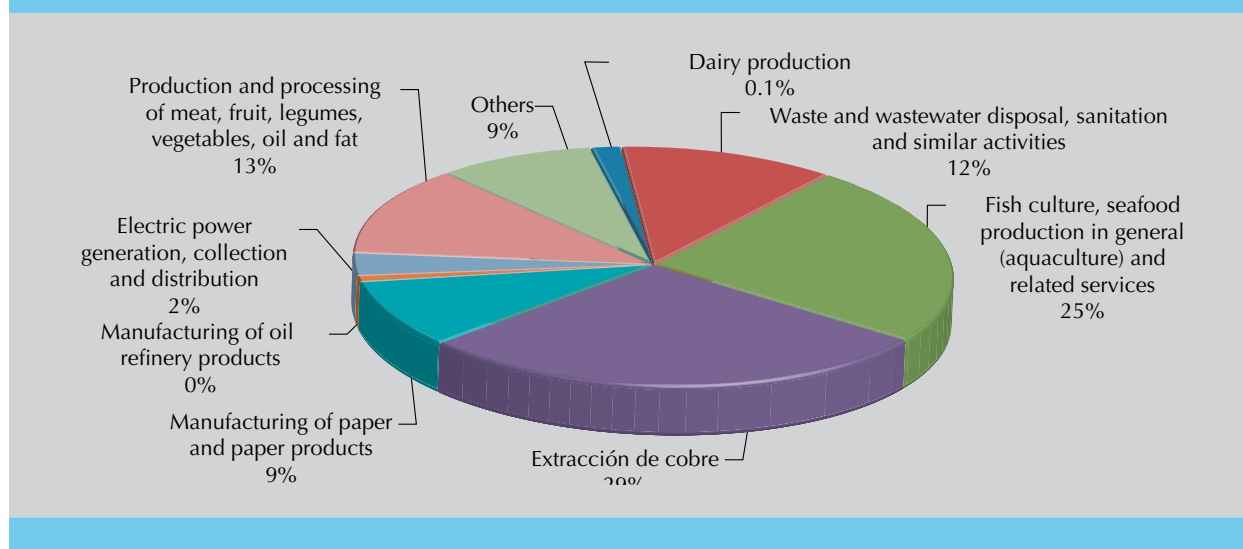
#### 5. Pollutant Transfer Associated to Liquid Waste Discharges into Sewerage Systems

The table below presents transfers recorded from the application of S.D. N° 609/1998, MOP, which regulates discharges into the sewerage system by the SISS:

**TABLE 16**  
**Total Water Transfers S.D. N° 609/1998,**  
**MOP, which Regulates Discharges into**  
**the Sewerage System, 2009**

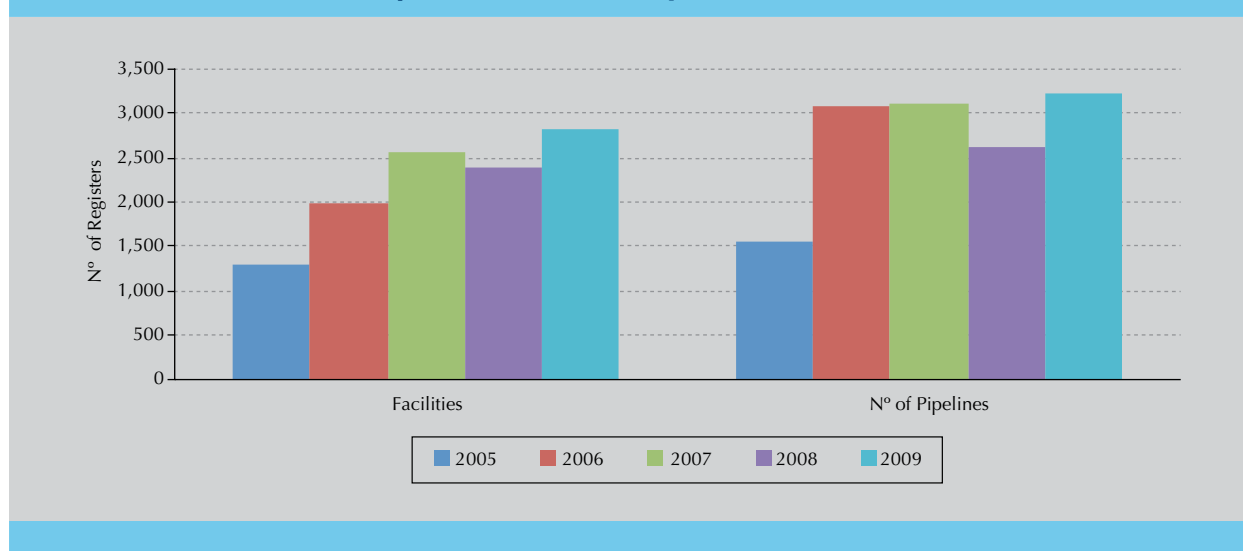
| Pollutants            | Transfers t/year |
|-----------------------|------------------|
| Oils and fats         | 5,700.83         |
| Aluminum              | 3.77             |
| Arsenic               | 0.03             |
| Boron                 | 0.54             |
| Cadmium               | 0.22             |
| Cyanide               | 0.75             |
| Copper                | 2.39             |
| Hexavalent chromium   | 2.06             |
| Chrome                | 8.38             |
| Phosphorus            | 764.82           |
| Stable hydrocarbons   | 47.69            |
| Total hydrocarbons    | 478.77           |
| Volatile hydrocarbons | 3.74             |

**FIGURE 11**  
**Total Releases from Stationary Source (On Site) into Marine and Continental Surface Waters by Economic Activity, 2009**



Source: DIRECTEMAR - SISS, 2009.

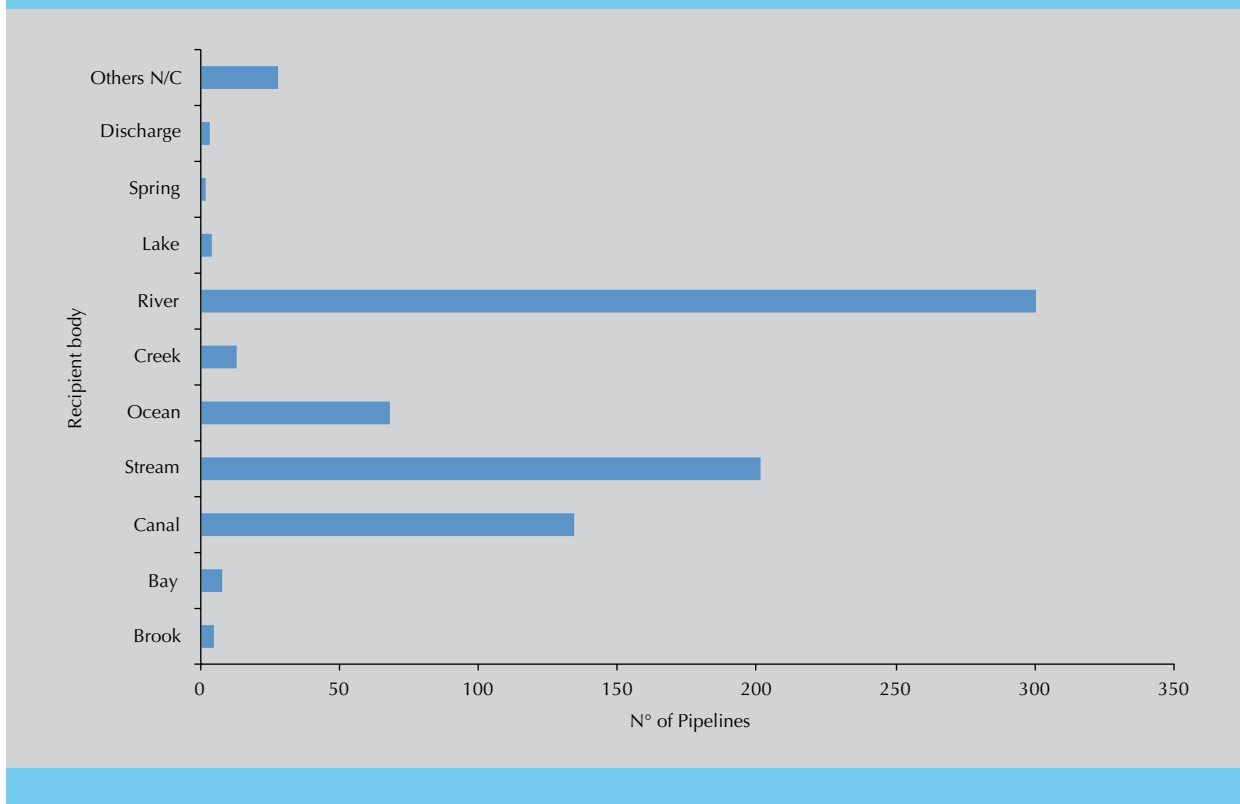
**FIGURE 12**  
**Number of Facilities and Pipelines Monitored by the SISS, 2005-2009**



Source: SISS, 2009.

Figure 13 shows the number of pipelines according to their receiving water body reported by the SISS

in 2009, with discharges into marine and continental surface waters.

**FIGURE 13****Number of Pipelines with Discharge into a Marine and Continental Surface Water Body Monitored by the SISS, 2009**

Source: SISS, 2009.

*(Table 16 continued)*

| Pollutants              | Transfers t/year |
|-------------------------|------------------|
| Iron                    | 0.05             |
| Manganese               | 1.44             |
| Mercury                 | 0.10             |
| Nickel                  | 4.28             |
| Ammonia nitrogen        | 2,679.21         |
| Total Kjeldahl Nitrogen | 0.56             |
| Lead                    | 0.56             |
| Sulfates                | 7,801.02         |
| Sulphides               | 37.72            |
| Zinc                    | 4.76             |

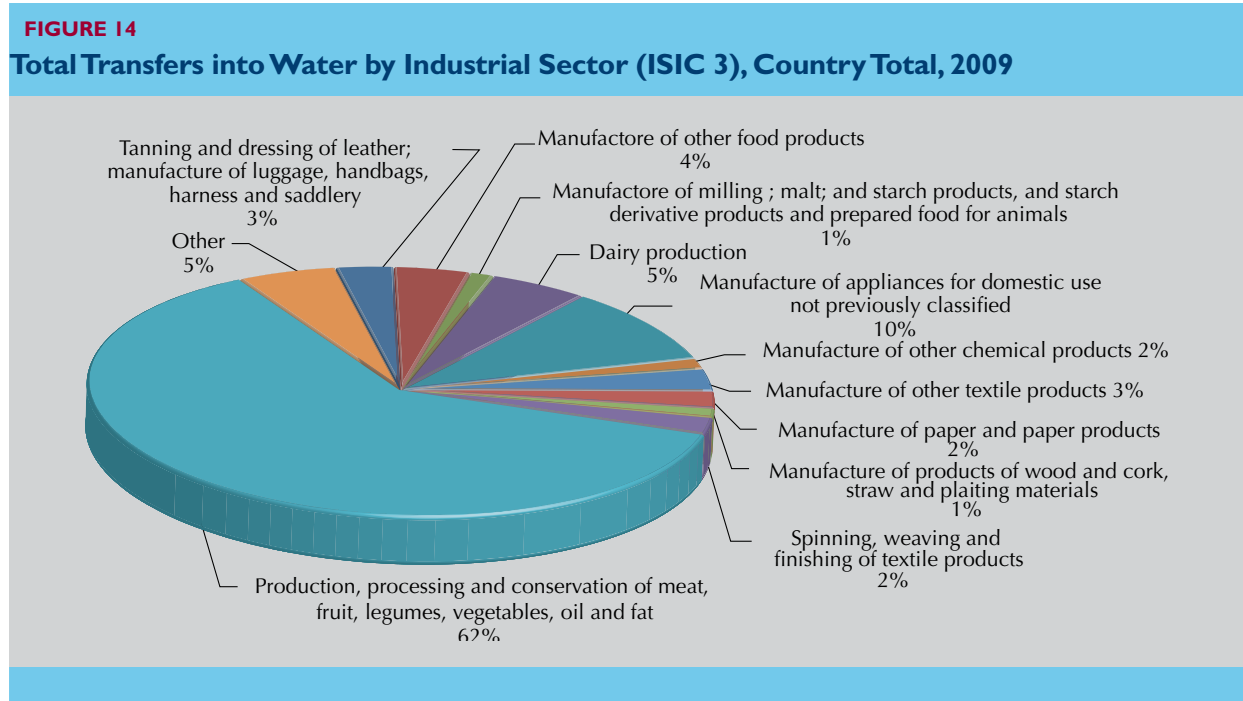
Source: SISS, 2009.

Figure 14 shows the transfers reported by the SISS derived from S.D. N° 609/1998 of the Ministry of Public Works which regulates the discharges into the sewerage system, grouped by economic activity (ISIC3).

## 6. Hazardous Waste Transfer Statistics from the Hazardous Waste Reporting and Monitoring System (SIDREP by its acronym in Spanish)

### Reporting Facilities

In 2005 there was no data from the System for the Declaration and Follow-up of Hazardous Waste (SIDREP). For the years 2006 and 2007 there was no data for the Araucanía Region and Magallanes and Chilean Antarctica Region, since the 2008 there is data for all of the regions of the country.



• Share by Sector or Productive Activity

Figure 16 shows the emissions from transfers of hazardous waste (off-site emissions) for the entire country, classified by economic activity, revealing the contribution of the sectors that pollute the most.

Methodology: SIDREP, based on what is set forth in S.D. N° 148/2004, MINSAL which approved the Health Regulation on Hazardous Waste Management.

Table 17 show the transfers of hazardous waste, by type:

**TABLE 17**  
**Hazardous Waste Transfers, by Type, 2009**

| Types of Hazardous Waste                                                                                    | Amount (t/year) |
|-------------------------------------------------------------------------------------------------------------|-----------------|
| Mixtures of various wastes (*)                                                                              | 73,757          |
| Hexavalent chrome compounds                                                                                 | 47,012          |
| Acid solutions or acid, in solid form                                                                       | 41,241          |
| Arsenic, arsenic compounds                                                                                  | 36,024          |
| Mineral oils not apt for their intended use                                                                 | 42,465          |
| Residues resulting from disposal and treatment operations of residues, such as sludges, filters, dust, etc. | 25,972          |
| Oil and water or hydrocarbons and water mixtures and emulsions                                              | 22,413          |
| Chemical substances, non-identified or new, resulting from R+D or education activities.                     | 10,130          |



(Table 17 continued)

| Types of Hazardous Waste                                                                                    | Amount (t/year) |
|-------------------------------------------------------------------------------------------------------------|-----------------|
| Waste resulting from Surface Treatment of Metals and Plastics                                               | 8,907           |
| Waste tarry residues arising from re-finishing, distillation and any pyrolytic treatment                    | 4,261           |
| Lead, lead compounds                                                                                        | 7,623           |
| Basic solutions or bases in solid form                                                                      | 3,832           |
| Soils or materials contaminated by one of the constituents listed in Category II                            | 5,199           |
| Contaminated containers and packaging which have held one or more of the constituents listed in Category II | 4,816           |
| Wastes from production, formulation and use of resins, latex, plasticizers, glues/adhesives                 | 3,525           |
| Copper compounds                                                                                            | 1,014           |
| Wastes resulting from production, preparation and use of inks, dyes, pigments, paints, lacquers and varnish | 2,925           |
| <b>Total</b>                                                                                                | <b>341,117</b>  |

Source: SIDREP, 2009.

(\*) The mixtures of various wastes refers to wastes that contain more than one residue and cannot be identified separately.

## IV. HIGHLIGHTED INFORMATION

With the acceptance of Chile as a member of the Organisation for Economic Co-Operation and Development (OECD), our country made a series of commitments regarding the recommendations<sup>8</sup> made by that forum to its member states.

In this context, during the 14th meeting of the OECD working group on pollutant release and transfer registers (held between October 3 and 5, 2011), the decision was made to move forward towards a Global PRTR in order to standardize and group pollutant names and reporting thresholds.

In order to comply with these requirements, Chile will need to adapt its PRTR. Some progress has already been made in this direction to accomplish this important challenge:

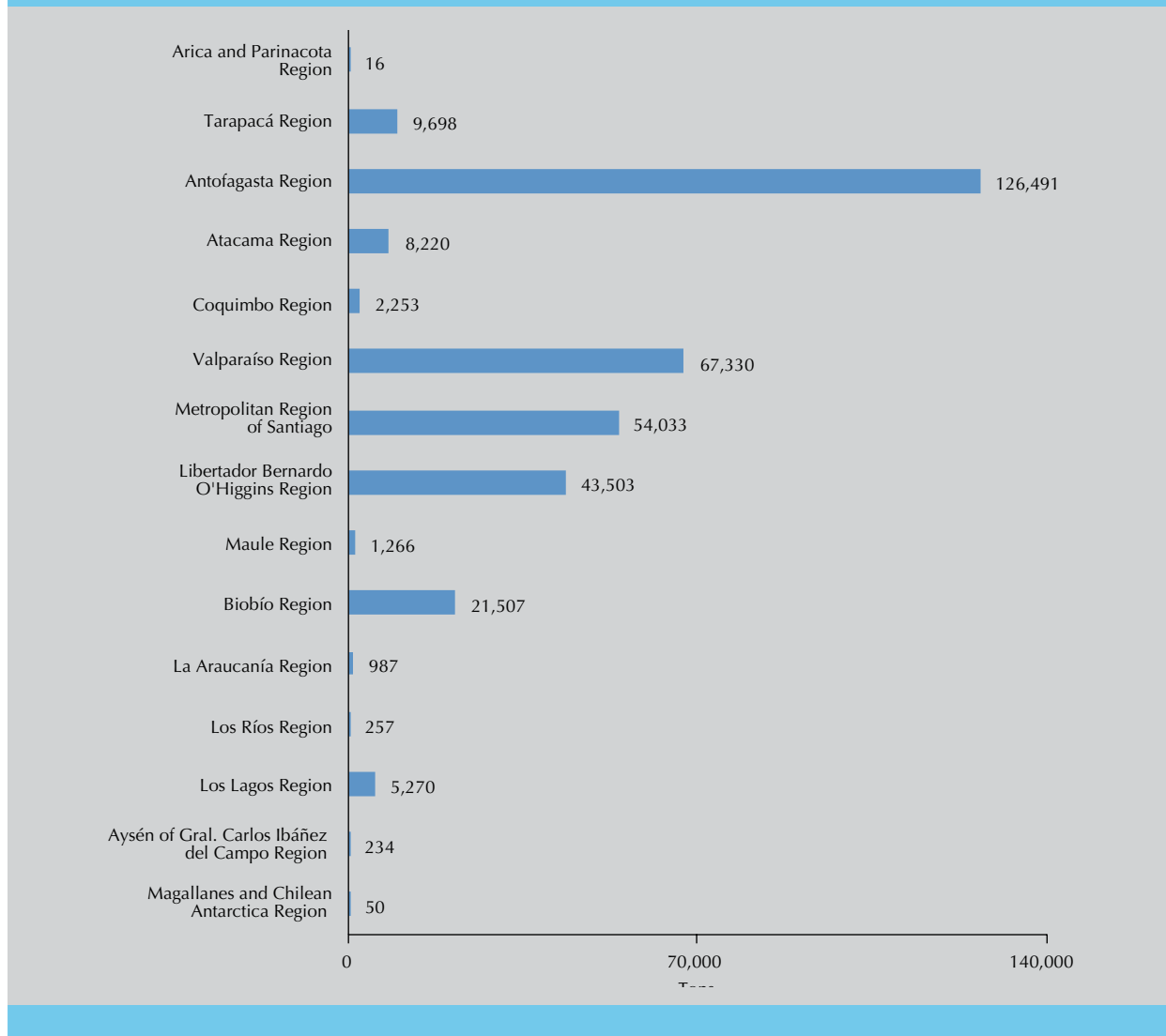
- Development of a Pollutant Release and Transfer Register Regulation (Law 20.417, article 70 letter p), which will establish the one-stop shop for reporting.
- By the end of 2010, a modification was made to S.D. N° 138/2005, MINSAL, which establishes the obligation of reporting atmospheric emissions. This modification is aimed at adapting the reporting date to the imminent enforcement of the PRTR one-stop shop as well as mandating that reported emissions be disseminated by facility.

Despite these efforts, there are still important deficiencies:

- Lack of reporting regulation: Industrial non-hazardous waste, residential waste, and valorization and reduction of waste generation.
- Lack of information regarding emissions into the soil.
- Setting homogeneous thresholds for reporting sectors.

<sup>8</sup> [Recommendation dated February 20, 1996, C(96)41/Final, amended on May 28, 2003, C(2003)87], regarding the implementation of Pollutant Release and Transfer Register.

**FIGURE 15**  
**Total Generation of Transferred Wastes by Region, 2009**



Source: SIDREP, 2009.

- Standardization of pollutants by environmental component (air, water and soil).

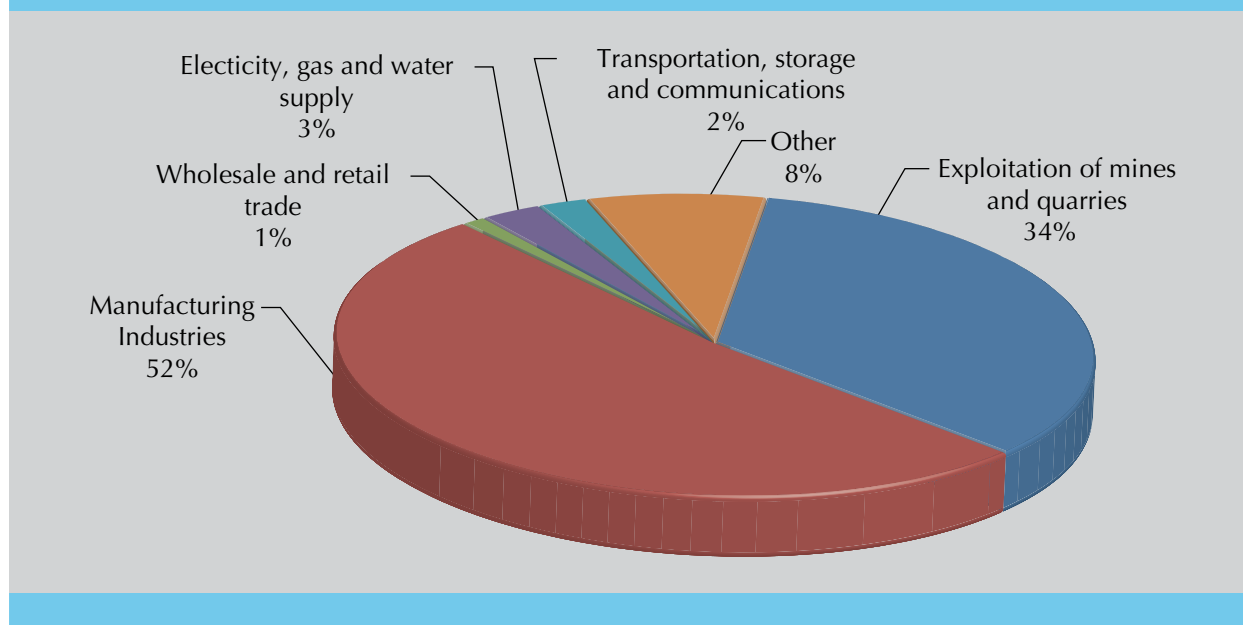
With the passing of the PRTR Regulation and the implementation of the one-stop shop (probably by 2013), these deficiencies will be addressed and gradually incorporated.

## V. COMPLIANCE WITH ENVIRONMENTAL REGULATIONS

### 5.1 Air Emissions

This section reports on the compliance with S.D. N° 4/1992, MINSAL, which sets Standards on the Emission of Particulate Matter from fixed point and group sources in the Metropolitan Region. The following table shows the total amount of facilities and sources regulated by this Decree in the Metropolitan Region. It also presents the number of facilities

**FIGURE 16**  
**Off-Site Hazardous Waste Generation by Industrial Sector (ISIC 3), Country Total, 2009**



Source: SIDREP, 2009.

and sources that did not comply with this regulation between 2005 and 2009.

**TABLE 18**  
**Total Amount of Inspected Facilities D.S. N° 4/1992, MINSAL, 2005 a 2009**

| Year | Total Facilities | Amount of Facilities that do not comply | Total Number of Sources | Amount of Sources that do not Comply |
|------|------------------|-----------------------------------------|-------------------------|--------------------------------------|
| 2005 | 4,092            | 9                                       | 8,358                   | 12                                   |
| 2006 | 2,552            | 46                                      | 6,257                   | 49                                   |
| 2007 | 2,627            | 7                                       | 4,495                   | 7                                    |
| 2008 | 4,580            | 8                                       | 8,767                   | 9                                    |
| 2009 | 5,721            | 41                                      | 11,095                  | 40                                   |

Source: MINSAL, 2009. Below is the report on the compliance by region with S.D. N° 167/1999, MINSEGPRES, for 2009, which sets Emission Standards for Nuisance Odors (Hydrogen Sulfide compounds and mercaptans: TRS gases) associated to the production of sulfate pulp.

# Emission Standard for Nuisance Odors (TRS Gases) Associated to the Production of Sulfate Pulp, 2009

Compliance with standard

**TABLE 19**

**Compliance Report by Region of D.S. N° 167/I 1999, MINSEGPRES, 2009**

| REGION                            | PLANT                                                         | Type of Emission Source                                    | TRS measured for H2S                                                                | Unit  | Standard Value | Unit  |      |
|-----------------------------------|---------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------------------------------|-------|----------------|-------|------|
| Maule                             | Celulosa Arauco y Constitución S.A., Planta Constitución      | Recovery boiler                                            | 4.43                                                                                | ppmv  | 5              | ppmv  | YES  |
|                                   |                                                               | Lime kiln                                                  | 4.23                                                                                | ppmv  | 20             | ppmv  | YES  |
|                                   |                                                               | Green Liquor Dissolving Tank                               | Standard compliance does not apply because emissions are sent to a recovery boiler. |       | 16.8           | mg/kg |      |
|                                   | Celulosa Arauco y Constitución S.A., Planta LICANCEL          | Recovery boiler                                            | 3.82                                                                                | ppmv  | 5              | ppmv  | YES  |
|                                   |                                                               | Lime kiln                                                  | 13.45                                                                               | ppmv  | 20             | ppmv  | YES  |
|                                   |                                                               | Green Liquor Dissolving Tank                               | 4.5                                                                                 | mg/kg | 16.8           | mg/kg | YES  |
|                                   | Planta Celulosa Arauco y Constitución S.A.-Planta Nueva Aldea | Recovery boiler N° 1                                       | 0.54                                                                                | ppmv  | 5              | ppmv  | YES  |
|                                   |                                                               | Lime kiln N° 1                                             | 12.07                                                                               | ppmv  | 20             | ppmv  | YES  |
|                                   | Biobío                                                        | Planta Celulosa Arauco y Constitución S.A. Planta Horcones | Recovery boiler N° 1                                                                | 1.35  | ppmv           | 5     | ppmv |
| Lime kiln N° 1                    |                                                               |                                                            | 2.21                                                                                | ppmv  | 20             | ppmv  | YES  |
| Green Liquor Dissolving Tank N° 1 |                                                               |                                                            | 8.87                                                                                | mg/kg | 16,8           | mg/kg | YES  |
| Recovery boiler N° 2              |                                                               |                                                            | 0.62                                                                                | ppmv  | 5              | ppmv  | YES  |
| Lime kiln N° 2                    |                                                               |                                                            | 15.09                                                                               | ppmv  | 20             | ppmv  | YES  |
| Green Liquor Dissolving Tank N° 2 |                                                               |                                                            | 2.3                                                                                 | mg/kg | 16.8           | mg/kg | YES  |
| Planta CMPC Santa Fe              |                                                               |                                                            | Recovery boiler N° 1                                                                | 1.48  | ppmv           | 5     | ppmv |
|                                   |                                                               | Recovery boiler N° 2                                       | 1.04                                                                                | ppmv  | 5              | ppmv  | YES  |
|                                   |                                                               | Lime kiln N° 1                                             | 4.84                                                                                | ppmv  | 20             | ppmv  | YES  |
|                                   |                                                               | Lime kiln N° 2                                             | 4.47                                                                                | ppmv  | 20             | ppmv  | YES  |
|                                   |                                                               | Green Liquor Dissolving Tank N° 1                          | 9                                                                                   | mg/kg | 16.8           | mg/kg | YES  |

(Table 19 continued)

| REGION       | PLANT                                                       | Type of Emission Source           | TRS measured for H2S | Unit  | Standard Value | Unit  |     |
|--------------|-------------------------------------------------------------|-----------------------------------|----------------------|-------|----------------|-------|-----|
| La Araucanía | Planta CMPC Laja                                            | Recovery boiler N° 1              | 0.67                 | ppmv  | 5              | ppmv  | YES |
|              |                                                             | Lime kiln N° 1                    | 4.3                  | ppmv  | 20             | ppmv  | YES |
|              |                                                             | Green Liquor Dissolving Tank N° 1 | 16.16                | mg/kg | 16.8           | mg/kg | YES |
|              | Planta Pacífico                                             | Recovery boiler N° 1              | 1.3                  | ppmv  | 5              | ppmv  | YES |
|              |                                                             | Lime kiln N° 1                    | 9.6                  | ppmv  | 20             | ppmv  | YES |
|              |                                                             | Green Liquor Dissolving Tank N° 1 | 16.8                 | mg/kg | 16.8           | mg/kg | YES |
| de Los Ríos  | Planta Celulosa Arauco y Constitución S.A., Planta Valdivia | Recovery boiler N° 1              | 0.73                 | ppmv  | 5              | ppmv  | YES |
|              |                                                             | Lime kiln N° 1                    | 7.98                 | ppmv  | 20             | ppmv  | YES |

Source: MINSAL, 2009.

Note: The percentile for dissolving tank does not apply for the Valdivia Plant since 2008, because its emission goes through a scrubber and is later burnt in a recovery boiler.

The following table presents the compliance with S.D. N° 185/1991 of the Ministry of Agriculture, Ministry of Mining and Ministry of Health, which regulates the operations of facilities that emit sulfur dioxide, particulate matter and arsenic in the entire territory, releasing into the atmosphere amounts higher than or equal to three daily tons of sulfur dioxide or one daily ton of particulate matter. This Decree is also applicable to any emission source

of sulfur dioxide or particulate matter located in a saturated or latent area.

### Arsenic Emission Standard, 2009

#### Regulation Compliance

Table 20 shows the compliance with the Arsenic Emission Standard inspected by the Ministry of Health.

**TABLE 20**

**Compliance D.S. N° 185/1991, Ministry of Agriculture, Ministry of Mining and Ministry of Health, 2009**

| Emission Source      | Annual Emission t/year | Standard value t/year | Complies YES/NO |
|----------------------|------------------------|-----------------------|-----------------|
| Chuquicamata Foundry | 501                    | 400                   | NO              |
| Alto Norte Foundry   | 120                    | 126                   | YES             |
| Potrerillos Foundry  | 103.787                | 800                   | YES             |

(Table 20 continued)

| Emission Source            | Annual Emission<br>t/year | Standard value<br>t/year | Complies<br>YES/NO |
|----------------------------|---------------------------|--------------------------|--------------------|
| Hernán Videla Lira Foundry | 21,09                     | 34                       | YES                |
| Ventanas Foundry           | 68,124                    | 120                      | YES                |
| Chagres Foundry            | 9,2                       | 95                       | YES                |
| El Teniente Foundry        | 136                       | 375                      | YES                |

Source: MINSAL, 2009.

### Decontamination Plans

The compliance with Regional Decontamination Plans is included since 2007 in order to monitor the compliance with current regulations.

**TABLE 21**  
**Compliance with Decontamination Plans, 2009**

| YEAR | Decontamination plan                                                                            | ZONE                                  | Maximum Annual<br>Emission<br>t/year |       | Annual emission for<br>2009 (t/year) |       | Complies with<br>Maximum<br>Emission |              |
|------|-------------------------------------------------------------------------------------------------|---------------------------------------|--------------------------------------|-------|--------------------------------------|-------|--------------------------------------|--------------|
|      |                                                                                                 |                                       | SO <sub>2</sub>                      | MP    | SO <sub>2</sub>                      | MP    | SO <sub>2</sub>                      | MP           |
| 2009 | Follow-up report<br>Decontamination plan<br>for Caletones foundry<br>surrounding area.          | Caletones                             | 230,000                              | 1,987 | 141,144                              | 1,987 | YES                                  | YES          |
| 2009 | Decontamination plan for<br>Chuquicamata surrounding<br>area.                                   | Chuquicamata                          | 56,600                               | 154*  | 90,601                               | 155*  | No                                   | No           |
| 2009 | Follow-up report<br>Decontamination Plan for<br>María Elena and Pedro de<br>Valdivia districts. | María Elena<br>y Pedro de<br>Valdivia | No aplica                            | 180   | No aplica                            | 93    | –                                    | YES          |
| 2009 | Results of Decontamination<br>Plan of Hérnan Videla Lira<br>Foundry.                            | Paipote                               | 39,982**                             | 600   | 12,344                               | ***   | ***                                  | Not<br>appli |
| 2009 | Current state of Potrerillos<br>Decontamination Plan<br>Report.                                 | Potrerillos                           | 100,000                              | 5,500 | 49,865                               | 575.8 | YES                                  | YES          |

(Table 2 I continued)

| YEAR | Decontamination plan                                                                    | ZONE             | Maximum Annual Emission t/year              |       | Annual emission for 2009 (t/year) |        | Complies with Maximum Emission |     |
|------|-----------------------------------------------------------------------------------------|------------------|---------------------------------------------|-------|-----------------------------------|--------|--------------------------------|-----|
|      |                                                                                         |                  | SO <sub>2</sub>                             | MP    | SO <sub>2</sub>                   | MP     | SO <sub>2</sub>                | MP  |
| 2009 | Follow-up report of Ventanas Decontamination Plan Ventanas, related to Ventana Foundry. | Foundry Ventanas | 90,000                                      | 1,000 | 20,314                            | 557    | YES                            | YES |
|      |                                                                                         | AESGENER         | 1.13 kg SO <sub>2</sub> por millones de BTU | 3,000 | 14,873.56                         | 349.19 | YES                            | YES |

Source: MINSAL, 2009.

\* Refers to tons per month.

\*\* Until 1999 the maximum SO<sub>2</sub> emission was the one stated in the table, since 2000 the quality standard required for compliance is 80 µg/m<sup>3</sup>N.

\*\*\* It is within the range of compliance with the primary air quality standard.

## Liquid Waste

In 2009, the SISS and DIRECTEMAR had the authority to obtain information on emissions from discharges into marine and continental surface waters, groundwater and sewerage to be included in the PRTR.

The scope of competence of the SISS (regulating and inspecting institution) focused on two main sectors:

- The sanitation sector, which is composed of a set of entities whose functions are related to the services of production and distribution of drinking-water as well as the collection and disposal of waste water.

- The industrial sector, specifically regarding release of liquid waste into bodies and masses of water and underground water courses. Regarding the release of liquid waste into sewerage systems (compliance with Supreme Decree No. 609/98 of the Ministry of Public Works), inspection is performed directly by sanitation companies, according to the area, under the supervision of the SISS. DIRECTEMAR is charged with enforcing the compliance with Supreme Decree 90/2000 MINSEGPRES for all land sources that release into the waters within its jurisdiction<sup>9</sup>. Main milestones for standards dealing with liquid waste release since the date they came into force.

<sup>9</sup> To that end, they have environmental management tools that allow them to inspect, once a selection has been made, land sources that release into the waters within its jurisdiction considering:

- a) Companies with self-assessment monitoring resolutions.
- b) The Coastal Environment Observation Program (POAL by its acronym in Spanish)
- c) Untreated liquid waste releases.

**TABLE 22**  
**Evolution of D.S. MOP N° 609/1998 Over Time**

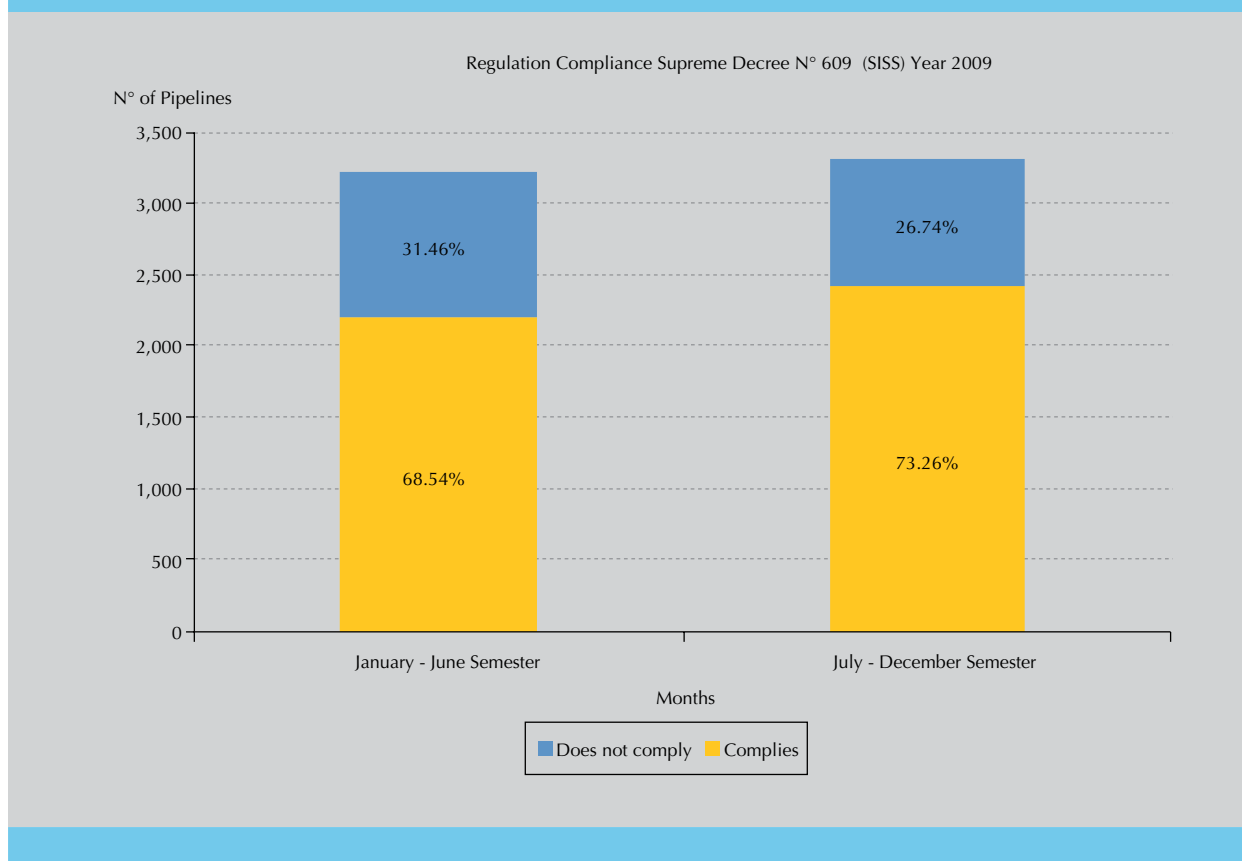
| DATE      | August 19, 1998                                      | August 19, 1999                                                                     | August 19, 2006               |
|-----------|------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------|
| Milestone | S.D. 609 came into force, applied to all new sources | Compliance by existing sources that discharge into the network with treatment plant | Full Compliance with S.D. 609 |

Beginning on August 19, 2006, all sources that did not have a waste water treatment plant and that released into a sewerage system must comply with this Decree. Consequently, for the reports from 2005 and part of 2006 this did not apply to 100% of the existing sources that released into the sewerage system.

The report on compliance with emissions standards for industrial liquid waste evaluated by SISS is presented below.

Figure 17 shows the percentage of pipelines that do not comply as compared to the total number of monitored pipelines.

**FIGURE 17**  
**Percentage of Average Compliance in Pipelines, 2009**



Source: SISS, 2009.



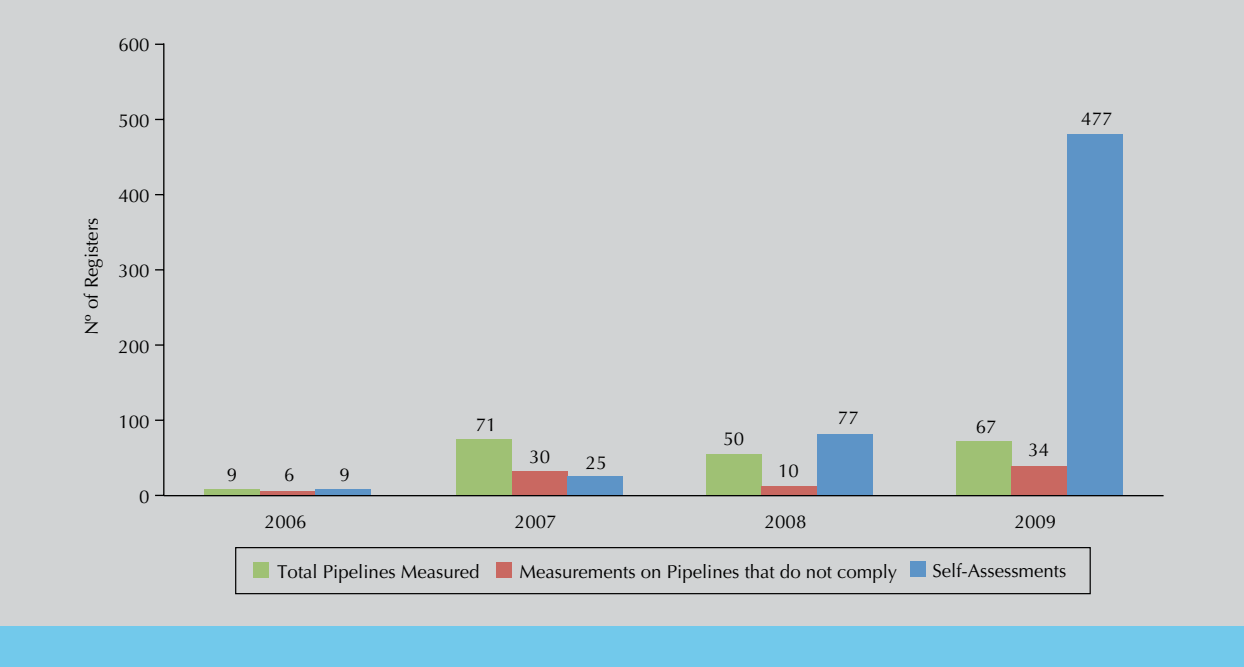
| DATE      | September, 2001         | December 31, 2002            | September 3, 2004                                  | September 3, 2006      |
|-----------|-------------------------|------------------------------|----------------------------------------------------|------------------------|
| Milestone | S.D. 90 came into force | Chronogram presented to SISS | Characterization of Liquid Waste presented to SISS | Full Compliance S.D.90 |

The parameters that are required in order to comply with this regulation will depend on the emission source and the maximum permissible limits for liquid waste discharge into river waters, considering the dilution capacity of the receiving body, the maximum permissible limits for liquid waste discharge into marine waters within the coastal protection zone and the maximum permissible limits for liquid waste discharge outside the coastal protection zone..

The figure below presents the number of inspected facilities and their compliance according to data provided by DIRECTEMAR for the 2006-2009 period.

The inspection performed by DIRECTEMAR is random and is carried out in the presence of a certified laboratory, taking into account specific parameters (PH, T° and Flow). A strong increase in self-assessments can be observed in 2009.

**FIGURE 18**  
**Compliance with D.S. N° 90/2000, Country Total, DIRECTEMAR, 2009**

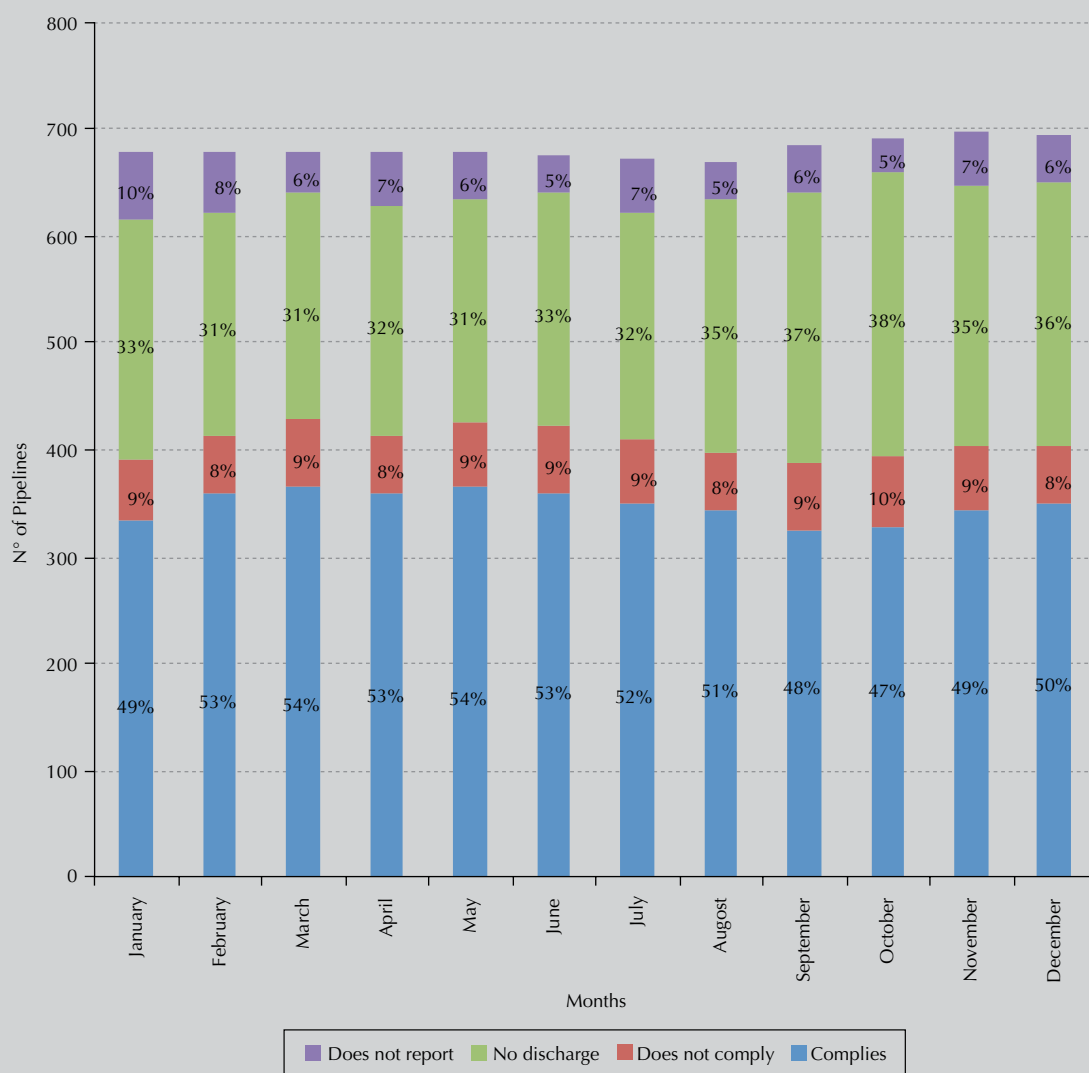


Source: DIRECTEMAR, 2009.

The information provided by the SISS for monitored pipelines and non-compliance with Supreme Decree No. 46/2002 of MINSEGPRES in 2009 for

the cities in which it was applied are presented in the figure below, which contains the national average for compliance as a percentage

**FIGURE 19**  
**Percentage of Average Compliance with D.S. N° 90/2000 in Pipelines, 2009**



Source: SISS, 2009.

Does Not Report: The plant does not report its self-assessments and may eventually be penalized.

Does Not Discharge: The plant does not discharge during the period.

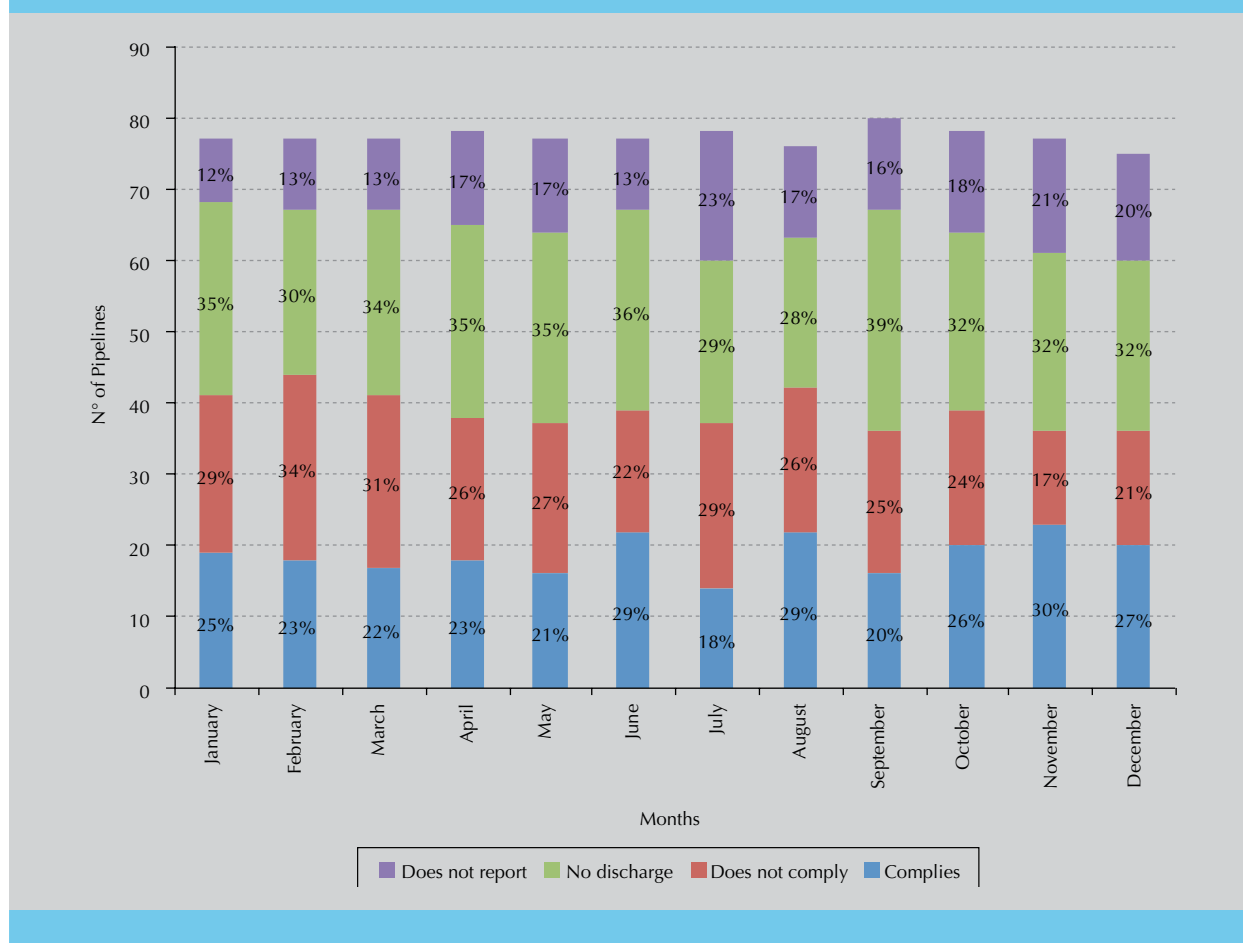
Does Not Comply: The plant does not comply with the decree.

Complies: The plant complies with the decree.

**TABLE 24**  
**Evolution of D.S. N° 46/2002 MINSEGPRES Over Time**

| DATE | February 17, 2003                 | February 17, 2004               | February 17, 2005                                                         | February 17, 2006                |
|------|-----------------------------------|---------------------------------|---------------------------------------------------------------------------|----------------------------------|
| HITO | Entrada en Vigencia<br>S.D. N° 46 | Entrega de<br>antecedentes SISS | Cumplimiento<br>para descarga en<br>Condiciones de<br>Vulnerabilidad Alta | Pleno Cumplimiento<br>S.D. N° 46 |

**FIGURE 20**  
**Percentage of Average Compliance with D.S. N° 46/2002 MINSEGPRES in Pipelines, 2009**



Source: SISS, 2009.

Does Not Report: The plant does not report its self-assessments and may eventually be penalized..

Does Not Discharge: The plant does not discharge during the period.

Does Not Comply: The plant does not comply with the decree.

Complies: The plant complies with the decree.

Does Not Apply: Refers to exceptions (i.e. seismic events that prevent the plant from reporting).

The information provided by the SISS for monitored pipelines and non-compliance in 2009 with Supreme Decree No. 46/2002 MINSEGPRES for the cities in which it was applied are presented in Figure 20, which contains the national average for compliance as a percentage.

**TABLE 25**  
**Evolution of D.S. N° 80/2005**  
**MINSEGPRES Over Time**

| DATE      | August 26,<br>2006             | April 26,<br>2007                         |
|-----------|--------------------------------|-------------------------------------------|
| Milestone | Entry into force<br>S.D. N° 80 | Unconstitutionality<br>Appeal is Rejected |

The parameters controlled for the release of liquid waste into bodies of underground water where the discharge of liquid waste is permitted are presented below.

**TABLE 26**  
**Parameters Considered by D.S.**  
**N° 80/2005 MINSEGPRES Over Time**

|            |            |
|------------|------------|
| Molybdenum | 1.6 mg/L   |
| Sulfates   | 2,000 mg/L |

The information provided by the SISS indicates that CODELCO-El Teniente Division was in 100% compliance. This is the only emissions source that releases waste into the Carén Estuary in 2009. The course's release threshold allows for concentrations of up to 1.6 mg/L of molybdenum and 2000 mg/L of sulfates.

#### 5.4. Montreal Protocolo (ODS)

The following table shows the report on compliance with the goals for consumption of ozone depleting substances (ODS) in 2009, according to the international commitments set in the Montreal Protocol.

**TABLE 27**  
**Compliance with Targets Set in the Montreal Protocol, 2009**

| Appendix Montreal Protocol | Consumption Ton ODP* | Maximum Limit of<br>Allowed Consumption 2009<br>t ODP | Complies with<br>Target |
|----------------------------|----------------------|-------------------------------------------------------|-------------------------|
| Appendix A Group I         | 21.74                | 828.7                                                 | Complies                |
| Appendix A Group II        | 0.00                 | 8.5                                                   | Complies                |
| Appendix B Group II        | 0.00                 | 0.6                                                   | Complies                |
| Appendix B Group III       | 0.00                 | 6.4                                                   | Complies                |
| Appendix C Group I         | 75.24                | No limit                                              | No limit                |
| Appendix E Group I         | 149.61               | 212.5                                                 | Complies                |

Source: MMA, 2009.

\* Consumption reported to the Secretariat of the Multilateral Fund. Consumption of controlled substances, defined as: Production + Import - Export.

## VI. PRTR INDICATORS

### a. Environmental Indicators

The development of environmental indicators goes hand in hand with the PRTR objectives and is aimed at assessing environmental conditions and trends on different scales.

#### Air

Figure 21 shows emissions by category from stationary sources during the 2005-2009 period, for PM 10, PM 2.5, NO<sub>x</sub> and SO<sub>2</sub>.

Figure 22 presents emissions by type of fuel from stationary sources during the 2005-2009 period, for PM 10, PM 2.5, NO<sub>x</sub> and SO<sub>2</sub>.

Figure 23 shows emissions by vehicle category from mobile sources during the 2005-2009 period, for PM 10, PM 2.5, NO<sub>x</sub> and SO<sub>2</sub>.

#### Water

Figure 24 presents emissions by economic activity released into marine and continental surface waters during the 2005-2009 period for Ammoniacal nitrogen (NH<sub>3</sub>) and Phosphorus (P).

Figure 25 shows emissions of heavy metals released into marine and continental surface waters during the 2005-2009 period for Aluminum (Al), Boron (B), Cadmium (Cd), Hexavalent chromium (Cr+6), Copper (Cu), Iron (Fe), Mercury (Hg), Manganese (Mn), Nickel (Ni), Lead (Pb) and Zinc (Zn).

Figure 26 presents emissions of biological parameters released into marine and continental surface waters during the 2005-2009 period, for Oils and fats, BOD<sub>5</sub>, Total Nitrogen, Total Suspended Solids and Methylene Blue Active Substances (MBAS).

In 2007 the "HUGO NAJLE H." company reported an emission of 527,533.169 tons of BOD<sub>5</sub> released.

Figure 27 shows the emissions of hydrocarbons discharged into marine and continental surface waters during the 2005-2009 period for Stable hydrocarbons, Total hydrocarbons and Volatile hydrocarbons.

The "Nor Oeste Pacífico Generación de Energía Limitada" company reported an emission of 6,213 tons of Total hydrocarbons discharged in 2008.

Figure 28 shows emissions of heavy metals discharged into groundwater during the 2006-2009 period for Cadmium (Cd), Hexavalent chromium (Cr+6), Total Chromium (CrT), Copper (Cu), Iron (Fe), Mercury (Hg), Manganese (Mn), Molybdenum (Mo), Nickel (Ni), Lead (Pb), Tin (Sn) and Zinc (Zn).

#### Waste

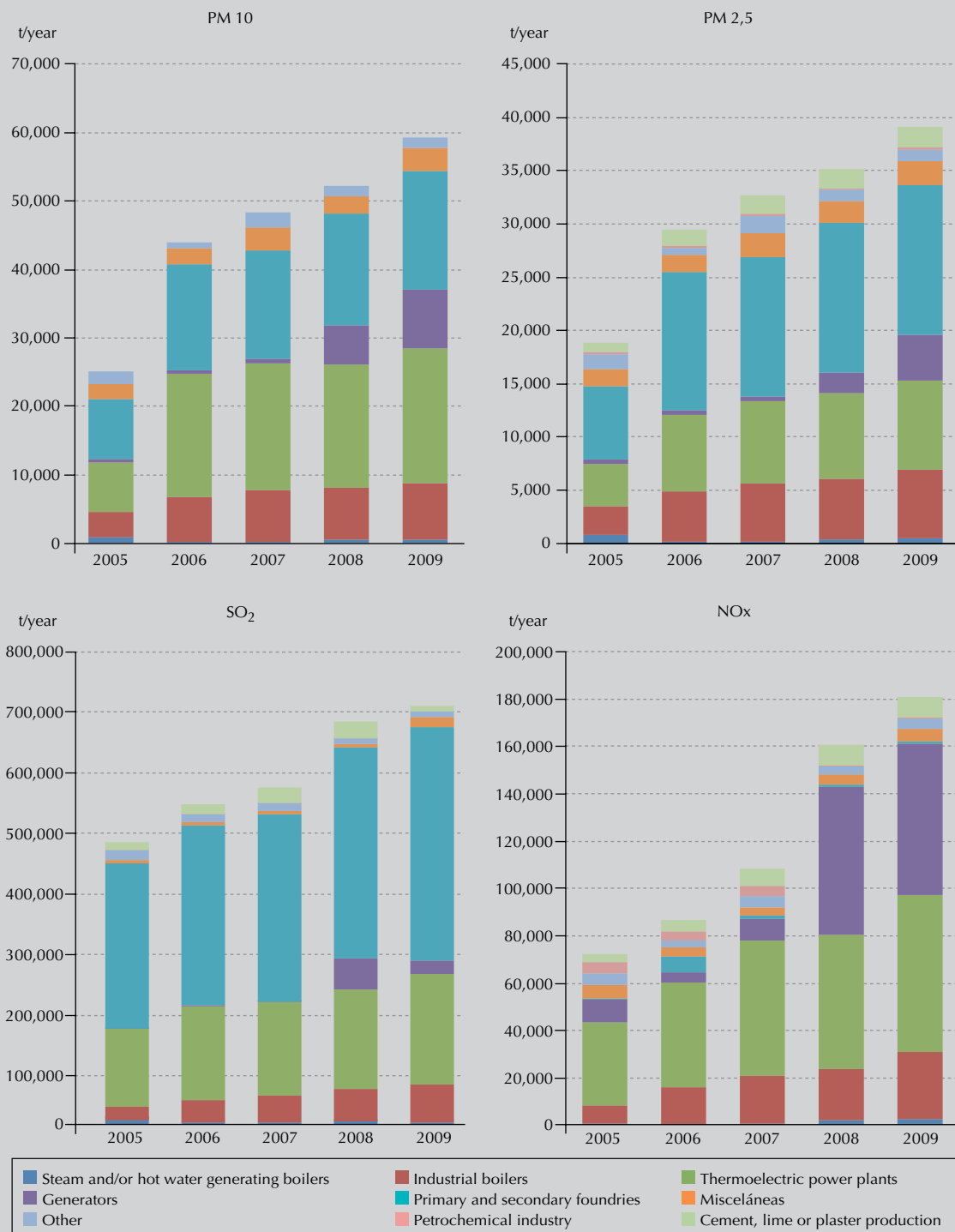
Figure 29 presents the total transfer of hazardous wastes by economic activity (ISIC1) during the 2006-2009 period.

Figure 30 shows the total transfer of hazardous wastes by type during the 2006-2009 period.

The constant increase in transfers since 2006 is due to the fact that a greater amount of facilities are reporting through the website and does not necessarily indicate an increase in transfers of the facilities reporting in the system.

**FIGURE 21**

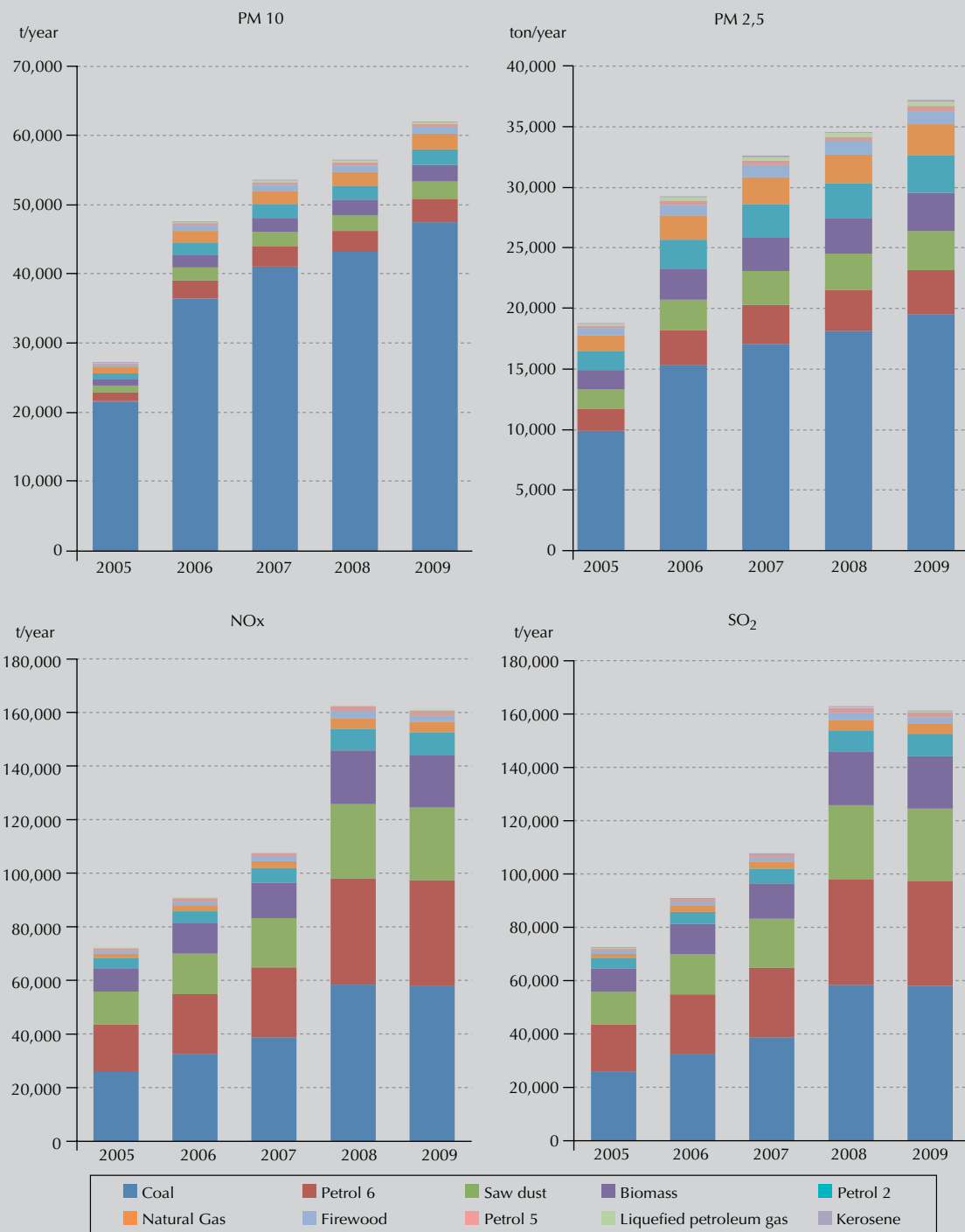
**Stationary Sources Air Emissions by Inventory Category, 2005-2009**



Source: MINSAL, 2009.

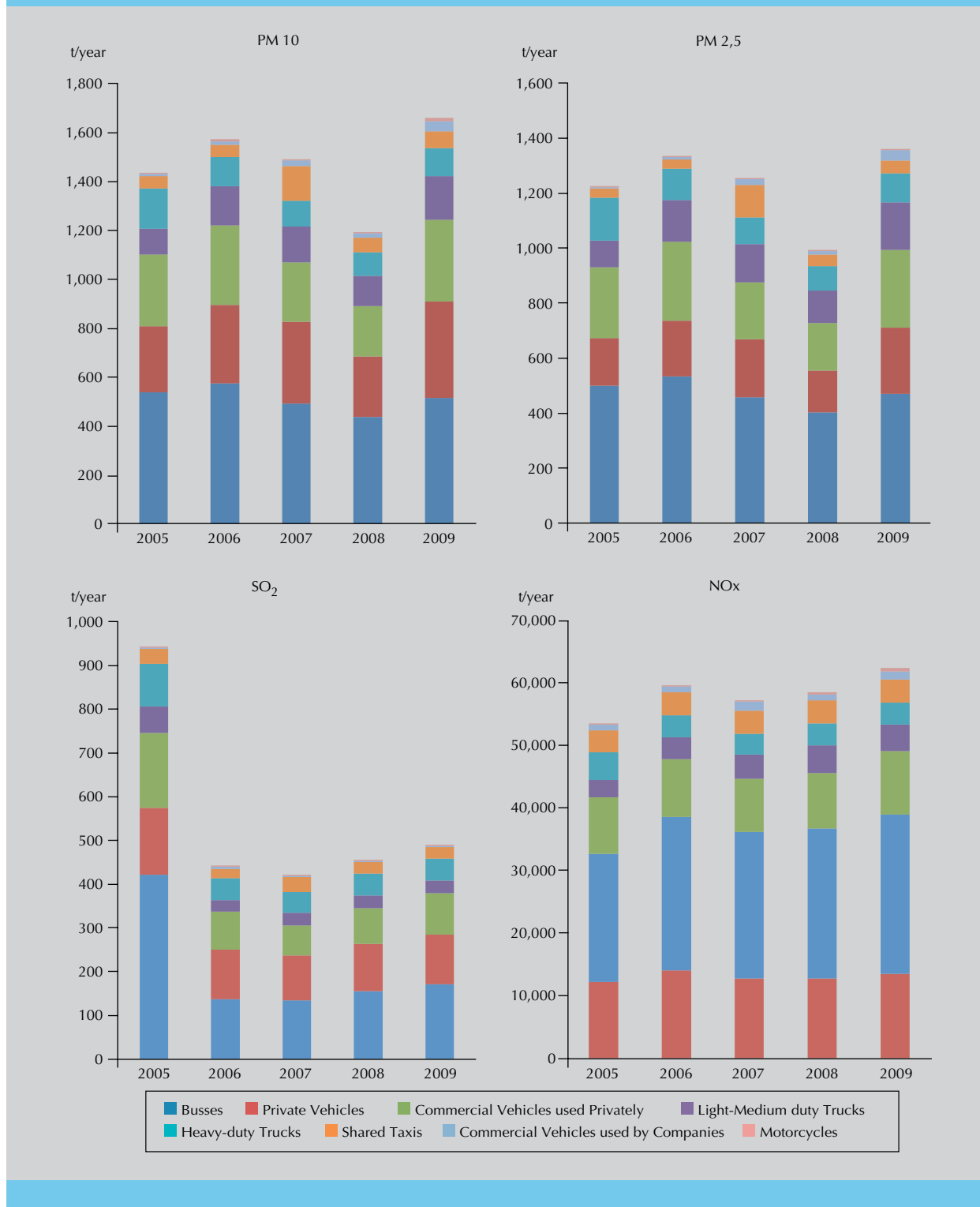
**FIGURE 22**

**Stationary Sources Air Emissions by Type of Fuel, 2005-2009**



Source: MINSAL, 2009.

**FIGURE 23**  
**Air Emissions by Vehicle Category, 2005-2009**



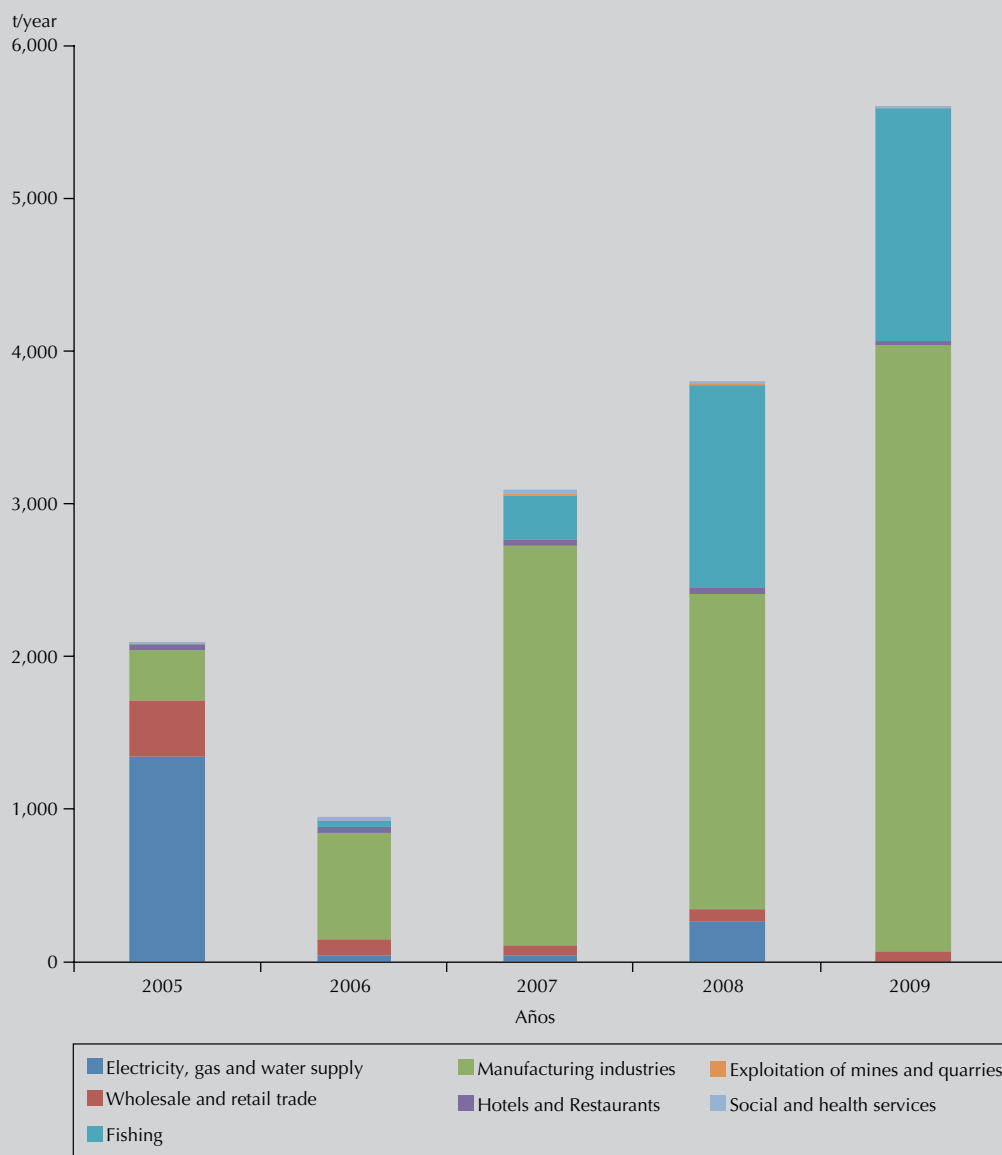
Source: SECTRA, 2009.

Note: PM 10 and PM 2.5 emissions do not included resuspended dust.



**FIGURE 24**

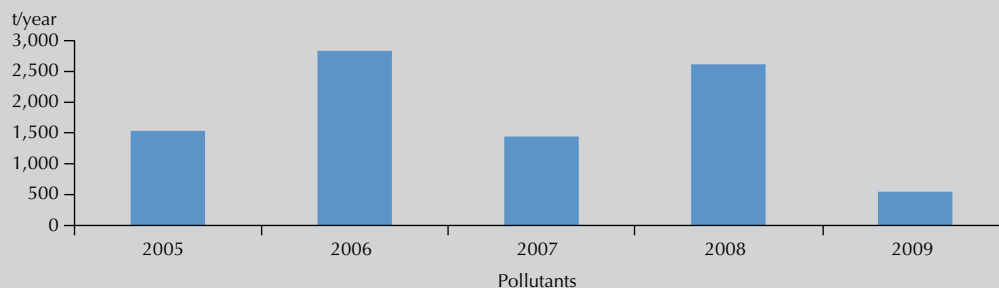
**Discharges of Ammonia Nitrogen and Total Phosphorus into Marine and Continental Surface Waters by Economic Activity, 2005-2009**



Source: DIRECTEMAR and SISS, 2009.

**FIGURE 25**

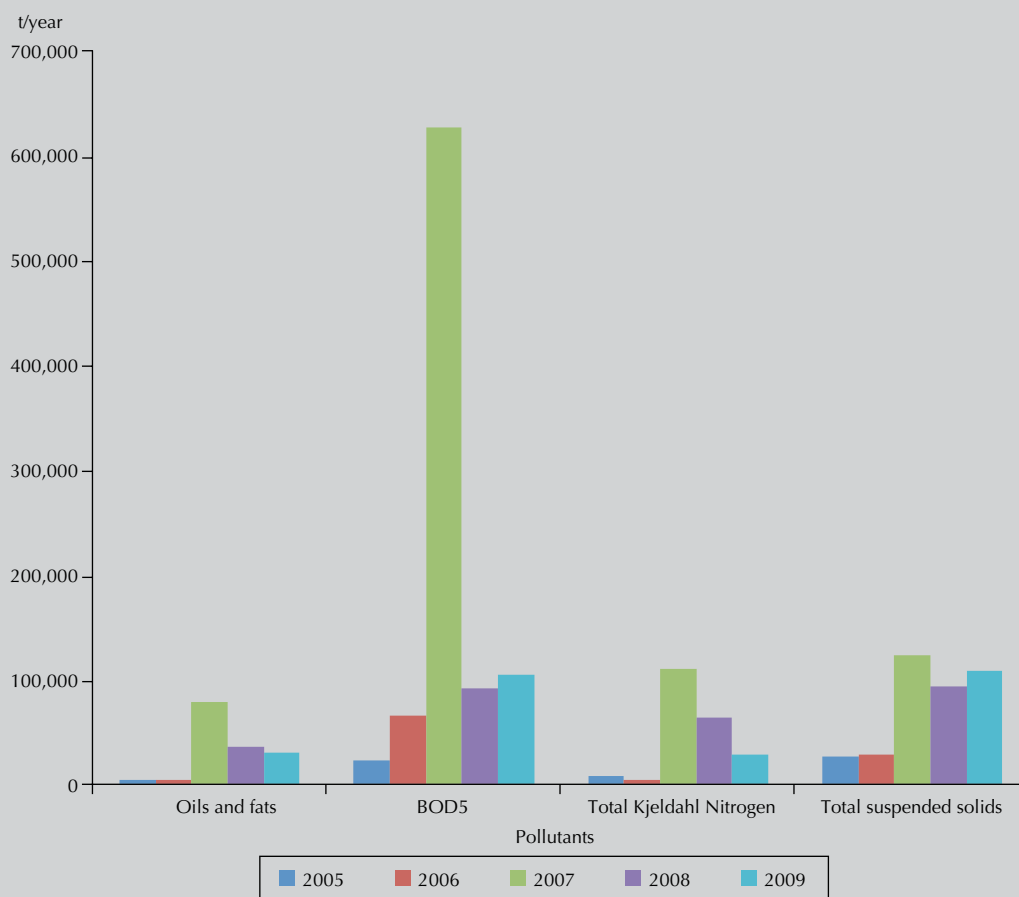
**Release of Heavy Metal Pollutants into Marine and Continental Surface Waters, 2005-2009**



Source: DIRECTEMAR and SISS, 2009.

**FIGURE 26**

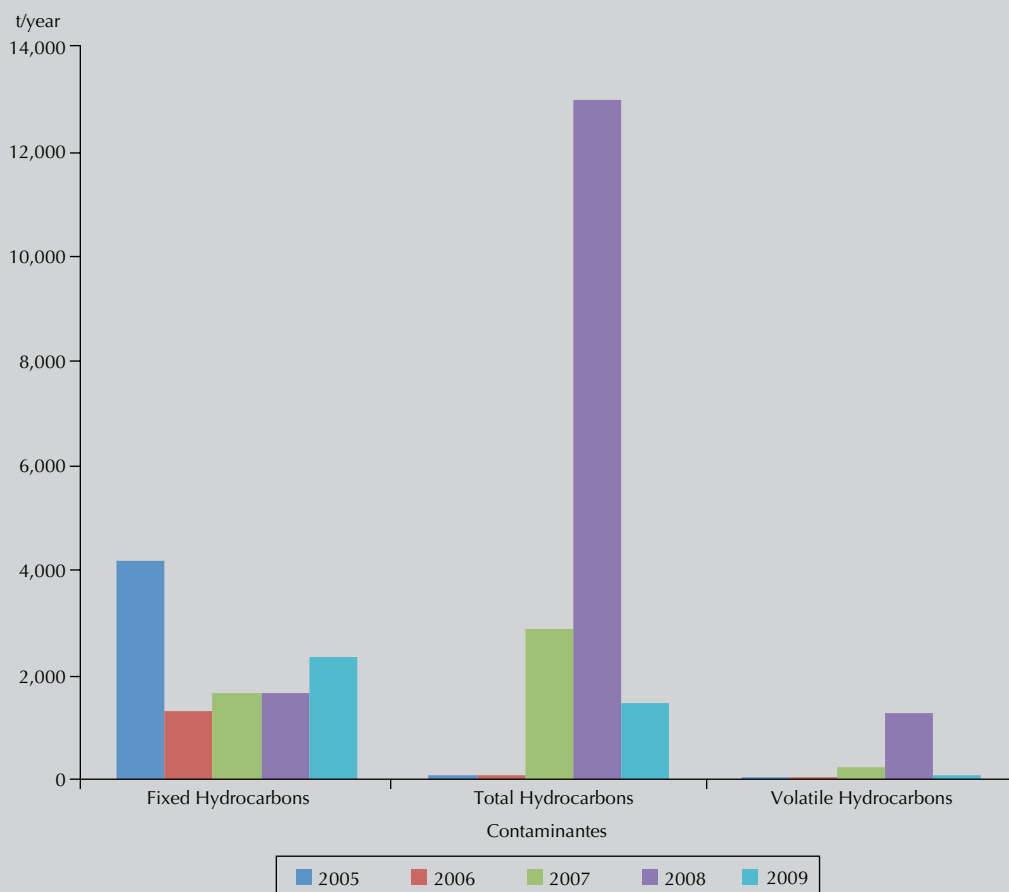
**Release of Biological Parameters into Marine and Continental Surface Waters, 2005-2009**



Source: DIRECTEMAR and SISS, 2009.

**FIGURE 27**

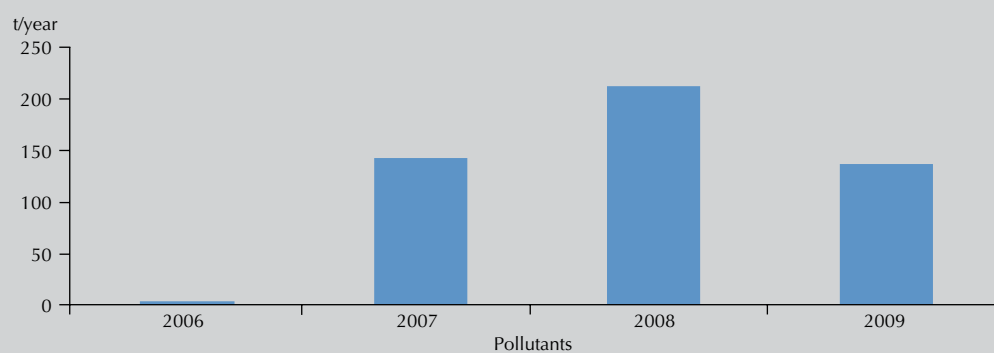
**Release of Hydrocarbons into Marine, Continental and Surface Waters, 2005-2009**



Source: DIRECTEMAR and SISS, 2009.

**FIGURE 28**

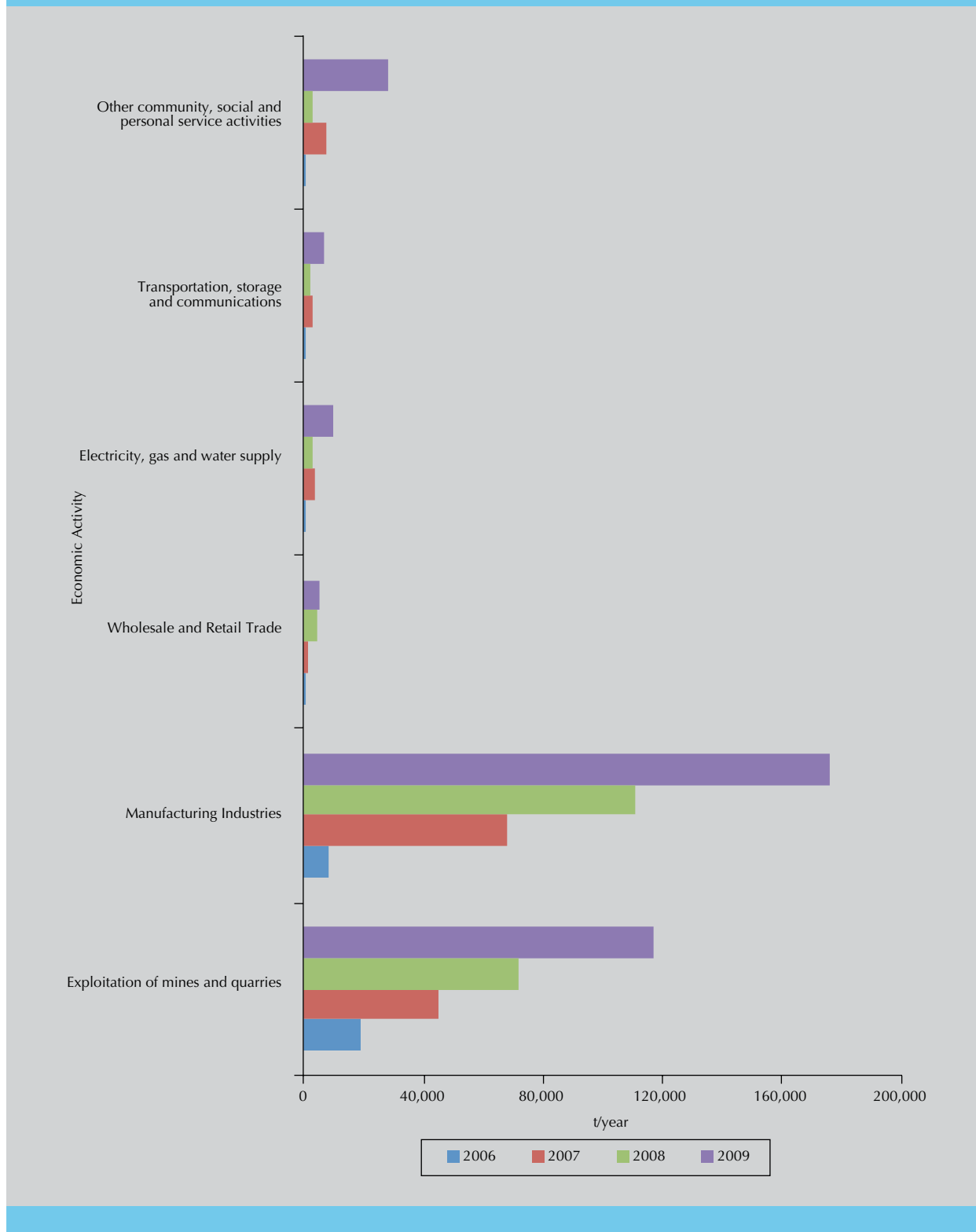
**Release of Heavy Metal Pollutants into Groundwater, 2006-2009**



Source: SISS, 2009.

**FIGURE 29**

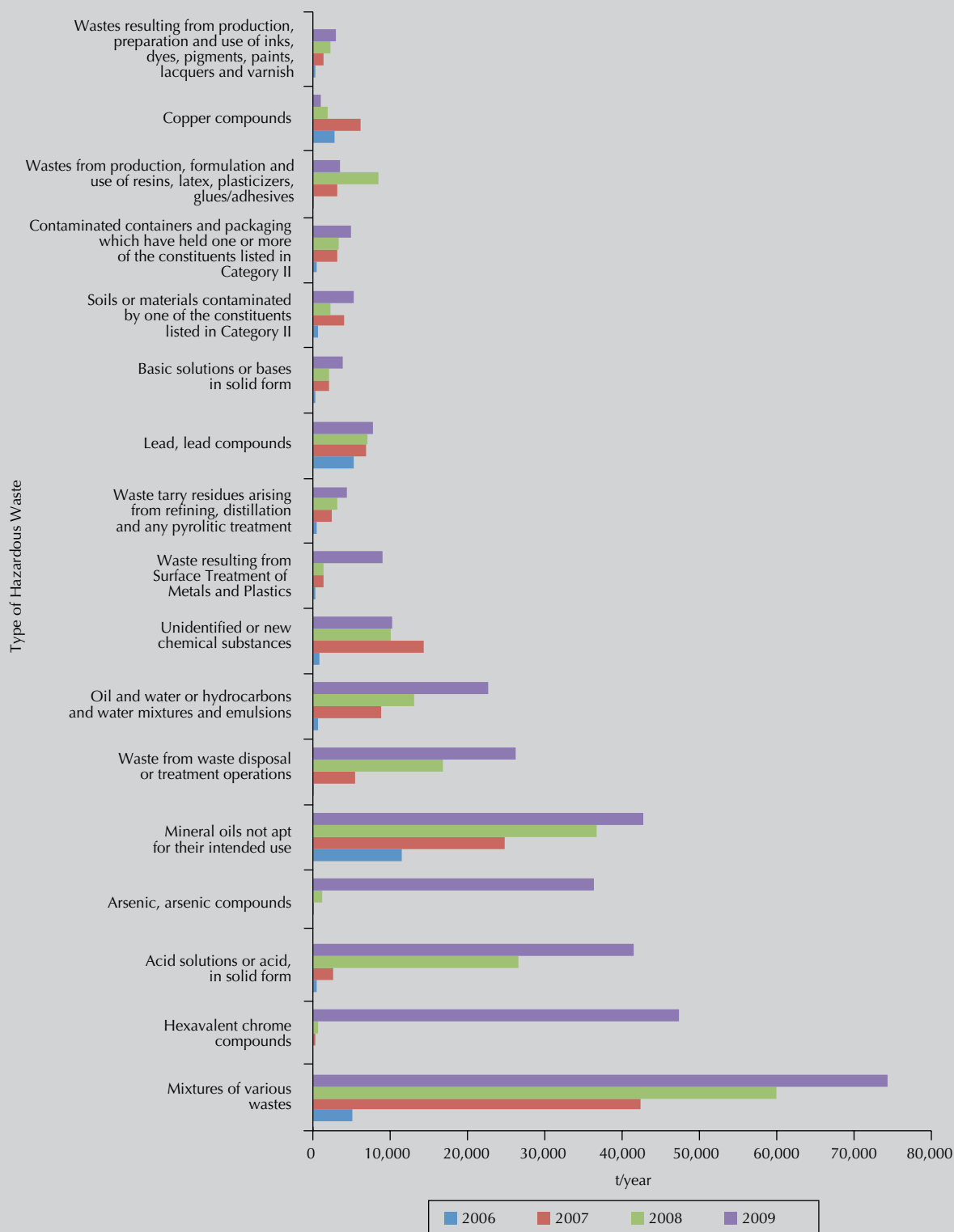
**Total Transfer of Hazardous Wastes by Economic Activity, 2006-2009**



Source: SIDREP, 2009.

**FIGURE 30**

**Total Transfer of Hazardous Wastes by Type of Hazardous Waste, 2006-2009**



Source: SIDREP, 2009.

# Appendices

## APPENDIX N° 1 NATIONAL COORDINATION GROUP

- Ministry of Health
- Ministry of Economy
- Ministry of Mining
- Transportation Planning Secretariat (SECTRA by its acronym in Spanish), Ministry of Transportation and Telecommunications
- Ministry of Defense
- Environment and Territory Secretariat (SEMAT by its acronym in Spanish), Ministry of Public Works
- General Directorate of Maritime Territory and Merchant Marine
- Superintendence of Sanitation Services
- General Water Directorate
- National Institute of Statistics
- National Customs Service
- Agriculture and Livestock Service
- Ministry of Energy
- Chilean Internal Revenue Service
- Chilean Copper Commission\* (Comisión Chilena del Cobre)
- National Forestry Corporation
- Regional Secretariat of the Health Authority for the Metropolitan Region (SEREMI by its acronym in Spanish)
- National Clean Production Council\*
- National Geology and Mining Service\* (Servicio Nacional de Geología y Minería)

It will also be comprised of, as advisory members, one representative of the following civil society institutions:

- Production and Commerce Confederation
- Chilean Chemical Industrial Trade Association (ASIQUM A.G.)
- TERRAM Foundation
- PARTICIPA Corporation
- Corporation for Sustainable Development of the South\* (CODESOSUR-SINERGIAS)
- Greenpeace
- University of Chile\*

\* Public services and civil society institutions which joined the National Coordination Group after the agreement.

## APPENDIX N° 2

### GLOSARY OF TERMS

**Acute Toxicity:** Waste will have the characteristic of acute toxicity when it is lethal to humans in low doses. A waste is considered to have this characteristic in the following cases:

- When its toxicity by oral ingestion in rats, expressed as a Lethal Dose 50 (oral LD50) in a laboratory test, is equal to or less than 50 mg of waste per kilogram of body weight.
- When its toxicity value by inhalation in rats, expressed as a Lethal Dose 50 (inhalation LD50) in a laboratory test, is equal to or less than 2 mg of waste per liter.
- When its toxicity by cutaneous absorption in rabbits, expressed as a Lethal Dose 50 (dermal LD50) in a laboratory test, is equal to or less than 200 mg of waste per kilogram of body weight.

The acute toxicity of waste can be estimated based on the technical information available regarding the acute toxicity of its component substances. Waste will be considered to have the characteristic of acutely toxic, when the percentage content in the waste of a toxic substance listed in Article 88 of the Health Regulation on Hazardous Waste Management, or another acutely toxic substance recognized as such by a supreme decree issued by the Ministry of Health, is higher than the lowest limit for acute toxic concentration, CTAL (by its acronym in Spanish), defined for this constituent, calculated as follows:

$$CTAL_{oral} = \left[ \frac{LD50_{oral}}{50 \frac{mg}{kg}} \right] \times 100$$

$$CTAL_{inhalation} = \left[ \frac{LD50_{inhalation}}{2 \frac{mg}{l}} \right] \times 100$$

$$CTAL_{dermal} = \left[ \frac{LD50_{dermal}}{200 \frac{mg}{kg}} \right] \times 100$$

If the waste contains more than one acute toxic substance, it will be considered hazardous if the sum of the percentage concentrations of such substances, divided by their respective Limit for Acute Toxic Concentrations, is greater than or equal to 1 for any of the aforementioned exposure paths.

$$\frac{C_1}{CTAL_1} + \frac{C_2}{CTAL_2} + \dots + \frac{C_n}{CTAL_n} > 1$$

(Source: S.D. N° 148/2003 Ministry of Health).

**Air Pollutant:** Any substance in the air which, at a specified concentration, may cause harm to humans, animals, plants or materials. This can include almost any natural or artificial compound of floating matter which can be transported through the air. Such pollutants can be found as solid particulates, liquid drops, gases or combinations of these. They are generally classified into two major groups: 1) Those emitted directly by identifiable sources and 2) those produced in the air by the interaction of two or more primary contaminants, or by a reaction with normal atmospheric compounds, with or without photoactivation. Excluding naturally occurring pollen, mist and dust, around 100 pollutants have been identified and placed within the following categories: Solids, sulphur components, volatile organic chemicals, nitrogen compounds, oxygen compounds, halogen compounds, radioactive compounds and odors.

(Source: TERRAM Foundation).



**Article 86.** The only disposal operations which may be used for hazardous waste are those listed below:

A) Operations which do not lead to resource recovery, recycling, regeneration, reuse or other uses:

A.1 Permanent deposit below or above ground (for example: In underground mines)..

A.2 Treatment in the soil (for example: Biodegradation of liquid wastes or sludge in the ground, etc.).

A.3 Hazardous waste landfills.

A.4 Biological treatment not specified in another operation listed in this article which leads to final compounds or mixtures which are disposed of via any of the operations indicated in this table.

A.5 Physicochemical treatment not specified in another operation listed in this article which leads to final compounds or mixtures which are disposed of through any of the operations indicated in this table (for example: Evaporation, drying, calcination, neutralization, precipitation, etc.)..

A.6 Underground incineration.

A.7 Long term waste storage.

B) Operations which can lead to resource recovery, recycling, regeneration, reuse or other uses:

B.1 Use as a fuel, which are not used in direct incineration, or other forms of generating energy.

B.2 Solvent recovery or regeneration.

B.3 Recycling or recovery of organic substances which are not used as solvents.

B.4 Metal and metallic compound recovery and regeneration..

B.5 Recycling or recovery of other inorganic materials..

B.6 Acid and base regeneration.

B.7 Recovery of components used to reduce pollution.

B.8 Recovery of components from catalytic converters.

B.9 Recovery or reuse of used oil.

B.10 Soil treatment for agriculture or ecological improvement.

B.11 Use of hazardous waste resulting from any of the operations listed in B.1 through B.10.

B.12 Exchange of wastes in order to subject them to any of the operations listed in B.1 through B.11.

**Biodiversity or Biological Diversity:** The variability of living organisms which are part of all terrestrial and aquatic ecosystems. This includes the diversity within a same species, between species and among ecosystems.

(Source: Law N° 19.300 de Environmental Framework Law).

**Carrier:** A person who takes on the obligation of transporting certain types of hazardous waste.

(Source: S.D. N° 148/2003 Ministry of Health).

**Cancerigenic or Carcinogenic:** A substance capable of inducing cancer.

(Source: S.D. N° 148/2003 Ministry of Health).

**Chronic Toxicity:** Waste has the characteristic of having chronic toxicity in the following cases:

- a) If it contains a substance which is not included in Article 89 of the Sanitary Regulation on Hazardous Waste Management, which has been declared chronic by a supreme decree of the Ministry of Health for posing cumulative, carcinogenic, mutagenic or teratogenic toxic effects on humans. The sanitary authorities must support their decision with national or foreign scientific studies.
- b) When it contains a substance included in Article 89 of the Sanitary Regulation on Hazardous Waste Management which is carcinogenic and whose concentration in the waste, expressed as a percentage, is higher than CTAL/1000, where CTAL is the Limit for Acute Toxic Concentrations of said substance.
- c) If it contains one of the substances which pose cumulative, teratogenic or mutagenic effects included in Article 89 of the Sanitary Regulation on Hazardous Waste Management whose concentration in the waste, expressed as a percentage, is higher than CTAL/100, where CTAL is the Limit for Acute Toxic Concentrations of the chronically toxic substance.

For the purposes of letters b) and c) preceding, the Ministry of Health shall establish, through a supreme

decree, those substances in Article 89 of the Health Regulation on Hazardous Waste Management which have carcinogenic effects. When waste contains more than one toxic substance, it shall be considered chronically toxic if:

- d) The sum of the percentage concentrations of the cancerogenic substances in the waste divided by their respective Limit for Acute Toxic Concentrations (CTAL) is higher than or equal to 0.001.

$$\frac{C_1}{CTAL_1} + \frac{C_2}{CTAL_2} + \dots + \frac{C_n}{CTAL_n} > 0,001$$

- e) The sum of the percentage concentrations of substances with cumulative, teratogenic or mutagenic effects divided by their respective Limit for Acute Toxic Concentrations (CTAL) is equal to or greater than 0.01.

$$\frac{C_1}{CTAL_1} + \frac{C_2}{CTAL_2} + \dots + \frac{C_n}{CTAL_n} > 0,01$$

(Source: S.D. N° 148/2003 Ministry of Health).

**Container:** Portable recipient for storing, transporting or disposing of waste.

(Source: S.D. N° 148/2003 Ministry of Health).

**Corrosivity:** Chemical process caused by certain substances which erode solids or that can produce lesions of lesser or greater seriousness to living tissue. A type of waste may be corrosive if it has any of the following properties:

- a) It is aqueous and has a pH of 2 or less or 12.5 or greater;
- b) It corrodes steel (SAE 1020) at a rate higher than 6.35 mm per year, at a temperature of 55 °C, according to the Corrosion Rate Method.

(Source: S.D. N° 148/2003 Ministry of Health).

**Diffuse Source:** Contaminant-emitting sources which are not located in a specific place, but can encompass large areas, such as for example unpaved roads which generate dust.

(Source: www.retc.cl).

**Disposal:** Any of the operations listed in Article 86 of Supreme Decree N° 148/2003, which approves the Sanitary Regulation on Hazardous Waste Management, to dispose of hazardous waste.

(Source: S.D. N° 148/2003 Ministry of Health).

**Disposal Facility:** A plant or structure designed for disposal of hazardous waste.

(Source: S.D. N° 148/2003 Ministry of Health).

**Emission Source (of Liquid Waste):** The facility which discharges liquid waste to one or more recipient bodies of water, as a result of its process, activity or service, with an average daily pollutant load or with a characteristic value higher in one or more of the parameters indicated in Supreme Decree N° 90/2000 of the Ministry Secretary General of the Presidency.

(Source: S.D. N° 90/2000 Ministry Secretary General of the Presidency).

**Emission Standards:** Standards which establish the maximum quantity allowed of a pollutant. This is measured in the effluent of the emissions source.

(Source: Law N° 19.300 Environmental Framework Law).

**Environment:** The global system comprised of natural and artificial elements of a physical, chemical, biological or sociocultural nature and their interaction which are in an ongoing process of modification by human or natural action and which governs and conditions the existence and development of life in its many forms.

(Source: Law N° 19.300 Environmental Framework Law).

**Environmental Education:** An ongoing, interdisciplinary process, the purpose of which is to train citizens to recognize values, clarify concepts and develop skills and attitudes necessary for harmonious coexistence between humans, their culture and their surrounding biophysical environment.

(Source: Law N° 19.300 de Environmental Framework Law).

**Environmental Protection:** The set of policies, plans, programs, regulations and actions destined to

improve the environment and prevent and control its deterioration.

(Source: Law N° 19.300 Environmental Framework Law).

**Extrinsic Toxicity:** Waste will have an extrinsic toxicity when its disposal could result in one or more acutely or chronically toxic substances in concentrations which would put people's health at risk. When the waste is disposed of through final underground disposal, the respective waste shall be considered to have this characteristic when the Leaching Toxicity Test shows, for any of the substances mentioned, concentrations higher than those indicated in the Sanitary Regulation on Hazardous Waste Management.

(Source: S.D. N° 148/2003 Ministry of Health).

**Environmental Impact Assessment (EIA):** Document which describes in detail the characteristics of a project or activity which is to be carried out or its modification. The document must provide well-supported background information to predict, identify and interpret its environmental impact and describe the action(s) to be carried out in order to prevent and minimize its significantly adverse effects.

(Source: Law N° 19.300 Environmental Framework Law).

**Environmental Impact Declaration:** The document describing an activity or project proposed for development, or describing the modifications to a project, and submitted under oath by the project's respective owner. The content of the declaration enables the competent organism to assess whether its environmental impact complies with current environmental regulations.

(Source: Law N° 19.300 Environmental Framework Law).

**Final Disposal:** Disposal procedure consisting of the permanent burial of hazardous waste in the ground, with or without prior treatment.

(Source: S.D. N° 148/2003 Ministry of Health).

**Flammability:** The capacity to begin combustion caused by a local increase in temperature. This

phenomenon turns into combustion when the ignition temperature is reached.

Waste has the characteristic of flammability if it has any of the following properties:

- a) It is liquid and has a flash point lower than 61 °C in closed cup tests, or no higher than 65.6 °C in open cup tests. Aqueous solutions with a concentration of alcohol in volume lesser than or equal to 24% are not included in this definition.
- b) It is not a liquid and is capable of generating, under standard pressure and temperature conditions (1 atm. and 25 °C), fire due to friction, absorption of moisture or spontaneous chemical changes and, when it ignites, it does so vigorously and persistently so as to create a hazardous situation.
- c) It is a flammable compressed gas. It is said that a gas, or mixture of gases, is flammable when, upon combining with air, they create a mixture which has a flash point lower than 61 °C.
- d) It is an oxidizing substance, such as a chlorate, permanganate, inorganic peroxide or nitrate which generates oxygen quickly enough to stimulate combustion of organic material.

(Source: S.D. N° 148/2003 Ministry of Health).

**Handling:** All of the operations to which a hazardous waste is subjected after its generation, including, among others, storage, transport and disposal.

(Source: S.D. N° 148/2003 Ministry of Health).

**Hazardous Waste:** Waste or mixtures of waste which pose a risk to public health and/or adverse effects on the environment, whether directly or due to current or projected management, as a consequence of featuring some of the characteristics listed in Article 11 of the Sanitary Regulation on Hazardous Waste Management.

(Source: S.D. N° 148/2003 Ministry of Health).

**Hazardous Waste Generator:** Owner of any facility or activity which generates hazardous waste.

(Source: S.D. N° 148/2003 Ministry of Health).

**Hazardous Waste Landfill:** Disposal facility used for final disposal of hazardous waste in the ground, designed, built and operated complying with specific requirements established in the Sanitary Regulation on Hazardous Waste Management.

(Source: S.D. N° 148/2003 Ministry of Health).

**Incineration:** Destruction of the organic substances contained in waste by combustion or technically controlled burning.

(Source: S.D. N° 148/2003 Ministry of Health).

**Incompatible Waste:** Wastes which upon coming into contact with each other can generate some of the effects described in Article 87 of the Sanitary Regulation on Hazardous Waste Management.

(Source: S.D. N° 148/2003 Ministry of Health).

**Industrial Facility:** A productive unit, permanently located in one place and controlled by a single owner, which carries out transformation, processing, preparation, assembly or production, either total or partial, of one or more products.

(Source: TERRAM Foundation).

**Industrial Facility:** A facility in which an economic activity is carried out which produces a transformation of raw material or materials used, creating new products, or which in its fractionation, manipulation or cleaning operations does not produce any kind of transformation of its essence. This concept includes industries, artisan workshops and small industries which discharge effluent with an average daily pollutant load, measured in conditions of maximum generation of contaminant load and before any type of treatment, higher than the equivalent to what is indicated in Supreme Decree N° 609/1998 of the Ministry of Public Works.

(S.D. N° 3.592/2000 MOP).

**Latent Zone:** A zone in which the level of concentration of pollutants in the air, water or soil is between 80% and 100% of the value of the respective environmental quality standard.

(Source: Law N° 19.300 Environmental Framework Law).

**Leached Liquid:** Liquid which has percolated or drained through a waste and contains soluble components of that waste.

(Source: S.D. N° 148/2003 Ministry of Health).

**Lethal Concentration 50 (LC50):** Concentration of vapor, mist or dust which, administered via continuous inhalation during an hour to a group of young adult albino rats, male and female, it causes, with maximum probability, the death of half of the animals in the group within a period of 14 days.

(Source: S.D. N° 148/2003 Ministry of Health).

**Lethal Dose 50 (LD50) by Cutaneous Absorption:** Concentration of the substance which, administered through continuous contact to a group of albino rabbits, causes, with maximum probability, the death of at least half of the animals in the group within 14 days.

(Source: S.D. N° 148/2003 Ministry of Health).

**Lethal Dose 50 (LD50) by Ingestion:** Concentration of the substance which, administered orally to a group of young adult albino rats, male and female, causes, with maximum probability, the death of half of the animals in the group within 14 days.

(Source: S.D. N° 148/2003 Ministry of Health).

**Liquid Waste Discharges:** The discharge or spilling of liquid waste into a recipient body of water as the result of a process, activity or service of an emission source.

(Source: S.D. N° 90/2000 Ministry Secretary General of the Presidency).

**Material Safety Data Sheet (MSDS) for the Transportation of Hazardous Wastes:** Document to transfer information about the essential characteristics and levels of risk to humans and the environment presented by hazardous waste, including aspects of transport, handling, storage and actions in the event of an emergency from the point at which a hazardous waste load is delivered by the generator to a means of transportation until it is received by the final recipient.

(Source: S.D. N° 148/2003 Ministry of Health).

**Minimization:** Actions to prevent, reduce or diminish in their origin the quantity and/or danger of generated hazardous waste. This includes measures such as reducing generation, concentration and recycling.

(Source: S.D. N° 148/2003 Ministry of Health).

**Mutagen:** A substance which induces any hereditary alteration in genetic material.

(Source: S.D. N° 148/2003 Ministry of Health).

**Mobile Source:** Motor vehicles, rail motor car, airplanes, mobile equipment or machinery with combustion or similar engines, and which during their operation emit or can emit contaminants into the atmosphere.

(Source: www.retc.cl).

**PM 10:** Solid or liquid particulates, such as dust, ash, soot, metallic particulates, cement or pollen, suspended in the air, whose diameter is less than 10 µm (1 micrometer is one-thousandth of 1 millimeter).

(Source: www.retc.cl).

**PM 2.5:** Those particulates with a diameter less than or equal to 2.5 micrometers. Their size makes them 100% inhalable thus they penetrate the respiratory system and become deposited in the alveoli of the lungs.

(Source: www.retc.cl).

**Pollutant:** Every element, compound, substance, chemical or biological derivative, energy, radiation, vibration, noise or combination of these, whose presence in the environment, at certain levels, concentrations or for periods of time may constitute a risk to human health, people's quality of life, preservation of nature, or to the conservation of our environmental heritage.

(Source: Law N° 19.300 Environmental Framework Law).

**Pollution:** The presence in the environment of substances, elements, energy or a combination of these, in concentrations and permanence, higher or lower, than the levels established in current legislation.

(Source: Law N° 19.300 Environmental Framework Law).

**Pollution-Free Environment:** An environment in which pollutants are found in concentrations and during periods lower than those which may pose a risk to human health, to people's quality of life, to the preservation of nature or the preservation of our environmental heritage.

(Source: Law N° 19.300 Environmental Framework Law).

**Primary Environmental Quality Standard:** Standard which establishes the values of concentrations and maximum and minimum permissible time periods for compound elements, substances, chemical or biological derivatives, energy types, radiations, vibrations, noises or combinations of these whose presence or absence in the environment may pose a risk to the life or health of the population.

(Source: Law N° 19.300 Environmental Framework Law).

**Pollutant Release and Transfer Register (PRTR):** A catalog or database containing periodic, updated information about chemical substances which contaminate or are potentially harmful to health and the environment, which are emitted directly into the ground, air or water by industrial facilities or other activities such as transport or agriculture. It also contains information about treatment or disposal of hazardous waste (transfers).

(Source: www.retc.cl).

**Reactivity:** The potential of waste to react chemically, violently releasing energy and/or toxic compounds, whether through decomposition or a combination with other substances. Waste will have a reactive characteristic if it has any of the following properties:

- a) It is usually unstable and easily suffers violent changes without detonating.
- b) It reacts violently with water.
- c) It forms explosive mixtures with water.
- d) When mixed or placed in contact with water, it produces gases, vapors or toxic smoke in quantities large enough to present a danger to human health.
- e) It contains cyanides or sulphides and upon exposure to pH conditions between 2 and 12.5

can produce gases, vapors or toxic smoke in quantities large enough to represent a danger to human health.

- f) When it is capable of detonating or exploding due to the action of an activating energy source or when it is heated in a confined manner
- g) When it is capable of detonating, explosively decomposing or reacting easily under standard temperature and pressure conditions (1 atm and 25° C).
- h) When it is classified as explosive by current legislation and regulations.

(Source: S.D. N° 148/2003 Ministry of Health).

**Recipient Bodies of Water or Recipient Body:** A natural or artificial course or volume of water, either marine or on the surface of land, which receives liquid waste discharge. This definition does not include artificial bodies of water which contain, store or treat tailings and/or rainwater or liquid waste from an industrial or mining process.

(Source: S.D. N° 90/2000 Ministry Secretary General of the Presidency).

**Recipient:** Owner, administrator or person responsible for a facility which is expressly authorized to dispose of hazardous waste generated at other sites.

(Source: S.D. N° 148/2003 Ministry of Health).

**Recycling:** Recovery of hazardous waste or materials present in them, through the operations listed in Article 86, letter B of the Sanitary Regulation on Hazardous Waste Management, to be used in their original form or after transformation to manufacture other products in production processes other than the one that generated the waste.

(Source: S.D. N° 148/2003 Ministry of Health).

**Reporting Unit:** Unit of measurement (length, mass, volume, etc.) used to report quantities of pollutants. Usually units of the metric system are used, such as: tons (t) or kilograms (kg) for weight; cubic meters (m<sup>3</sup>) for volume; megajoules per hour (MJ/hr) for energy.

(Source: Fundación TERRAM).



**Reuse:** Recovery of hazardous waste or materials present in them through the operations listed in Article 86, letter B of the Sanitary Regulation on Hazardous Waste Management, to be used in their original form or after transformation as a substitute raw material in the production process which generated them.

(Source: S.D. N° 148/2003 Ministry of Health).

**Risk:** Probability that harm will occur.

(Source: S.D. N° 148/2003 Ministry of Health).

**Saturated Zone:** A zone in which one or more environmental quality standards is exceeded.

(Source: Law N° 19.300 Environmental Framework Law).

**Secondary Environmental Quality Standard:** Standard which establishes the values of concentrations and maximum and minimum permissible time periods for substances, elements, energy types or combinations of these, whose presence or absence in the environment may pose a risk to environmental preservation or conservation or nature preservation.

(Source: Law N° 19.300 Environmental Framework Law).

**Sewage Treatment System, Sewage Treatment Plant:**

The set of physical, chemical, biological operations and processes, or a combination of them, whether natural or artificial, possible to control, which are developed in facilities designed and built according to specific technical criteria for these types of works and whose purpose is to reduce the pollutant load of wastewater in order to adequate it to the discharge requirements of the recipient body. This concept also includes, among others, stabilization lagoons, activated sludge and submarine emissaries approved by the competent authority.

(Source: S.D. N° 3.592/2000 MOP).

**Sludge:** Any semisolid waste which has been generated by effluent treatment plants which discharge into the atmosphere, from sewage, liquid industrial waste or drinking-water. Waste in the form of sludge, mud or sediments from processes, equipment, or

industrial units or any type of activity are included in this definition.

(Source: S.D. N° 148/2003 Ministry of Health).

**Solidification:** Process in which certain materials are added to waste to convert them into a solid, to reduce the mobility of pollutants or to improve their handling and physical properties. The process may or may not involve the chemical mixture of a waste, its pollutants and the binding material.

(Source: S.D. N° 148/2003 Ministry of Health).

**Stabilization:** Process through which a waste is converted to a more stable chemical form, which may include solidification when this produces chemical changes to reduce the mobility of pollutants.

(Source: S.D. N° 148/2003 Ministry of Health).

**State Agency with Environmental Competence:**

Ministry, public agency, organism or institution, la created to fulfill a public function, which grants any of the sectoral environmental permits described in this Regulation, or which has legal attributes directly related to environmental protection, nature preservation, the use and management of a natural resource and/or inspection of compliance with standards and conditions on which the qualification resolution of a project or activity is based.

(Source: S.D. N° 95 de 2001 Ministry Secretary General of the Presidency).

**Stationary Source:** All facilities or activities established in one place or area, that carries out operations or industrial, commercial and/or service processes which emit or can emit contaminants into the air, water or soil.

(Source: www.retc.cl).

**Storage or Accumulation:** Refers to the conservation of wastes at a site for a specified period.

(Source: Supreme Decree N° 148/2003 Ministry of Health).

**Sustainable Development:** The sustained and equitable process of improvement in human quality of life, founded on appropriate measures of environmental

conservation and protection, without compromising the expectations of future generations.

(Source: Law N° 19,300 Environmental Framework Law).

**Teratogen:** An agent which can disturb the development of an embryo or fetus causing a malformation..

(Source: S.D. N° 148/2003 Ministry of Health).

**Toxicity:** Capacity of a substance to be lethal in low concentrations or to produce cumulative, carcinogenic, mutagenic or teratogenic toxic effects.

(Source: S.D. N° 148/2003 Ministry of Health).

**Transfers:** The transfer of contaminants to a place which is physically separate from the place where they were generated. This includes among others:

- a) discharge of wastewater into the public sewer system;
- b) transfers for recycling, recovery or regeneration;

- c) transfers for recovery of energy outside of the generating facility, and
- d) transfers for treatments such as neutralization, biological treatment, incineration or physical separation.

(Source: CONAMA, Estudio "Diseño del Sistema Nacional de Registro de Emisiones y Transferencias de Contaminantes Etapa III").

**Treatment:** All processes designed to change the physical and/or chemical characteristics of hazardous waste in order to neutralize them, recover energy or materials, or eliminate or reduce their hazard level.

(Source: S.D. N° 148/2003 Ministry of Health).

**Waste or Refuse:** Substance, element or object which the generator disposes of, plans to dispose of or is required to dispose of.

(Source: S.D. N° 148/2003 Ministry of Health).



## APPENDIX N° 3 LIST OF PRTR POLLUTANTS

| ID | Parameter                                                        | SD 185/91 MINING | SD 165/98 MINSEGPRES | SD 167/99 MINSEGPRES | SD 4/92 MINSAL | Res 1583/1992 MINSAL | SD 138/2005 MINSAL | SD 46/2002 MINSEGPRES | SD 90/2000 MINSEGPRES | SD 609/98 MOP | SD 148/2004 MINSAL List I | SD 148/2004 MINSAL List II | SD 148/2004 MINSAL List III | Stockholm Convention | Kyoto Protocol | Montreal Protocol (ODS) | cas_number | Substance generating activities | Family of Substance group | Specific Substance | Physical parameters | Biological Parameters |
|----|------------------------------------------------------------------|------------------|----------------------|----------------------|----------------|----------------------|--------------------|-----------------------|-----------------------|---------------|---------------------------|----------------------------|-----------------------------|----------------------|----------------|-------------------------|------------|---------------------------------|---------------------------|--------------------|---------------------|-----------------------|
| 1  | Residual mineral oils unfit for intended use                     | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       | 1          | 0                               | 0                         | 0                  | 0                   | 0                     |
| 2  | Oils and fats                                                    | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 0          | 1                               | 0                         | 0                  | 0                   | 0                     |
| 3  | Sulfurated hydrogen / hydrogen sulfide (or Total Reduced Sulfur) | 0                | 0                    | 1                    | 0              | 0                    | 1                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7783-06-4  | 0                               | 0                         | 1                  | 0                   | 0                     |
| 4  | Aldrin                                                           | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 1                    | 0              | 0                       | 309-00-2   | 0                               | 0                         | 1                  | 0                   | 0                     |
| 5  | Aluminum                                                         | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7429-90-5  | 0                               | 0                         | 1                  | 0                   | 0                     |
| 6  | Arsenic                                                          | 1                | 1                    | 0                    | 0              | 0                    | 1                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7440-38-2  | 0                               | 0                         | 1                  | 0                   | 0                     |
| 7  | Arsenic, arsenic compounds                                       | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 8  | Benzene                                                          | 0                | 0                    | 0                    | 0              | 0                    | 1                  | 1                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 71-43-2    | 0                               | 0                         | 1                  | 0                   | 0                     |
| 9  | Beryllium, beryllium compounds                                   | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 10 | Polychlorinated biphenyl (PCB)                                   | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 1                    | 0              | 0                       | 1336-36-3  |                                 |                           |                    |                     | Industrial chemicals  |

| ID | Parameter                                            | SD 185/91 MINING | SD 165/98 MINSEGPRES | SD 167/99 MINSEGPRES | SD 4/92 MINSAL | Res 1583/1992 MINSAL | SD 138/2005 MINSAL | SD 46/2002 MINSEGPRES | SD 90/2000 MINSEGPRES | SD 609/98 MOP | SD 148/2004 MINSAL List I | SD 148/2004 MINSAL List II | SD 148/2004 MINSAL List III | Stockholm Convention | Kyoto Protocol | Montreal Protocol (SAO) | cas_number | Substance generating activities | Family of Substance group | Specific Substance | Physical parameters | Biological Parameters |
|----|------------------------------------------------------|------------------|----------------------|----------------------|----------------|----------------------|--------------------|-----------------------|-----------------------|---------------|---------------------------|----------------------------|-----------------------------|----------------------|----------------|-------------------------|------------|---------------------------------|---------------------------|--------------------|---------------------|-----------------------|
| 11 | Boron                                                | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7440-42-8  | 0                               | 0                         | 1                  | 0                   | 0                     |
| 12 | Bromochloromethane, Appendix C, Group III            | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 1                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 13 | Methyl bromide, Appendix E, Group I                  | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 1                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 14 | Cadmium                                              | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7440-43-9  | 0                               | 0                         | 1                  | 0                   | 0                     |
| 15 | Cadmium, cadmium compounds                           | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 16 | Used catalysts                                       | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 1                           | 0                    | 0              | 0                       |            | 0                               | 0                         | 0                  | 0                   | 0                     |
| 17 | Fully halogenated CFCs (others), Appendix B, Group I | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 1                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 18 | Cyanide                                              | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 57-12-5    | 0                               | 0                         | 1                  | 0                   | 0                     |
| 19 | Inorganic cyanides                                   | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 20 | Organic cyanides                                     | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 21 | Chlordane                                            | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 1                    | 0              | 0                       | 57-74-9    | 0                               | 0                         | 1                  | 0                   | 0                     |
| 22 | Chlorofluorocarbons (CFCs), Appendix A, Group I      | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 1                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |

| ID | Parameter                                                  | SD 185/91 MINING | SD 165/98 MINSEGPRES | SD 167/99 MINSEGPRES | SD 4/92 MINSAL | Res 1583/1992 MINSAL | SD 138/2005 MINSAL | SD 46/2002 MINSEGPRES | SD 90/2000 MINSEGPRES | SD 609/98 MOP | SD 148/2004 MINSAL List 1 | SD 148/2004 MINSAL List 11 | SD 148/2004 MINSAL List 111 | Stockholm Convention | Kyoto Protocol | Montreal Protocol (SAO) | cas_number | Substance generating activities | Family of Substance group | Specific Substance | Physical parameters | Biological Parameters |
|----|------------------------------------------------------------|------------------|----------------------|----------------------|----------------|----------------------|--------------------|-----------------------|-----------------------|---------------|---------------------------|----------------------------|-----------------------------|----------------------|----------------|-------------------------|------------|---------------------------------|---------------------------|--------------------|---------------------|-----------------------|
| 23 | Chlorides                                                  | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 24 | Copper                                                     | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7440-50-8  | 0                               | 0                         | 1                  | 0                   | 0                     |
| 25 | Copper, copper compounds                                   | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 26 | Fecal or thermotolerant coliforms                          | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 0                         | 0                  | 0                   | 1                     |
| 27 | Antimony compounds                                         | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 28 | Hexavalent chromium compounds                              | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 29 | Mercury compounds                                          | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 30 | Lead compounds                                             | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 31 | Selenium compounds                                         | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 32 | Zinc compounds                                             | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            |                                 |                           |                    |                     |                       |
| 33 | Non-organic flourine compounds, excluding calcium flourine | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 34 | Phosphorus organic compounds                               | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 35 | Volatile Organic Compounds                                 | 0                | 0                    | 0                    | 0              | 0                    | 1                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |

| ID | Parameter                                                | SD 185/91 MINING | SD 165/98 MINSECPRES | SD 167/99 MINSECPRES | SD 4/92 MINSAL | Res 1583/1992 MINSAL | SD 138/2005 MINSAL | SD 46/2002 MINSECPRES | SD 90/2000 MINSECPRES | SD 609/98 MOP | SD 148/2004 MINSAL List 1 | SD 148/2004 MINSAL List 11 | SD 148/2004 MINSAL List 111 | Stockholm Convention | Kyoto Protocol | Montreal Protocol (SAO) | cas_number | Substance generating activities | Family of Substance group | Specific Substance | Physical parameters | Biological Parameters                |
|----|----------------------------------------------------------|------------------|----------------------|----------------------|----------------|----------------------|--------------------|-----------------------|-----------------------|---------------|---------------------------|----------------------------|-----------------------------|----------------------|----------------|-------------------------|------------|---------------------------------|---------------------------|--------------------|---------------------|--------------------------------------|
| 36 | Hexavalent chromium                                      | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 18540-29-9 | 0                               | 0                         | 1                  | 0                   | 0                                    |
| 37 | Total Chromium                                           | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7440-47-3  | 0                               | 0                         | 1                  | 0                   | 0                                    |
| 38 | Any substance in the polychlorinated dibenzofurans group | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                                    |
| 39 | DBO5                                                     | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 0                         | 0                  | 0                   | 0                                    |
| 40 | DDT (1,1,1-Trichloro-2,2-bis(4-chlorophenyl) ethane)     | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 1                    | 0              | 0                       | 50-29-3    | 0                               | 1                         | 0                  | 0                   | 0                                    |
| 41 | Polychlorinated dibenzofurans (PCDF)                     | 0                | 0                    | 0                    | 0              | 0                    | 1                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 1                    | 0              | 0                       |            |                                 |                           |                    |                     | Unintentional industrial by-products |
| 42 | Polychlorinated dibenzodioxins (PCDF)                    | 0                | 0                    | 0                    | 0              | 0                    | 1                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 1                    | 0              | 0                       |            |                                 |                           |                    |                     | Unintentional industrial by-products |
| 43 | Dieldrin                                                 | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 1                    | 0              | 0                       | 60-57-1    | 0                               | 1                         | 0                  | 0                   | 0                                    |
| 44 | Sulfur dioxide (SO <sub>2</sub> )                        | 1                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                                    |
| 45 | Carbon dioxide (CO <sub>2</sub> )                        | 0                | 0                    | 0                    | 0              | 0                    | 1                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 1              | 0                       | 124-38-9   | 0                               | 0                         | 1                  | 0                   | 0                                    |
| 46 | Nitrogen dioxide (NO <sub>2</sub> )                      | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 1              | 0                       |            | 0                               | 0                         | 1                  | 0                   | 0                                    |

| ID | Parameter                                                                                       | SD 185/91 MINING | SD 165/98 MINSEGPRES | SD 167/99 MINSEGPRES | SD 4/92 MINSAL | Res 1583/1992 MINSAL | SD 138/2005 MINSAL | SD 46/2002 MINSEGPRES | SD 90/2000 MINSEGPRES | SD 609/98 MOP | SD 148/2004 MINSAL List 1 | SD 148/2004 MINSAL List 11 | SD 148/2004 MINSAL List 111 | Stockholm Convention | Kyoto Protocol | Montreal Protocol (SAO) | cas_number | Substance generating activities | Family of Substance group | Specific Substance | Physical parameters | Biological Parameters |                      |
|----|-------------------------------------------------------------------------------------------------|------------------|----------------------|----------------------|----------------|----------------------|--------------------|-----------------------|-----------------------|---------------|---------------------------|----------------------------|-----------------------------|----------------------|----------------|-------------------------|------------|---------------------------------|---------------------------|--------------------|---------------------|-----------------------|----------------------|
| 47 | Endrin                                                                                          | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 1                    | 0              | 0                       | 72-20-8    | 0                               | 0                         | 1                  | 0                   | 0                     | Pesticide            |
| 48 | Polluted containers and vessels that have contained one or more compounds listed in Category II | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 1                           | 0                    | 0              | 0                       |            | 0                               | 0                         | 0                  | 0                   | 0                     | Others               |
| 49 | Tin                                                                                             | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7440-31-5  | 0                               | 0                         | 1                  | 0                   | 0                     |                      |
| 50 | Esters                                                                                          | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |                      |
| 51 | Phenols, phenolic compounds, including chlorophenols                                            | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |                      |
| 52 | Fluorides                                                                                       | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 16984-48-8 | 0                               | 0                         | 1                  | 0                   | 0                     |                      |
| 53 | Total Phosphorus                                                                                | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7723-14-0  | 0                               | 0                         | 1                  | 0                   | 0                     |                      |
| 54 | Halons, Appendix A, Group II                                                                    | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 1                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |                      |
| 55 | Heptachlor                                                                                      | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 1                    | 0              | 0                       | 76-44-8    | 0                               | 0                         | 1                  | 0                   | 0                     | Pesticide            |
| 56 | Hexachlorobenzene                                                                               | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 1                    | 0              | 0                       | 118-74-1   | 0                               | 0                         | 1                  | 0                   | 0                     | Industrial chemicals |

| ID | Parameter                                                       | SD 185/91 MINING | SD 165/98 MINSEGPRES | SD 167/99 MINSEGPRES | SD 4/92 MINSAL | Res 1583/1992 MINSAL | SD 138/2005 MINSAL | SD 46/2002 MINSEGPRES | SD 90/2000 MINSEGPRES | SD 609/98 MOP | SD 148/2004 MINSAL List 1 | SD 148/2004 MINSAL List 11 | SD 148/2004 MINSAL List 111 | Stockholm Convention | Kyoto Protocol | Montreal Protocol (SAO) | cas_number | Substance generating activities | Family of Substance group | Specific Substance | Physical parameters | Biological Parameters |
|----|-----------------------------------------------------------------|------------------|----------------------|----------------------|----------------|----------------------|--------------------|-----------------------|-----------------------|---------------|---------------------------|----------------------------|-----------------------------|----------------------|----------------|-------------------------|------------|---------------------------------|---------------------------|--------------------|---------------------|-----------------------|
| 57 | Sulfur hexafluoride (SF <sub>6</sub> )                          | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 1              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 58 | Hydrobromofluorocarbons (HBFC), Appendix C, Group II            | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 1                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 59 | Stable hydrocarbons                                             | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 60 | Total hydrocarbons                                              | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 61 | Volatile hydrocarbons                                           | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 62 | Hydrochlorofluorocarbons (HCFCs), Appendix C, Group I           | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 1                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 63 | Hydrofluorocarbons (HFC)                                        | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 1              | 0                       |            | 1                               | 0                         | 0                  | 0                   | 0                     |
| 64 | Iron / dissolved iron                                           | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 15438-31-0 | 0                               | 0                         | 1                  | 0                   | 0                     |
| 65 | Phenol rate                                                     | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 66 | Manganese                                                       | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7439-96-5  | 0                               | 0                         | 1                  | 0                   | 0                     |
| 67 | Mercury                                                         | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7439-97-6  | 0                               | 0                         | 1                  | 0                   | 0                     |
| 68 | Carbonyl metals                                                 | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           |                      |                | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 69 | Methane (CH <sub>4</sub> )                                      | 0                | 0                    | 0                    | 0              | 0                    | 1                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 1              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 70 | Methylchloroform (1,1,1-trichloroethane), Appendix B, Group III | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 1                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 71 | Mirex                                                           | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 1                    | 0              | 0                       | 2385-85-5  | 0                               | 1                         | 0                  | 0                   | 0                     |

| ID | Parameter                                                                                         | SD 185/91 MINING | SD 165/98 MINSEGPRES | SD 167/99 MINSEGPRES | SD 4/92 MINSAL | Res 1583/1992 MINSAL | SD 138/2005 MINSAL | SD 46/2002 MINSEGPRES | SD 90/2000 MINSEGPRES | SD 609/98 MOP | SD 148/2004 MINSAL List 1 | SD 148/2004 MINSAL List 11 | SD 148/2004 MINSAL List 111 | Stockholm Convention | Kyoto Protocol | Montreal Protocol (SAO) | cas_number | Substance generating activities | Family of Substance group | Specific Substance | Physical parameters | Biological Parameters |
|----|---------------------------------------------------------------------------------------------------|------------------|----------------------|----------------------|----------------|----------------------|--------------------|-----------------------|-----------------------|---------------|---------------------------|----------------------------|-----------------------------|----------------------|----------------|-------------------------|------------|---------------------------------|---------------------------|--------------------|---------------------|-----------------------|
| 72 | Molybdenum                                                                                        | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7439-98-7  | 0                               | 0                         | 1                  | 0                   | 0                     |
| 73 | Carbon monoxide                                                                                   | 0                | 0                    | 0                    | 0              | 0                    | 1                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 630-08-0   | 0                               | 0                         | 1                  | 0                   | 0                     |
| 74 | PM 10                                                                                             | 0                | 0                    | 0                    | 0              | 0                    | 1                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 75 | Nickel                                                                                            | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7440-02-0  | 0                               | 0                         | 1                  | 0                   | 0                     |
| 76 | Nitrite plus Nitrate (and NO <sub>x</sub> )                                                       | 0                | 0                    | 0                    | 0              | 0                    | 1                  | 1                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 77 | Ammoniacal nitrogen (or NH <sub>3</sub> )                                                         | 0                | 0                    | 0                    | 0              | 0                    | 1                  | 0                     | 0                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 0                         | 1                  | 0                   | 0                     |
| 78 | Total Kjeldahl Nitrogen                                                                           | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 0                         | 1                  | 0                   | 0                     |
| 79 | Ozone                                                                                             | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 80 | Total suspended particles (TSP)                                                                   | 1                | 0                    | 0                    | 1              | 1                    | 1                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 81 | Pentachlorophenol (PCP)                                                                           | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 87-86-5    | 0                               | 0                         | 1                  | 0                   | 0                     |
| 82 | Perfluorocarbons (PFC)                                                                            | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 1              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 83 | Ph                                                                                                | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 0                         | 0                  | 1                   | 0                     |
| 84 | Lead                                                                                              | 0                | 0                    | 0                    | 0              | 0                    | 1                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7439-92-1  | 0                               | 0                         | 1                  | 0                   | 0                     |
| 85 | Foaming power                                                                                     | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 0                         | 0                  | 0                   | 0                     |
| 86 | Asbestos dust and/or fibers, excluding waste from construction material made from asbestos cement | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |

| ID | Parameter                                                                                                              | SD 185/91 MINING | SD 165/98 MINSEGPRES | SD 167/99 MINSEGPRES | SD 4/92 MINSAL | Res 1583/1992 MINSAL | SD 138/2005 MINSAL | SD 46/2002 MINSEGPRES | SD 90/2000 MINSEGPRES | SD 609/98 MOP | SD 148/2004 MINSAL List 1 | SD 148/2004 MINSAL List 11 | SD 148/2004 MINSAL List 111 | Stockholm Convention | Kyoto Protocol | Montreal Protocol (SAO) | cas_number | Substance generating activities | Family of Substance group | Specific Substance | Physical parameters | Biological Parameters |
|----|------------------------------------------------------------------------------------------------------------------------|------------------|----------------------|----------------------|----------------|----------------------|--------------------|-----------------------|-----------------------|---------------|---------------------------|----------------------------|-----------------------------|----------------------|----------------|-------------------------|------------|---------------------------------|---------------------------|--------------------|---------------------|-----------------------|
| 87 | Tarred waste resulting from refining, distillation or any pyrolytic treatment                                          | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       | 1          | 1                               | 0                         | 0                  | 0                   | 0                     |
| 88 | Explosive residues                                                                                                     | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       | 1          | 1                               | 0                         | 0                  | 0                   | 0                     |
| 89 | Waste containing cyanides, resulting from thermal treatment and tempering activities                                   | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       | 1          | 1                               | 0                         | 0                  | 0                   | 0                     |
| 90 | Waste from selective collection or segregation of residential solid waste that have at least one hazard characteristic | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 1                           | 0                    | 0              | 0                       | 0          | 0                               | 0                         | 0                  | 0                   | 0                     |
| 91 | Waste resulting from the manufacturing, preparation and use of chemical products for wood preservation                 | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       | 1          | 1                               | 0                         | 0                  | 0                   | 0                     |



| ID | Parameter                                                                                                                     | SD 185/91 MINING | SD 165/98 MINSEGPRES | SD 167/99 MINSEGPRES | SD 4/92 MINSAL | Res 1583/1992 MINSAL | SD 138/2005 MINSAL | SD 46/2002 MINSEGPRES | SD 90/2000 MINSEGPRES | SD 609/98 MOP | SD 148/2004 MINSAL List 1 | SD 148/2004 MINSAL List 11 | SD 148/2004 MINSAL List 111 | Stockholm Convention | Kyoto Protocol | Montreal Protocol (SAO) | cas_number | Substance generating activities | Family of Substance group | Specific Substance | Physical parameters | Biological Parameters |
|----|-------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------|----------------------|----------------|----------------------|--------------------|-----------------------|-----------------------|---------------|---------------------------|----------------------------|-----------------------------|----------------------|----------------|-------------------------|------------|---------------------------------|---------------------------|--------------------|---------------------|-----------------------|
| 92 | Waste resulting from the manufacturing, preparation and use of biocidal products, phytopharmaceutical products and pesticides | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       | 1          | 1                               | 0                         | 0                  | 0                   | 0                     |
| 93 | Waste resulting from the production and preparation of pharmaceutical products                                                | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       | 1          | 1                               | 0                         | 0                  | 0                   | 0                     |
| 94 | Waste resulting from the production, preparation and use of organic solvents                                                  | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       | 1          | 1                               | 0                         | 0                  | 0                   | 0                     |
| 95 | Waste resulting from the manufacturing, preparation and use of chemicals and materials for photography                        | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       | 1          | 1                               | 0                         | 0                  | 0                   | 0                     |

| ID  | Parameter                                                                                                       | SD 185/91 MINING | SD 165/98 MINSEGPRES | SD 167/99 MINSEGPRES | SD 4/92 MINSAL | Res 1583/1992 MINSAL | SD 138/2005 MINSAL | SD 46/2002 MINSEGPRES | SD 90/2000 MINSEGPRES | SD 609/98 MOP | SD 148/2004 MINSAL List 1 | SD 148/2004 MINSAL List 11 | SD 148/2004 MINSAL List 111 | Stockholm Convention | Kyoto Protocol | Montreal Protocol (SAO) | cas_number | Substance generating activities | Family of Substance group | Specific Substance | Physical parameters | Biological Parameters |
|-----|-----------------------------------------------------------------------------------------------------------------|------------------|----------------------|----------------------|----------------|----------------------|--------------------|-----------------------|-----------------------|---------------|---------------------------|----------------------------|-----------------------------|----------------------|----------------|-------------------------|------------|---------------------------------|---------------------------|--------------------|---------------------|-----------------------|
| 96  | Waste resulting from the production, preparation and use of resins, latex, plasticizer or glues and adhesives   | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 1                               | 0                         | 0                  | 0                   | 0                     |
| 97  | Waste resulting from the production, preparation and use of inks, dyes, pigments, paints, lacquers or varnishes | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 1                               | 0                         | 0                  | 0                   | 0                     |
| 98  | Waste resulting from the surface treatment of metals and plastics                                               | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 1                               | 0                         | 0                  | 0                   | 0                     |
| 99  | Selenium                                                                                                        | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7782-49-2  | 0                               | 0                         | 1                  | 0                   | 0                     |
| 100 | Settling solids                                                                                                 | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 0                         | 0                  | 1                   | 0                     |
| 101 | Total suspended solids                                                                                          | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 0                         | 0                  | 1                   | 0                     |
| 102 | Halogenated organic solvents                                                                                    | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 103 | Organic solvents, excluding halogenated solvents                                                                | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |

| ID  | Parameter                                                                                                                                                                            | SD 185/91 MINING | SD 165/98 MINSECPRES | SD 167/99 MINSECPRES | SD 4/92 MINSAL | Res 1583/1992 MINSAL | SD 138/2005 MINSAL | SD 46/2002 MINSECPRES | SD 90/2000 MINSECPRES | SD 609/98 MOP | SD 148/2004 MINSAL List 1 | SD 148/2004 MINSAL List 11 | SD 148/2004 MINSAL List 111 | Stockholm Convention | Kyoto Protocol | Montreal Protocol (SAO) | cas_number | Substance generating activities | Family of Substance group | Specific Substance | Physical parameters | Biological Parameters |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------|----------------------|----------------|----------------------|--------------------|-----------------------|-----------------------|---------------|---------------------------|----------------------------|-----------------------------|----------------------|----------------|-------------------------|------------|---------------------------------|---------------------------|--------------------|---------------------|-----------------------|
| 104 | SO <sub>x</sub>                                                                                                                                                                      | 0                | 0                    | 0                    | 0              | 0                    | 1                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            |                                 |                           |                    |                     |                       |
| 105 | Soils or matter resulting from earthworks in sites contaminated by one of the components listed in Category II                                                                       | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 1                           | 0                    | 0              | 0                       |            | 0                               | 0                         | 0                  | 0                   | 0                     |
| 106 | Sulfates                                                                                                                                                                             | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 107 | Sulfides                                                                                                                                                                             | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 0                         | 1                  | 0                   | 0                     |
| 108 | Methylene Blue Active Substances (MBAS)                                                                                                                                              | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 0                               | 1                         | 0                  | 0                   | 0                     |
| 109 | Residual chemical substances, non-identified or new, resulting from the investigation and development or teaching activities whose effects for humans or the environment are unknown | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 1                               | 0                         | 0                  | 0                   | 0                     |
| 110 | Substance and waste containing, or contaminated by, polychlorinated biphenyl (PCB), polychlorinated terphenyl (PCT) or polybrominated biphenyl (PBB)                                 | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       |            | 1                               | 0                         | 0                  | 0                   | 0                     |

| ID  | Parameter                                         | SD 185/91 MINING | SD 165/98 MINSECPRES | SD 167/99 MINSECPRES | SD 4/92 MINSAL | Res 1583/1992 MINSAL | SD 138/2005 MINSAL | SD 46/2002 MINSECPRES | SD 90/2000 MINSECPRES | SD 609/98 MOP | SD 148/2004 MINSAL List 1 | SD 148/2004 MINSAL List 11 | SD 148/2004 MINSAL List 111 | Stockholm Convention | Kyoto Protocol | Montreal Protocol (SAO) | cas_number | Substance generating activities | Family of Substance group | Specific Substance | Physical parameters | Biological Parameters |
|-----|---------------------------------------------------|------------------|----------------------|----------------------|----------------|----------------------|--------------------|-----------------------|-----------------------|---------------|---------------------------|----------------------------|-----------------------------|----------------------|----------------|-------------------------|------------|---------------------------------|---------------------------|--------------------|---------------------|-----------------------|
| 111 | Thallium, thallium compounds                      | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       | 0          | 0                               | 1                         | 0                  | 0                   | 0                     |
| 112 | Tellurium, tellurium compounds                    | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       | 0          | 0                               | 1                         | 0                  | 0                   | 0                     |
| 113 | Temperature                                       | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 0          | 0                               | 0                         | 0                  | 1                   | 0                     |
| 114 | Tetrachloroethene                                 | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 0          | 0                               | 0                         | 1                  | 0                   | 0                     |
| 115 | Carbon tetrachloride, Appendix B, Group II        | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 1                       | 0          | 0                               | 1                         | 0                  | 0                   | 0                     |
| 116 | Toluene / Methylbenzene / Toluole / Phenylmethane | 0                | 0                    | 0                    | 0              | 0                    | 1                  | 1                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 108-88-3   | 0                               | 0                         | 1                  | 0                   | 0                     |
| 117 | Toxaphene                                         | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 1                    | 0              | 0                       | 8001-35-2  | 0                               | 1                         | 0                  | 0                   | Pesticide             |
| 118 | Trichloromethane                                  | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 0          | 0                               | 0                         | 1                  | 0                   | 0                     |
| 119 | Xylene                                            | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 0          | 0                               | 1                         | 0                  | 0                   | 0                     |
| 120 | Zinc                                              | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 1                     | 1                     | 1             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 7440-66-6  | 0                               | 0                         | 1                  | 0                   | 0                     |
| 121 | Polychlorinated dibenzodioxins and furan (PCDD/F) | 0                | 0                    | 0                    | 0              | 1                    | 0                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 1                    | 0              | 0                       | 0          | 0                               | 0                         | 1                  | 0                   | 0                     |
| 122 | PM 2.5                                            | 0                | 0                    | 0                    | 0              | 0                    | 1                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 0          | 0                               | 0                         | 1                  | 0                   | 0                     |

| ID  | Parameter                                                                                                  | SD 185/91 MINING | SD 165/98 MINSECPRES | SD 167/99 MINSECPRES | SD 4/92 MINSAL | Res 1583/1992 MINSAL | SD 138/2005 MINSAL | SD 46/2002 MINSECPRES | SD 90/2000 MINSECPRES | SD 609/98 MOP | SD 148/2004 MINSAL List 1 | SD 148/2004 MINSAL List 11 | SD 148/2004 MINSAL List 111 | Stockholm Convention | Kyoto Protocol | Montreal Protocol (SAO) | cas_number | Substance generating activities | Family of Substance group | Specific Substance | Physical parameters | Biological Parameters |
|-----|------------------------------------------------------------------------------------------------------------|------------------|----------------------|----------------------|----------------|----------------------|--------------------|-----------------------|-----------------------|---------------|---------------------------|----------------------------|-----------------------------|----------------------|----------------|-------------------------|------------|---------------------------------|---------------------------|--------------------|---------------------|-----------------------|
| 123 | NO <sub>x</sub>                                                                                            | 0                | 0                    | 0                    | 0              | 0                    | 1                  | 0                     | 0                     | 0             | 0                         | 0                          | 0                           | 0                    | 0              | 0                       | 0          | 0                               | 0                         | 1                  | 0                   | 0                     |
| 124 | Hospital waste                                                                                             | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       | 1          | 1                               | 0                         | 0                  | 0                   | 0                     |
| 125 | Discarded medicines, drugs and pharmaceutical products                                                     | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       | 1          | 1                               | 0                         | 0                  | 0                   | 0                     |
| 126 | Mixes and emulsions of oil and water or hydrocarbons and water.                                            | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       | 1          | 1                               | 0                         | 0                  | 0                   | 0                     |
| 127 | Residues resulting from disposal and treatment operations of residues, such as sludges, filters, dust, etc | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 1                         | 0                          | 0                           | 0                    | 0              | 0                       | 1          | 1                               | 0                         | 0                  | 0                   | 0                     |
| 128 | Acidic solutions or acids in solid form                                                                    | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       | 1          | 1                               | 0                         | 0                  | 0                   | 0                     |
| 129 | Basic solutions or bases in solid form                                                                     | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       | 1          | 1                               | 0                         | 0                  | 0                   | 0                     |
| 130 | Organohalogen compounds, excluding substances mentioned in List II                                         | 0                | 0                    | 0                    | 0              | 0                    | 0                  | 0                     | 0                     | 0             | 0                         | 1                          | 0                           | 0                    | 0              | 0                       | 1          | 1                               | 0                         | 0                  | 0                   | 0                     |

## APPENDIX N° 4

### EMISSIONS FROM STATIONARY AND MOBILE SOURCES BY REGION, 2009

*Emissions from Stationary Sources by Activity (t/year):*

| Arica and Parinacota Region     |                 |                 |              |               |              |               |               |                 |
|---------------------------------|-----------------|-----------------|--------------|---------------|--------------|---------------|---------------|-----------------|
| Activity                        | NO <sub>x</sub> | SO <sub>2</sub> | COV          | PM 10         | PM 2.5       | CO            | PTS           | NH <sub>3</sub> |
| Boilers                         | 184.59          | 644.53          | 0.92         | 35.05         | 32.36        | 16.92         | 49.34         | 3.08            |
| Primary and Secondary Foundries | 0.00            | 0.00            | 0.00         | 0.00          | 0.00         | 0.00          | 0.00          | 0.00            |
| Other Industrial Processes      | 211.66          | 378.50          | 38.83        | 171.55        | 51.96        | 893.39        | 312.25        | 9.12            |
| Thermoelectric Power Plants     | 41.97           | 2.23            | 3.33         | 2.95          | 2.95         | 9.07          | 2.95          | 0.07            |
| <b>Total</b>                    | <b>438.22</b>   | <b>1,025.26</b> | <b>43.08</b> | <b>209.55</b> | <b>87.27</b> | <b>919.37</b> | <b>364.54</b> | <b>12.27</b>    |

| Tarapacá Region                 |                  |                  |               |                 |               |                 |                 |                 |
|---------------------------------|------------------|------------------|---------------|-----------------|---------------|-----------------|-----------------|-----------------|
| Activity                        | NO <sub>x</sub>  | SO <sub>2</sub>  | COV           | PM 10           | PM 2.5        | CO              | PTS             | NH <sub>3</sub> |
| Boilers                         | 531.26           | 1,389.53         | 3.46          | 45.42           | 34.40         | 52.85           | 62.97           | 9.54            |
| Primary and Secondary Foundries | 0.00             | 0.00             | 0.00          | 0.00            | 0.00          | 0.00            | 0.00            | 0.00            |
| Other Industrial Processes      | 11,099.29        | 927.27           | 541.33        | 1,004.29        | 549.57        | 2,390.55        | 1,355.69        | 24.14           |
| Thermoelectric Power Plants     | 5,269.56         | 22,963.45        | 81.76         | 501.43          | 379.05        | 681.29          | 590.82          | 343.65          |
| <b>Total</b>                    | <b>16,900.12</b> | <b>25,280.26</b> | <b>626.54</b> | <b>1,551.14</b> | <b>963.03</b> | <b>3,124.70</b> | <b>2,009.47</b> | <b>377.32</b>   |

| Antofagasta Region              |                 |                 |        |           |          |          |           |                 |
|---------------------------------|-----------------|-----------------|--------|-----------|----------|----------|-----------|-----------------|
| Activity                        | NO <sub>x</sub> | SO <sub>2</sub> | COV    | PM 10     | PM 2.5   | CO       | PTS       | NH <sub>3</sub> |
| Boilers                         | 1,877.03        | 3,208.07        | 44.88  | 164.63    | 82.29    | 1,594.98 | 293.97    | 27.39           |
| Primary and Secondary Foundries | 307.81          | 159,613.20      | 5.04   | 11,940.72 | 9,474.69 | 9.55     | 20,205.82 | 14.22           |
| Other Industrial Processes      | 8,750.07        | 6,314.92        | 500.12 | 3,131.02  | 2,252.94 | 1,928.14 | 4,791.78  | 126.70          |

|                             |                  |                   |                 |                  |                  |                 |                  |                 |
|-----------------------------|------------------|-------------------|-----------------|------------------|------------------|-----------------|------------------|-----------------|
| Thermoelectric Power Plants | 24,782.90        | 73,117.20         | 996.85          | 1,617.17         | 1,222.69         | 823.03          | 3,406.09         | 1,775.35        |
| <b>Total</b>                | <b>35,717.80</b> | <b>242,253.39</b> | <b>1,546.89</b> | <b>16,853.54</b> | <b>13,032.62</b> | <b>4,355.69</b> | <b>28,697.66</b> | <b>1,943.66</b> |

| Atacama Region                  |                  |                   |               |                 |                 |                 |                  |                 |
|---------------------------------|------------------|-------------------|---------------|-----------------|-----------------|-----------------|------------------|-----------------|
| Activity                        | NO <sub>x</sub>  | SO <sub>2</sub>   | COV           | PM 10           | PM 2.5          | CO              | PTS              | NH <sub>3</sub> |
| Boilers                         | 3.39             | 3.87              | 0.04          | 0.12            | 0.05            | 0.55            | 0.22             | 0.11            |
| Primary and Secondary Foundries | 113.74           | 54,894.69         | 0.58          | 3,000.60        | 2,486.59        | 23.76           | 6,099.93         | 5.76            |
| Other Industrial Processes      | 16,033.24        | 4,778.03          | 120.38        | 3,686.36        | 955.08          | 2,128.67        | 6,317.95         | 145.45          |
| Thermoelectric Power Plants     | 13,735.21        | 45,704.56         | 18.30         | 1,460.61        | 621.80          | 152.34          | 1,826.30         | 1,145.07        |
| <b>Total</b>                    | <b>29,885.58</b> | <b>105,381.15</b> | <b>139.29</b> | <b>8,147.70</b> | <b>4,063.52</b> | <b>2,305.32</b> | <b>14,244.41</b> | <b>1,296.39</b> |

| Coquimbo Region                 |                 |                 |               |               |              |                 |               |                 |
|---------------------------------|-----------------|-----------------|---------------|---------------|--------------|-----------------|---------------|-----------------|
| Activity                        | NO <sub>x</sub> | SO <sub>2</sub> | COV           | PM 10         | PM 2.5       | CO              | PTS           | NH <sub>3</sub> |
| Boilers                         | 157.42          | 1,034.45        | 6.81          | 59.91         | 34.12        | 431.56          | 90.10         | 74.54           |
| Primary and Secondary Foundries | 0.20            | 0.30            | 0.00          | 0.00          | 0.01         | 0.05            | 0.02          | 0.01            |
| Other Industrial Processes      | 7,038.83        | 2,614.06        | 290.24        | 115.31        | 38.43        | 2,088.49        | 229.29        | 83.19           |
| Thermoelectric Power Plants     | 0.00            | 0.00            | 0.00          | 0.00          | 0.00         | 0.00            | 0.00          | 0.00            |
| <b>Total</b>                    | <b>7,196.46</b> | <b>3,648.81</b> | <b>297.05</b> | <b>175.22</b> | <b>72.55</b> | <b>2,520.10</b> | <b>319.41</b> | <b>157.74</b>   |

| Valparaíso Region               |                 |                 |        |        |        |          |          |                 |
|---------------------------------|-----------------|-----------------|--------|--------|--------|----------|----------|-----------------|
| Activity                        | NO <sub>x</sub> | SO <sub>2</sub> | COV    | PM 10  | PM 2.5 | CO       | PTS      | NH <sub>3</sub> |
| Boilers                         | 2,939.81        | 2,751.64        | 138.81 | 414.04 | 374.74 | 2,952.14 | 597.17   | 52.12           |
| Primary and Secondary Foundries | 196.91          | 27,999.14       | 3.91   | 552.10 | 438.55 | 50.58    | 1,082.69 | 3.87            |

|                             |                  |                  |                 |                 |                 |                 |                 |                 |
|-----------------------------|------------------|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Other Industrial Processes  | 7,529.00         | 4,043.55         | 964.21          | 1,721.86        | 1,440.70        | 2,044.55        | 2,232.47        | 174.08          |
| Thermoelectric Power Plants | 7,705.97         | 29,966.76        | 149.23          | 1,277.65        | 565.01          | 1,054.69        | 1,618.25        | 1,221.15        |
| <b>Total</b>                | <b>18,371.70</b> | <b>64,761.08</b> | <b>1,256.15</b> | <b>3,965.65</b> | <b>2,819.00</b> | <b>6,101.96</b> | <b>5,530.59</b> | <b>1,451.22</b> |

| Santiago Metropolitan Region    |                 |                  |                 |                 |                 |                 |                 |                 |
|---------------------------------|-----------------|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Activity                        | NO <sub>x</sub> | SO <sub>2</sub>  | COV             | PM 10           | PM 2.5          | CO              | PTS             | NH <sub>3</sub> |
| Boilers                         | 3,142.94        | 15,240.48        | 451.94          | 462.25          | 437.89          | 1,081.67        | 622.77          | 165.21          |
| Primary and Secondary Foundries | 36.25           | 578.88           | 77.87           | 164.49          | 153.03          | 350.96          | 209.21          | 1.51            |
| Other Industrial Processes      | 4,580.37        | 15,869.70        | 1,120.87        | 993.13          | 863.42          | 2,408.95        | 1,335.89        | 119.86          |
| Thermoelectric Power Plants     | 1,451.11        | 454.24           | 72              | 136.3           | 38.22           | 467.58          | 303.84          | 100.05          |
| <b>Total</b>                    | <b>9,210.66</b> | <b>32,143.30</b> | <b>1,722.68</b> | <b>1,756.17</b> | <b>1,492.57</b> | <b>4,309.16</b> | <b>2,471.71</b> | <b>386.63</b>   |

| Libertador Gral. Bernardo O'Higgins Region |                 |                   |               |                 |                 |                 |                 |                 |
|--------------------------------------------|-----------------|-------------------|---------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Activity                                   | NO <sub>x</sub> | SO <sub>2</sub>   | COV           | PM 10           | PM 2.5          | CO              | PTS             | NH <sub>3</sub> |
| Boilers                                    | 1,314.59        | 3,611.41          | 182.90        | 230.96          | 195.24          | 382.53          | 360.55          | 1,385.33        |
| Primary and Secondary Foundries            | 141.56          | 155,070.23        | 0.75          | 1,720.27        | 1,439.18        | 18.36           | 3,330.14        | 3.15            |
| Other Industrial Processes                 | 2,730.74        | 1,824.87          | 289.54        | 2,581.44        | 1,167.46        | 2,671.63        | 4,557.96        | 298.04          |
| Thermoelectric Power Plants                | 707.82          | 90.76             | 0.91          | 866.66          | 338.21          | 139.11          | 1,056.90        | 313.59          |
| <b>Total</b>                               | <b>4,894.71</b> | <b>160,597.28</b> | <b>474.11</b> | <b>5,399.32</b> | <b>3,140.10</b> | <b>3,211.63</b> | <b>9,305.55</b> | <b>2,000.11</b> |

| Maule Region |                 |                 |        |          |          |          |          |                 |
|--------------|-----------------|-----------------|--------|----------|----------|----------|----------|-----------------|
| Activity     | NO <sub>x</sub> | SO <sub>2</sub> | COV    | PM 10    | PM 2.5   | CO       | PTS      | NH <sub>3</sub> |
| Boilers      | 1,841.86        | 4,690.16        | 108.71 | 1,137.24 | 1,115.22 | 6,193.68 | 1,546.78 | 1,476.69        |



|                                 |                 |                 |               |                 |                 |                 |                 |                 |
|---------------------------------|-----------------|-----------------|---------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Primary and Secondary Foundries | 0.03            | 0.40            | 0.00          | 0.04            | 0.01            | 0.02            | 0.07            | 0.01            |
| Other Industrial Processes      | 3,853.81        | 977.93          | 135.02        | 478.11          | 481.63          | 1,309.98        | 543.73          | 30.18           |
| Thermoelectric Power Plants     | 106.47          | 30.22           | 9.21          | 81.66           | 74.74           | 726.56          | 95.18           | 213.12          |
| <b>Total</b>                    | <b>5,802.16</b> | <b>5,698.70</b> | <b>252.95</b> | <b>1,697.04</b> | <b>1,671.59</b> | <b>8,230.24</b> | <b>2,185.75</b> | <b>1,720.00</b> |

| Biobío Region                   |                  |                  |               |                  |                 |                  |                  |                 |
|---------------------------------|------------------|------------------|---------------|------------------|-----------------|------------------|------------------|-----------------|
| Activity                        | NO <sub>x</sub>  | SO <sub>2</sub>  | COV           | PM 10            | PM 2.5          | CO               | PTS              | NH <sub>3</sub> |
| Boilers                         | 15,261.30        | 22,650.65        | 610.25        | 4,319.95         | 3,121.03        | 30,366.87        | 6,961.64         | 4,144.44        |
| Primary and Secondary Foundries | 0.23             | 0.23             | 0.00          | 0.02             | 0.02            | 0.04             | 0.02             | 0.06            |
| Other Industrial Processes      | 4,871.20         | 7,232.84         | 168.77        | 2,436.60         | 793.83          | 2,309.96         | 3,186.21         | 279.62          |
| Thermoelectric Power Plants     | 8,817.56         | 15,009.75        | 21.86         | 13,676.62        | 4,997.94        | 283.49           | 17,038.17        | 613.78          |
| <b>Total</b>                    | <b>28,950.29</b> | <b>44,893.47</b> | <b>800.88</b> | <b>20,433.19</b> | <b>8,912.82</b> | <b>32,960.37</b> | <b>27,186.04</b> | <b>5,037.89</b> |

| La Araucanía Region             |                 |                 |               |                 |               |                 |                 |                 |
|---------------------------------|-----------------|-----------------|---------------|-----------------|---------------|-----------------|-----------------|-----------------|
| Activity                        | NO <sub>x</sub> | SO <sub>2</sub> | COV           | PM 10           | PM 2.5        | CO              | PTS             | NH <sub>3</sub> |
| Boilers                         | 2,049.50        | 3,610.74        | 67.58         | 969.15          | 744.01        | 4,548.20        | 1,149.06        | 674.97          |
| Primary and Secondary Foundries | 0.24            | 0.08            | 0.03          | 1.29            | 0.91          | 10.08           | 1.63            | 0.13            |
| Other Industrial Processes      | 804.89          | 278.89          | 105.62        | 316.34          | 153.42        | 970.44          | 446.59          | 45.41           |
| Thermoelectric Power Plants     | 37.80           | 24.42           | 2.11          | 28.46           | 11.67         | 3.54            | 35.10           | 17.55           |
| <b>Total</b>                    | <b>2,892.42</b> | <b>3,914.14</b> | <b>175.34</b> | <b>1,315.25</b> | <b>910.01</b> | <b>5,532.27</b> | <b>1,632.38</b> | <b>738.06</b>   |

| Región de Los Ríos              |                 |                 |               |               |               |                 |               |                 |
|---------------------------------|-----------------|-----------------|---------------|---------------|---------------|-----------------|---------------|-----------------|
| Activity                        | NO <sub>x</sub> | SO <sub>2</sub> | COV           | PM 10         | PM 2.5        | CO              | PTS           | NH <sub>3</sub> |
| Boilers                         | 349.38          | 1,988.94        | 8.04          | 143.6         | 126.11        | 341.74          | 182.34        | 58.33           |
| Primary and Secondary Foundries | 0               | 0               | 0             | 0             | 0             | 0               | 0             | 0               |
| Other Industrial Processes      | 3,201.43        | 1,157.98        | 233.44        | 224.74        | 75.66         | 796.47          | 375.18        | 35.36           |
| Thermoelectric Power Plants     | 3.88            | 19.42           | 0.01          | 3.25          | 2.4           | 0.09            | 14.1          | 0.3             |
| <b>Total</b>                    | <b>3,554.68</b> | <b>3,166.34</b> | <b>241.49</b> | <b>371.59</b> | <b>204.17</b> | <b>1,138.29</b> | <b>571.62</b> | <b>94</b>       |

| Los Lagos Region                |                  |                  |               |                 |               |                 |                 |                 |
|---------------------------------|------------------|------------------|---------------|-----------------|---------------|-----------------|-----------------|-----------------|
| Activity                        | NO <sub>x</sub>  | SO <sub>2</sub>  | COV           | PM 10           | PM 2.5        | CO              | PTS             | NH <sub>3</sub> |
| Boilers                         | 697.20           | 5,426.58         | 13.03         | 427.99          | 321.49        | 716.80          | 930.79          | 268.22          |
| Primary and Secondary Foundries | 0.00             | 0.00             | 0.00          | 0.00            | 0.00          | 0.00            | 0.00            | 0.00            |
| Other Industrial Processes      | 9,433.65         | 12,418.74        | 370.95        | 1,226.79        | 477.14        | 5,376.41        | 2,218.46        | 508.77          |
| Thermoelectric Power Plants     | 1,493.91         | 351.16           | 0.68          | 19.58           | 19.56         | 5.44            | 19.56           | 11.90           |
| <b>Total</b>                    | <b>11,624.76</b> | <b>18,196.48</b> | <b>384.66</b> | <b>1,674.36</b> | <b>818.19</b> | <b>6,098.66</b> | <b>3,168.81</b> | <b>78890</b>    |

| Aisén del Gral. Carlos Ibáñez del Campo Region |                 |                 |               |               |               |                 |               |                 |
|------------------------------------------------|-----------------|-----------------|---------------|---------------|---------------|-----------------|---------------|-----------------|
| Activity                                       | NO <sub>x</sub> | SO <sub>2</sub> | COV           | PM 10         | PM 2.5        | CO              | PTS           | NH <sub>3</sub> |
| Boilers                                        | 34.67           | 103.25          | 2.55          | 88.08         | 75.23         | 146.89          | 55.08         | 23.74           |
| Primary and Secondary Foundries                | 0.00            | 0.00            | 0.00          | 0.00          | 0.00          | 0.00            | 0.00          | 0.00            |
| Other Industrial Processes                     | 2,760.18        | 224.93          | 121.43        | 259.03        | 72.40         | 841.20          | 275.54        | 7.07            |
| Thermoelectric Power Plants                    | 183.05          | 13.77           | 20.49         | 16.93         | 4.19          | 55.75           | 18.14         | 0.47            |
| <b>Total</b>                                   | <b>2,977.90</b> | <b>341.95</b>   | <b>144.46</b> | <b>364.04</b> | <b>151.82</b> | <b>1,043.84</b> | <b>348.76</b> | <b>31.28</b>    |

| Magallanes and Chilean Antarctica Region |                 |                 |              |               |               |                 |               |                 |
|------------------------------------------|-----------------|-----------------|--------------|---------------|---------------|-----------------|---------------|-----------------|
| Activity                                 | NO <sub>x</sub> | SO <sub>2</sub> | COV          | PM 10         | PM 2.5        | CO              | PTS           | NH <sub>3</sub> |
| Boilers                                  | 710.11          | 95.99           | 22.01        | 260.24        | 260.24        | 1,747.14        | 260.94        | 43.98           |
| Primary and Secondary Foundries          | 0.00            | 0.00            | 0.00         | 0.00          | 0.00          | 0.00            | 0.00          | 0.00            |
| Other Industrial Processes               | 274.84          | 837.22          | 3.76         | 484.77        | 481.80        | 35.78           | 485.29        | 1.59            |
| Thermoelectric Power Plants              | 1,619.13        | 2.96            | 7.10         | 22.21         | 22.21         | 246.42          | 27.21         | 0.00            |
| <b>Total</b>                             | <b>2,604.08</b> | <b>936.17</b>   | <b>32.87</b> | <b>767.22</b> | <b>764.25</b> | <b>2,029.33</b> | <b>773.44</b> | <b>45.57</b>    |

*Mobile Emission Sources by vehicle category (t/year):*

| Arica                                    | CO     | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel Consumption | Kilometers Driven |
|------------------------------------------|--------|--------|-----------------|-----------------|-------|--------|-----------------|------------------|-------------------|
| Tendered Euro 1 diesel urban buses       | 12.9   | 4.56   | 0.01            | 51.42           | 2.52  | 2.38   | 0.61            | 868.32           | 5,026,782.54      |
| Tendered Euro 2 diesel urban buses       | 10.44  | 2.57   | 0.01            | 45.82           | 1.07  | 0.95   | 0.52            | 745.71           | 4,449,938.42      |
| Tendered Euro 3 diesel urban buses       | 39.68  | 8.72   | 0.02            | 169.46          | 3.31  | 2.97   | 1.25            | 1,786.63         | 12,196,127.61     |
| Tendered non-standard diesel urban buses | 172.62 | 126.54 | 0.03            | 375.95          | 35.97 | 35.5   | 2.09            | 2,982.85         | 17,222,910.15     |
| Light-duty Euro 1 diesel trucks          | 0.54   | 0.19   | 0               | 2.81            | 0.13  | 0.12   | 0.06            | 83.13            | 847,198.57        |
| Light-duty Euro 2 diesel trucks          | 0.49   | 0.14   | 0               | 3.17            | 0.08  | 0.07   | 0.06            | 86.54            | 919,815.58        |
| Light-duty Euro 3 diesel trucks          | 0.1    | 0.02   | 0               | 0.49            | 0.03  | 0.03   | 0.01            | 18.54            | 185,710.51        |

| Arica                                      | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel Consumption | Kilometers Driven |
|--------------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|------------------|-------------------|
| Light-duty non-standard diesel trucks      | 3.46   | 2.19  | 0.01            | 8.17            | 0.67  | 0.65   | 0.15            | 209.4            | 1,754,911.32      |
| Medium-duty Euro 1 diesel trucks           | 0.37   | 0.13  | 0               | 1.91            | 0.08  | 0.08   | 0.04            | 54.38            | 359,566.37        |
| Medium-duty Euro 2 diesel trucks           | 0.36   | 0.09  | 0               | 2.16            | 0.05  | 0.04   | 0.04            | 56.97            | 390,386.33        |
| Medium-duty Euro 3 diesel trucks           | 0.09   | 0.02  | 0               | 0.38            | 0.01  | 0.01   | 0.01            | 13.44            | 88,607.42         |
| Medium-duty non-standard diesel trucks     | 1.66   | 0.65  | 0               | 6.65            | 0.28  | 0.27   | 0.09            | 128.63           | 744,816.04        |
| Heavy-duty Euro 1 diesel trucks            | 0.43   | 0.15  | 0               | 1.95            | 0.1   | 0.09   | 0.04            | 54.35            | 232,406.08        |
| Heavy-duty Euro 2 diesel trucks            | 1.91   | 0.54  | 0               | 10.75           | 0.27  | 0.24   | 0.19            | 276.89           | 1,152,070.15      |
| Heavy-duty Euro 3 diesel trucks            | 0.16   | 0.03  | 0               | 0.63            | 0.02  | 0.02   | 0.02            | 21.57            | 92,962.43         |
| Heavy-duty non-standard diesel trucks      | 0.75   | 0.24  | 0               | 3.91            | 0.18  | 0.17   | 0.06            | 88.11            | 325,368.51        |
| Euro 1 four-stroke motorcycles             | 23.52  | 1.95  | 0               | 0.61            | 0.01  | 0.01   | 0               | 54.75            | 1,918,967.82      |
| Non-standard four-stroke motorcycles       | 32.61  | 2.25  | 0               | 0.24            | 0.01  | 0      | 0               | 39.21            | 1,393,069.86      |
| Euro 1 two-stroke motorcycles              | 0.18   | 0.12  | 0               | 0               | 0     | 0      | 0               | 0.5              | 20,260.59         |
| Non-standard two-stroke motorcycles        | 0.35   | 0.14  | 0               | 0               | 0     | 0      | 0               | 0.46             | 14,708.13         |
| Euro 1 compressed natural gas shared taxis | 182.68 | 32.67 | 0               | 31.31           | 0.94  | 0.51   | 0.36            | 2,254.36         | 68,787,101.92     |
| Euro 1 diesel shared taxis                 | 20.92  | 2.91  | 0.02            | 34.94           | 2.96  | 2.76   | 0.9             | 1,286.84         | 31,207,308.54     |
| Euro 3 diesel shared taxis                 | 2.18   | 0.43  | 0.01            | 11.5            | 0.59  | 0.51   | 0.37            | 537.3            | 11,672,962.44     |
| Pre Euro diesel shared taxis               | 0.9    | 0.23  | 0               | 0.73            | 0.26  | 0.26   | 0.05            | 69.88            | 1,191,118.62      |



| Africa                                                                | CO       | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel Consumption | Kilometers Driven |
|-----------------------------------------------------------------------|----------|--------|-----------------|-----------------|-------|--------|-----------------|------------------|-------------------|
| Light-duty non-catalytic petrol commercial vehicles used by companies | 88.33    | 62.11  | 0               | 0.43            | 0     | 0      | 0               | 155.02           | 21,544.29         |
| Light-duty Euro 1 diesel privately used commercial vehicles           | 9.55     | 2.72   | 0.02            | 23.01           | 1.94  | 1.82   | 0.86            | 1,272.48         | 17,800,036.72     |
| Light-duty Euro 2 diesel privately used commercial vehicles           | 0.28     | 0.08   | 0               | 0.76            | 0.05  | 0.05   | 0.03            | 46.35            | 684,062.60        |
| Light-duty Euro 3 diesel privately used commercial vehicles           | 0.62     | 0.15   | 0               | 1.68            | 0.12  | 0.1    | 0.08            | 123.8            | 1,759,675.30      |
| Light-duty non-standard diesel privately used commercial vehicles     | 4.07     | 0.46   | 0               | 5.6             | 1.08  | 1.05   | 0.19            | 271.86           | 3,444,279.62      |
| Light-duty Euro 1 petrol privately used commercial vehicles           | 203.44   | 7.13   | 0.78            | 11.66           | 0.15  | 0.08   | 0.06            | 1,045.34         | 10,843,919.85     |
| Light-duty Euro 2 petrol privately used commercial vehicles           | 1.37     | 0.02   | 0.05            | 0.07            | 0     | 0      | 0               | 26.79            | 301,238.57        |
| Light-duty Euro 3 petrol privately used commercial vehicles           | 1.94     | 0.13   | 0.01            | 0.16            | 0.01  | 0.01   | 0               | 78.1             | 870,308.73        |
| Light-duty non-catalytic petrol privately used commercial vehicles    | 159.59   | 54.8   | 0.02            | 37.39           | 0.12  | 0.07   | 0.04            | 726.06           | 8,842,844.69      |
| Light-duty Euro 1 diesel passenger vehicles                           | 24.49    | 3.64   | 0.03            | 33.77           | 3.52  | 3.26   | 1.3             | 2,091.59         | 37,487,708.91     |
| Light-duty Euro 1 diesel passenger vehicles                           | 0.34     | 0.07   | 0               | 1.33            | 0.09  | 0.08   | 0.06            | 103.66           | 1,802,156.23      |
| Light-duty Pre euro diesel passenger vehicles                         | 6.5      | 1.64   | 0.01            | 5.44            | 1.93  | 1.93   | 0.37            | 524.88           | 9,055,507.76      |
| Light-duty Euro 1 petrol passenger vehicles                           | 1,003.72 | 160.32 | 5.85            | 194.8           | 1.39  | 0.75   | 0.34            | 5,693.08         | 101,136,923.92    |

| Arica                                       | CO              | COV             | NH <sub>3</sub> | NO <sub>x</sub> | PM 10         | PM 2.5        | SO <sub>2</sub> | Fuel Consumption | Kilometers Driven     |
|---------------------------------------------|-----------------|-----------------|-----------------|-----------------|---------------|---------------|-----------------|------------------|-----------------------|
| Light-duty Euro 3 petrol passenger vehicles | 11.48           | 4.78            | 0.06            | 3.85            | 0.14          | 0.07          | 0.04            | 611.15           | 9,865,049.50          |
| Light-duty non-catalytic passenger vehicles | 2,274.44        | 712.9           | 0.08            | 191.71          | 0.68          | 0.37          | 0.24            | 4,091.23         | 49,963,358.41         |
| Medium-duty Euro 1 diesel vehicles          | 0.1             | 0.03            | 0               | 0.28            | 0.02          | 0.02          | 0.01            | 16.95            | 251,647.16            |
| Medium-duty Euro 2 diesel vehicles          | 0               | 0               | 0               | 0.01            | 0             | 0             | 0               | 0.66             | 9,789.27              |
| Medium-duty Euro 3 diesel vehicles          | 0.01            | 0               | 0               | 0.02            | 0             | 0             | 0               | 1.68             | 24,877.32             |
| Medium-duty non-standard diesel vehicles    | 0.06            | 0.01            | 0               | 0.07            | 0.01          | 0.01          | 0               | 3.77             | 50,024.08             |
| Medium-duty Euro 1 petrol vehicles          | 0.52            | 0.03            | 0.01            | 0.07            | 0             | 0             | 0               | 13.51            | 153,305.39            |
| Medium-duty Euro 2 petrol vehicles          | 0.01            | 0               | 0               | 0               | 0             | 0             | 0               | 0.38             | 4,310.87              |
| Medium-duty Euro 3 petrol vehicles          | 0.02            | 0               | 0               | 0               | 0             | 0             | 0               | 1.08             | 12,303.95             |
| Medium-duty non-catalytic petrol vehicles   | 1.62            | 0.19            | 0               | 0.36            | 0             | 0             | 0               | 9.39             | 125,015.29            |
| Street Dust                                 |                 |                 |                 |                 | 419.56        | 60.19         |                 |                  |                       |
| <b>TOTAL</b>                                | <b>4,560.93</b> | <b>1,224.54</b> | <b>8.35</b>     | <b>1,317.33</b> | <b>480.85</b> | <b>117.83</b> | <b>10.69</b>    | <b>30,444.25</b> | <b>447,474,993.69</b> |

| Iquique                            | CO    | COV  | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel Consumption | Kilometers Driven |
|------------------------------------|-------|------|-----------------|-----------------|-------|--------|-----------------|------------------|-------------------|
| Tendered Euro 1 diesel urban buses | 12.82 | 4.33 | 0.01            | 48.07           | 2.46  | 2.33   | 0.65            | 929.76           | 5,001,741.48      |
| Tendered Euro 3 diesel urban buses | 29.23 | 5.76 | 0.02            | 115.68          | 2.58  | 2.31   | 1.27            | 1,820.60         | 10,003,482.97     |
| Euro 1 diesel rural buses          | 0.63  | 0.21 | 0               | 2.81            | 0.14  | 0.13   | 0.06            | 81.12            | 352,627.38        |

| Ilique                                 |  | CO       | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel      | Kilometers Driven |
|----------------------------------------|--|----------|-------|-----------------|-----------------|-------|--------|-----------------|-----------|-------------------|
| Euro 3 diesel rural buses              |  | 1.27     | 0.25  | 0               | 5.02            | 0.15  | 0.13   | 0.12            | 169.36    | 705,254.75        |
| Light-duty Euro 1 diesel trucks        |  | 4.05     | 1.57  | 0.01            | 14.62           | 0.9   | 0.87   | 0.25            | 359.57    | 3,677,549.27      |
| Light-duty Euro 2 diesel trucks        |  | 1.24     | 0.39  | 0               | 6.52            | 0.16  | 0.14   | 0.11            | 161.59    | 1,671,613.30      |
| Light-duty Euro 3 diesel trucks        |  | 0.52     | 0.12  | 0               | 1.93            | 0.13  | 0.12   | 0.05            | 70.76     | 668,645.32        |
| Light-duty non-standard diesel trucks  |  | 16.45    | 12.13 | 0.01            | 28.15           | 3.19  | 3.14   | 0.42            | 605.39    | 5,014,839.91      |
| Medium-duty Euro 1 diesel trucks       |  | 3.29     | 1.26  | 0.01            | 13.77           | 0.71  | 0.69   | 0.29            | 408.18    | 2,211,867.10      |
| Medium-duty Euro 2 diesel trucks       |  | 1.07     | 0.31  | 0               | 6.12            | 0.13  | 0.12   | 0.11            | 164.16    | 1,005,394.14      |
| Medium-duty Euro 3 diesel trucks       |  | 0.47     | 0.1   | 0               | 1.91            | 0.05  | 0.05   | 0.05            | 66.24     | 402,157.65        |
| Medium-duty non-standard diesel trucks |  | 10.25    | 4.56  | 0.01            | 32.36           | 1.67  | 1.64   | 0.47            | 672.1     | 3,016,182.41      |
| Heavy-duty Euro 2 diesel trucks        |  | 10       | 3.32  | 0.01            | 50.83           | 1.25  | 1.14   | 0.8             | 1,135.74  | 4,134,898.36      |
| Heavy-duty Euro 3 diesel trucks        |  | 3.28     | 0.74  | 0               | 11.52           | 0.38  | 0.34   | 0.28            | 395.68    | 1,378,299.42      |
| Heavy-duty non-standard diesel trucks  |  | 1.25     | 0.42  | 0               | 6.12            | 0.29  | 0.28   | 0.1             | 144.46    | 459,433.16        |
| Euro 1 Four-stroke motorcycles         |  | 85.3     | 8.08  | 0.01            | 1.85            | 0.05  | 0.03   | 0.01            | 201.86    | 7,451,575.47      |
| Non-standard four-stroke motorcycles   |  | 88.24    | 7.38  | 0.01            | 0.51            | 0.02  | 0.01   | 0.01            | 109.08    | 3,756,377.16      |
| Euro 1 two-stroke motorcycles          |  | 0.77     | 0.46  | 0               | 0               | 0.01  | 0.01   | 0               | 1.83      | 78,674.25         |
| Non-standard two-stroke motorcycles    |  | 0.9      | 0.38  | 0               | 0               | 0.01  | 0.01   | 0               | 1.21      | 39,660.09         |
| Euro 1 diesel shared taxis             |  | 0.71     | 0.1   | 0               | 1.05            | 0.12  | 0.11   | 0.06            | 80.78     | 1,523,704.95      |
| Euro 1 petrol shared taxis             |  | 4,195.35 | 323   | 15.19           | 595.14          | 5.04  | 2.72   | 1.03            | 17,164.21 | 371,784,002.11    |



| Iquique                                                               | CO     | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|-----------------------------------------------------------------------|--------|--------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Euro 3 petrol shared taxis                                            | 76.76  | 5.21   | 0.1             | 15.47           | 0.66  | 0.36   | 0.14            | 2,331.11 | 48,758,558.32     |
| Euro 1 compressed natural gas rental cars                             | 0.16   | 0.02   | 0               | 0.06            | 0     | 0      | 0               | 4.28     | 87,107.51         |
| Euro 1 diesel rental cars                                             | 0.02   | 0      | 0               | 0.03            | 0     | 0      | 0               | 2.7      | 49,804.64         |
| Euro 3 diesel rental cars                                             | 0.03   | 0.01   | 0               | 0.16            | 0.01  | 0.01   | 0.01            | 11.79    | 215,820.13        |
| Euro 1 petrol rental cars                                             | 245.47 | 34.71  | 1.65            | 46.28           | 0.38  | 0.21   | 0.1             | 1,688.91 | 28,353,497.01     |
| Euro 3 petrol rental cars                                             | 23.47  | 3.8    | 0.04            | 5.35            | 0.2   | 0.11   | 0.06            | 921.11   | 14,416,294.01     |
| Light-duty Euro 2 diesel commercial vehicles used by companies        | 0      | 0      | 0               | 0               | 0     | 0      | 0               | 0.02     | 269.85            |
| Light-duty Euro 5 diesel commercial vehicles used by companies        | 0      | 0      | 0               | 0               | 0     | 0      | 0               | 0.04     | 620.66            |
| Light-duty non-standard diesel commercial vehicles used by companies  | 0.06   | 0.01   | 0               | 0.02            | 0.01  | 0.01   | 0               | 2.39     | 1,133.39          |
| Light-duty Euro 1 petrol commercial vehicles used by companies        | 61.88  | 10.2   | 0               | 5.52            | 0     | 0      | 0               | 296.21   | 62,687.00         |
| Light-duty Euro 2 petrol commercial vehicles used by companies        | 0.06   | 0      | 0               | 0               | 0     | 0      | 0               | 1.85     | 19,240.56         |
| Light-duty Euro 3 petrol commercial vehicles used by companies        | 15.79  | 1.63   | 0               | 0.3             | 0     | 0      | 0               | 233.73   | 49,464.17         |
| Light-duty Euro 4 petrol commercial vehicles used by companies        | 0      | 0      | 0               | 0               | 0     | 0      | 0               | 0.3      | 3,157.29          |
| Light-duty non-catalytic petrol commercial vehicles used by companies | 425.14 | 298.05 | 0               | 2.26            | 0     | 0      | 0               | 749.95   | 175,323.89        |

| Iquique                                                            | CO       | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel      | Kilometers Driven |
|--------------------------------------------------------------------|----------|--------|-----------------|-----------------|-------|--------|-----------------|-----------|-------------------|
| Light-duty Euro 1 diesel privately used commercial vehicles        | 0.69     | 0.21   | 0               | 1.77            | 0.14  | 0.13   | 0.07            | 108.23    | 1,477,051.15      |
| Light-duty Euro 2 diesel privately used commercial vehicles        | 0.06     | 0.02   | 0               | 0.16            | 0.01  | 0.01   | 0.01            | 9.38      | 134,183.44        |
| Light-duty Euro 3 diesel privately used commercial vehicles        | 0.2      | 0.05   | 0               | 0.53            | 0.04  | 0.03   | 0.03            | 38.64     | 530,223.48        |
| Light-duty non-standard diesel privately used commercial vehicles  | 0.4      | 0.05   | 0               | 0.6             | 0.1   | 0.1    | 0.02            | 26.33     | 330,535.66        |
| Light-duty Euro 1 petrol privately used commercial vehicles        | 1,261.91 | 59.63  | 4.3             | 74.4            | 1.11  | 0.6    | 0.43            | 7,275.80  | 82,020,518.18     |
| Light-duty Euro 2 petrol privately used commercial vehicles        | 89.43    | 1.06   | 1.43            | 2.9             | 0     | 0      | 0.06            | 967.06    | 9,567,279.52      |
| Light-duty Euro 3 petrol privately used commercial vehicles        | 174.23   | 5.26   | 0.07            | 6.39            | 0.4   | 0.21   | 0.17            | 2,769.71  | 29,326,407.23     |
| Light-duty non-catalytic petrol privately used commercial vehicles | 627.48   | 173    | 0.04            | 83.2            | 0.31  | 0.17   | 0.11            | 1,907.52  | 23,140,466.93     |
| Light-duty Euro 1 compressed natural gas passenger vehicles        | 0.03     | 0      | 0               | 0               | 0     | 0      | 0               | 0.67      | 11,729.11         |
| Light-duty Euro 1 diesel passenger vehicles                        | 5.77     | 0.84   | 0.01            | 7.49            | 0.84  | 0.77   | 0.36            | 564.72    | 9,693,058.82      |
| Light-duty Euro 1 diesel passenger vehicles                        | 0.61     | 0.12   | 0               | 2.42            | 0.15  | 0.13   | 0.12            | 182.64    | 3,128,518.17      |
| Light-duty Pre euro diesel passenger vehicles                      | 0.56     | 0.14   | 0               | 0.47            | 0.17  | 0.17   | 0.03            | 46.11     | 796,355.77        |
| Light-duty Euro 1 petrol passenger vehicles                        | 3,514.96 | 529.18 | 17.21           | 671.03          | 4.56  | 2.46   | 1.1             | 18,718.42 | 335,698,791.34    |

| Iquique                                     | CO               | COV             | NH <sub>3</sub> | NO <sub>x</sub> | PM 10         | PM 2.5       | SO <sub>2</sub> | Fuel             | Kilometers Driven       |
|---------------------------------------------|------------------|-----------------|-----------------|-----------------|---------------|--------------|-----------------|------------------|-------------------------|
| Light-duty Euro 3 petrol passenger vehicles | 83.34            | 32.37           | 0.15            | 26.47           | 0.94          | 0.51         | 0.24            | 4,012.27         | 69,201,731.27           |
| Light-duty non-catalytic passenger vehicles | 2,443.95         | 714.55          | 0.08            | 184.02          | 0.7           | 0.38         | 0.26            | 4,317.00         | 51,654,987.31           |
| Medium-duty Euro 1 diesel vehicles          | 0.01             | 0               | 0               | 0.03            | 0             | 0            | 0               | 1.95             | 28,027.15               |
| Medium-duty Euro 2 diesel vehicles          | 0                | 0               | 0               | 0               | 0             | 0            | 0               | 0.17             | 2,395.48                |
| Medium-duty Euro 3 diesel vehicles          | 0                | 0               | 0               | 0.01            | 0             | 0            | 0               | 0.7              | 10,061.03               |
| Medium-duty non-standard diesel vehicles    | 0.01             | 0               | 0               | 0.01            | 0             | 0            | 0               | 0.43             | 5,509.61                |
| Medium-duty Euro 1 petrol vehicles          | 7.91             | 0.36            | 0.11            | 0.68            | 0             | 0            | 0.01            | 152.77           | 1,556,344.97            |
| Medium-duty Euro 2 petrol vehicles          | 0.49             | 0.01            | 0.03            | 0.03            | 0             | 0            | 0               | 16.35            | 170,797.91              |
| Medium-duty Euro 3 petrol vehicles          | 1.38             | 0.02            | 0               | 0.05            | 0             | 0            | 0               | 53.53            | 556,470.59              |
| Medium-duty non-catalytic petrol vehicles   | 7.28             | 0.86            | 0               | 1.17            | 0             | 0            | 0               | 35.97            | 439,091.95              |
| Street Dust                                 |                  |                 |                 |                 | 379.47        | 54.44        |                 |                  |                         |
| <b>TOTAL</b>                                | <b>13,536.57</b> | <b>2,246.24</b> | <b>40.54</b>    | <b>2,083.25</b> | <b>409.68</b> | <b>77.12</b> | <b>9.46</b>     | <b>72,194.45</b> | <b>1,136,011,495.18</b> |

| Antofagasta                          | CO   | COV  | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel  | Kilometers Driven |
|--------------------------------------|------|------|-----------------|-----------------|-------|--------|-----------------|-------|-------------------|
| Euro 1 diesel interurban buses       | 0.13 | 0.05 | 0               | 0.57            | 0.03  | 0.03   | 0.01            | 16.96 | 76,052.47         |
| Euro 2 diesel interurban buses       | 0.2  | 0.06 | 0               | 1.15            | 0.03  | 0.03   | 0.02            | 31.08 | 139,287.12        |
| Euro 3 diesel interurban buses       | 0.72 | 0.17 | 0               | 2.89            | 0.09  | 0.08   | 0.01            | 20.69 | 421,279.46        |
| Non-standard diesel interurban buses | 0.14 | 0.05 | 0               | 0.69            | 0.03  | 0.03   | 0.01            | 16.95 | 70,070.82         |

| Antofagasta                              |  | CO    | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|------------------------------------------|--|-------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Tendered Euro 1 diesel urban buses       |  | 6.55  | 2.3   | 0.01            | 28.61           | 1.47  | 1.35   | 0.6             | 850.91   | 4,525,103.18      |
| Tendered Euro 2 diesel urban buses       |  | 11.62 | 2.88  | 0.02            | 57.9            | 1.56  | 1.34   | 1.08            | 1,540.91 | 8,287,548.71      |
| Tendered Euro 3 diesel urban buses       |  | 46.11 | 9.15  | 0.07            | 175.6           | 5.06  | 4.37   | 3.78            | 5,401.68 | 25,066,022.55     |
| Tendered non-standard diesel urban buses |  | 17.12 | 10.82 | 0.01            | 36.04           | 3.36  | 3.24   | 0.68            | 969.75   | 4,169,196.49      |
| Light-duty Euro 1 diesel trucks          |  | 0.38  | 0.13  | 0               | 2.18            | 0.09  | 0.08   | 0.05            | 66.91    | 678,372.63        |
| Light-duty Euro 2 diesel trucks          |  | 1.32  | 0.34  | 0.01            | 9.02            | 0.21  | 0.19   | 0.18            | 257.65   | 2,718,629.63      |
| Light-duty Euro 3 diesel trucks          |  | 1.47  | 0.33  | 0.01            | 7.19            | 0.5   | 0.47   | 0.2             | 290.24   | 2,911,349.25      |
| Light-duty non-standard diesel trucks    |  | 1.1   | 0.63  | 0               | 3.03            | 0.21  | 0.21   | 0.05            | 78.52    | 678,372.63        |
| Medium-duty Euro 1 diesel trucks         |  | 0.39  | 0.14  | 0               | 2.07            | 0.09  | 0.08   | 0.04            | 61.77    | 405,312.91        |
| Medium-duty Euro 2 diesel trucks         |  | 1.4   | 0.35  | 0               | 8.64            | 0.19  | 0.17   | 0.17            | 238.89   | 1,624,322.15      |
| Medium-duty Euro 3 diesel trucks         |  | 1.59  | 0.33  | 0.01            | 7.23            | 0.18  | 0.16   | 0.19            | 266.52   | 1,739,467.94      |
| Medium-duty non-standard diesel trucks   |  | 0.82  | 0.31  | 0               | 3.46            | 0.14  | 0.13   | 0.05            | 70.14    | 405,312.91        |
| Heavy-duty Euro 1 diesel trucks          |  | 5.65  | 2     | 0.01            | 25.69           | 1.29  | 1.2    | 0.53            | 756.94   | 3,006,657.55      |
| Heavy-duty Euro 2 diesel trucks          |  | 30.48 | 9.05  | 0.05            | 169.93          | 4.29  | 3.83   | 3.24            | 4,635.18 | 16,930,693.68     |
| Heavy-duty Euro 3 diesel trucks          |  | 32.68 | 7.22  | 0.04            | 118.2           | 3.86  | 3.45   | 2.98            | 4,256.16 | 15,033,288.02     |
| Heavy-duty non-standard diesel trucks    |  | 6.78  | 2.17  | 0.01            | 35.51           | 1.64  | 1.56   | 0.59            | 847.75   | 2,919,085.13      |
| Euro 1 Four-stroke motorcycles           |  | 134.2 | 11.04 | 0.02            | 3.36            | 0.07  | 0.04   | 0.02            | 304.56   | 11,011,219.58     |

| Antofagasta                                                           | CO     | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|-----------------------------------------------------------------------|--------|--------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Non-standard four-stroke motorcycles                                  | 40.13  | 2.8    | 0               | 0.31            | 0.01  | 0.01   | 0               | 48.63    | 1,793,358.20      |
| Euro 1 two-stroke motorcycles                                         | 0.68   | 0.42   | 0               | 0               | 0.01  | 0.01   | 0               | 1.72     | 69,617.83         |
| Non-standard two-stroke motorcycles                                   | 0.27   | 0.1    | 0               | 0               | 0     | 0      | 0               | 0.35     | 11,338.41         |
| Euro 1 diesel shared taxis                                            | 1.69   | 0.23   | 0               | 2.58            | 0.3   | 0.27   | 0.15            | 211.19   | 4,021,213.92      |
| Euro 3 diesel shared taxis                                            | 0.65   | 0.14   | 0.01            | 4.63            | 0.28  | 0.24   | 0.23            | 331.13   | 6,221,500.74      |
| Euro 1 petrol shared taxis                                            | 693.27 | 57.17  | 7.07            | 134.02          | 1.39  | 0.75   | 0.42            | 6,966.29 | 101,592,559.42    |
| Euro 3 petrol shared taxis                                            | 111.57 | 7.65   | 0.22            | 22.3            | 1.06  | 0.57   | 0.32            | 5,315.41 | 77,161,784.91     |
| Euro 1 diesel rental cars                                             | 0.01   | 0      | 0               | 0.02            | 0     | 0      | 0               | 1.83     | 36,093.93         |
| Euro 3 diesel rental cars                                             | 0.01   | 0      | 0               | 0.09            | 0.01  | 0      | 0               | 6.18     | 120,313.11        |
| Euro 1 petrol rental cars                                             | 11.74  | 1.46   | 0.19            | 2.97            | 0.03  | 0.02   | 0.01            | 137.92   | 2,418,293.43      |
| Euro 3 petrol rental cars                                             | 2.79   | 0.25   | 0.01            | 0.48            | 0.02  | 0.01   | 0.01            | 95.66    | 1,672,352.27      |
| Light-duty non-standard diesel commercial vehicles used by companies  | 2.54   | 0.36   |                 | 0.69            | 0.39  | 0.36   |                 | 100.24   |                   |
| Light-duty Euro 1 petrol commercial vehicles used by companies        | 17.35  | 2.87   |                 | 1.55            |       |        |                 | 81.76    |                   |
| Light-duty Euro 3 petrol commercial vehicles used by companies        | 4.86   | 0.5    |                 | 0.09            |       |        |                 | 71.02    |                   |
| Light-duty non-catalytic petrol commercial vehicles used by companies | 208.28 | 146.84 |                 | 0.78            |       |        |                 | 362.87   |                   |
| Light-duty Euro 1 diesel privately used commercial vehicles           | 13.09  | 4      | 0.03            | 35.29           | 2.8   | 2.61   | 1.51h           | 2,163.19 | 30,386,349.01     |

| Antofagasta                                                        | CO              | COV           | NH <sub>3</sub> | NO <sub>x</sub> | PM 10        | PM 2.5        | SO <sub>2</sub> | Fuel             | Kilometers Driven     |
|--------------------------------------------------------------------|-----------------|---------------|-----------------|-----------------|--------------|---------------|-----------------|------------------|-----------------------|
| Light-duty Euro 3 diesel privately used commercial vehicles        | 15.68           | 3.58          | 0.04            | 42.79           | 2.91         | 2.64          | 2.18            | 3,131.02         | 43,083,654.40         |
| Light-duty non-standard diesel privately used commercial vehicles  | 2.63            | 0.3           | 0               | 3.4             | 0.73         | 0.72          | 0.12            | 177.64           | 2,397,774.91          |
| Light-duty Euro 1 petrol privately used commercial vehicles        | 1,357.57        | 32.72         | 5.66            | 66.15           | 1.03         | 0.56          | 0.46            | 7,743.28         | 75,573,506.71         |
| Light-duty Euro 3 petrol privately used commercial vehicles        | 35.88           | 1.41          | 0.12            | 1.71            | 0.21         | 0.11          | 0.08            | 1,398.04         | 15,432,951.57         |
| Light-duty non-catalytic petrol privately used commercial vehicles | 175.28          | 35.11         | 0.03            | 57.66           | 0.18         | 0.1           | 0.06            | 1,022.89         | 13,405,741.17         |
| Light-duty Euro 1 diesel passenger vehicles                        | 1.98            | 0.29          | 0.01            | 3.11            | 0.38         | 0.35          | 0.18            | 263.9            | 5,113,307.22          |
| Light-duty Euro 1 diesel passenger vehicles                        | 1.44            | 0.31          | 0.01            | 8.88            | 0.56         | 0.48          | 0.44            | 652.5            | 12,416,313.12         |
| Light-duty Euro 1 petrol passenger vehicles                        | 1,351.21        | 161.69        | 16.36           | 262.35          | 3.02         | 1.62          | 0.87            | 14,591.39        | 220,906,896.17        |
| Light-duty Euro 3 petrol passenger vehicles                        | 128.22          | 32.63         | 0.76            | 29.18           | 2.27         | 1.22          | 0.66            | 11,011.10        | 166,128,347.64        |
| Light-duty non-catalytic passenger vehicles                        | 1,136.24        | 231.66        | 0.08            | 135.42          | 0.53         | 0.29          | 0.2             | 3,339.59         | 38,837,072.39         |
| Street Dust                                                        |                 |               |                 |                 | 937.59       | 134.52        |                 |                  |                       |
| <b>TOTAL</b>                                                       | <b>5,615.91</b> | <b>784.01</b> | <b>30.89</b>    | <b>1,515.41</b> | <b>980.1</b> | <b>169.49</b> | <b>22.4</b>     | <b>80,206.93</b> | <b>921,616,985.31</b> |

| Calama                             | CO   | COV  | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel   | Kilometers Driven |
|------------------------------------|------|------|-----------------|-----------------|-------|--------|-----------------|--------|-------------------|
| Tendered Euro 1 diesel urban buses | 0.71 | 0.25 | 0               | 3.03            | 0.16  | 0.14   | 0.06            | 89.83  | 465,642.27        |
| Tendered Euro 2 diesel urban buses | 1.48 | 0.36 | 0               | 7.21            | 0.19  | 0.17   | 0.13            | 190.82 | 1,017,060.73      |

| Calama                                   | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|------------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Tendered Euro 3 diesel urban buses       | 16.85  | 3.24  | 0.02            | 63.47           | 1.68  | 1.48   | 1.17            | 1,675.73 | 7,438,022.59      |
| Tendered non-standard diesel urban buses | 7.91   | 5.03  | 0               | 15.66           | 1.56  | 1.51   | 0.29            | 414.02   | 1,666,509.13      |
| Light-duty Euro 1 diesel trucks          | 0.12   | 0.04  | 0               | 0.61            | 0.03  | 0.03   | 0.01            | 19.31    | 180,616.63        |
| Light-duty Euro 2 diesel trucks          | 0.6    | 0.16  | 0               | 3.8             | 0.09  | 0.08   | 0.08            | 113.68   | 1,093,462.82      |
| Light-duty Euro 3 diesel trucks          | 0.58   | 0.13  | 0               | 2.66            | 0.18  | 0.17   | 0.08            | 107.5    | 1,002,340.90      |
| Light-duty non-standard diesel trucks    | 0.46   | 0.28  | 0               | 1.19            | 0.09  | 0.09   | 0.02            | 33.09    | 252,212.40        |
| Medium-duty Euro 1 diesel trucks         | 0.12   | 0.04  | 0               | 0.59            | 0.03  | 0.02   | 0.01            | 18.35    | 107,914.51        |
| Medium-duty Euro 2 diesel trucks         | 0.64   | 0.16  | 0               | 3.7             | 0.08  | 0.08   | 0.07            | 106.79   | 653,320.28        |
| Medium-duty Euro 3 diesel trucks         | 0.64   | 0.13  | 0               | 2.7             | 0.07  | 0.06   | 0.07            | 102.09   | 598,876.92        |
| Medium-duty non-standard diesel trucks   | 0.35   | 0.14  | 0               | 1.37            | 0.06  | 0.06   | 0.02            | 29.11    | 150,691.43        |
| Heavy-duty Euro 1 diesel trucks          | 0.16   | 0.06  | 0               | 0.73            | 0.04  | 0.03   | 0.02            | 21.44    | 83,045.91         |
| Heavy-duty Euro 2 diesel trucks          | 1.59   | 0.43  | 0               | 8.93            | 0.24  | 0.21   | 0.17            | 242.99   | 971,861.53        |
| Heavy-duty Euro 3 diesel trucks          | 0.82   | 0.17  | 0               | 3.12            | 0.1   | 0.09   | 0.08            | 112.53   | 435,429.87        |
| Heavy-duty non-standard diesel trucks    | 0.15   | 0.05  | 0               | 0.78            | 0.04  | 0.03   | 0.01            | 18.76    | 62,845.55         |
| Euro 1 Four-stroke motorcycles           | 115.76 | 10.14 | 0.02            | 3.15            | 0.06  | 0.03   | 0.02            | 291.35   | 9,591,066.67      |
| Non-standard four-stroke motorcycles     | 58.41  | 4.32  | 0               | 0.39            | 0.01  | 0.01   | 0               | 69.73    | 2,301,082.47      |
| Euro 1 two-stroke motorcycles            | 0.51   | 0.35  | 0               | 0               | 0.01  | 0      | 0               | 1.46     | 60,638.99         |

| Calama                                                               | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|----------------------------------------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Non-standard two-stroke motorcycles                                  | 0.34   | 0.14  | 0               | 0               | 0     | 0      | 0               | 0.46     | 14,548.47         |
| Euro 1 diesel shared taxis                                           | 0.1    | 0.01  | 0               | 0.15            | 0.02  | 0.02   | 0.01            | 12.5     | 234,589.83        |
| Euro 3 diesel shared taxis                                           | 0.08   | 0.02  | 0               | 0.53            | 0.03  | 0.03   | 0.03            | 37.82    | 703,769.49        |
| Euro 1 petrol shared taxis                                           | 601.17 | 53.16 | 4.92            | 106.52          | 1.01  | 0.54   | 0.33            | 5,490.89 | 73,426,616.70     |
| Euro 3 petrol shared taxis                                           | 74.4   | 6.5   | 0.12            | 15.79           | 0.7   | 0.38   | 0.23            | 3,881.15 | 51,453,367.26     |
| Euro 1 diesel rental cars                                            | 0.01   | 0     | 0               | 0.01            | 0     | 0      | 0               | 1.07     | 19,663.62         |
| Euro 1 petrol rental cars                                            | 11.03  | 1.66  | 0.15            | 2.87            | 0.03  | 0.01   | 0.01            | 120.35   | 1,984,826.60      |
| Euro 3 petrol rental cars                                            | 2.29   | 0.27  | 0.02            | 0.4             | 0.02  | 0.01   | 0               | 75.72    | 1,245,381.43      |
| Light-duty Euro 2 diesel commercial vehicles used by companies       | 0.02   | 0.01  | 0               | 0.06            | 0     | 0      | 0               | 3.72     | 50,736.38         |
| Light-duty Euro 5 diesel commercial vehicles used by companies       | 0      | 0     | 0               | 0               | 0     | 0      | 0               | 0.18     | 2,470.48          |
| Light-duty non-standard diesel commercial vehicles used by companies | 5.23   | 0.73  | 0               | 1.59            | 0.81  | 0.75   | 0.01            | 210.44   | 113,230.43        |
| Light-duty Euro 1 petrol commercial vehicles used by companies       | 23.34  | 3.84  | 0               | 2.08            | 0     | 0      | 0               | 111.97   | 27,038.05         |
| Light-duty Euro 2 petrol commercial vehicles used by companies       | 0.02   | 0     | 0               | 0               | 0     | 0      | 0               | 0.73     | 7,685.94          |
| Light-duty Euro 3 petrol commercial vehicles used by companies       | 14.27  | 1.47  | 0               | 0.27            | 0     | 0      | 0               | 211.62   | 51,102.38         |



| Calama                                                                | CO       | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|-----------------------------------------------------------------------|----------|--------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Light-duty Euro 4 petrol commercial vehicles used by companies        | 0.09     | 0      | 0               | 0               | 0     | 0      | 0               | 6.11     | 64,141.03         |
| Light-duty non-catalytic petrol commercial vehicles used by companies | 445.24   | 311.83 | 0               | 2.54            | 0     | 0      | 0               | 786.56   | 209,853.73        |
| Light-duty Euro 1 diesel privately used commercial vehicles           | 12.51    | 3.39   | 0.02            | 30.62           | 2.64  | 2.48   | 1.34            | 1,916.85 | 24,714,007.75     |
| Light-duty Euro 2 diesel privately used commercial vehicles           | 9.76     | 2.64   | 0.02            | 24.06           | 1.81  | 1.81   | 1.05            | 1,502.55 | 19,642,496.64     |
| Light-duty Euro 3 diesel privately used commercial vehicles           | 18.43    | 3.81   | 0.04            | 46.25           | 3.33  | 3.06   | 2.39            | 3,435.33 | 43,628,509.67     |
| Light-duty non-standard diesel privately used commercial vehicles     | 1.12     | 0.12   | 0               | 1.69            | 0.3   | 0.29   | 0.05            | 78.72    | 961,899.90        |
| Light-duty Euro 1 petrol privately used commercial vehicles           | 1,539.00 | 36.7   | 5.99            | 71.74           | 1.09  | 0.59   | 0.52            | 8,685.15 | 80,858,169.57     |
| Light-duty Euro 2 petrol privately used commercial vehicles           | 20.12    | 0.25   | 0.43            | 0.86            | 0     | 0      | 0.02            | 283.98   | 2,975,599.16      |
| Light-duty Euro 3 petrol privately used commercial vehicles           | 34.08    | 0.99   | 0.13            | 1.21            | 0.14  | 0.08   | 0.06            | 1,016.52 | 10,417,958.90     |
| Light-duty non-catalytic petrol privately used commercial vehicles    | 381.49   | 60.91  | 0.04            | 79.61           | 0.27  | 0.14   | 0.1             | 1,699.28 | 19,690,118.70     |
| Light-duty Euro 1 diesel passenger vehicles                           | 2.12     | 0.31   | 0               | 3.01            | 0.39  | 0.36   | 0.17            | 257.47   | 4,581,622.34      |
| Light-duty Euro 1 diesel passenger vehicles                           | 2.24     | 0.46   | 0.01            | 10.93           | 0.71  | 0.62   | 0.54            | 823.23   | 14,374,101.79     |
| Light-duty Pre euro diesel passenger vehicles                         | 0.29     | 0.07   | 0               | 0.26            | 0.09  | 0.09   | 0.02            | 26.11    | 450,172.38        |

| Calama                                      | CO              | COV             | NH <sub>3</sub> | NO <sub>x</sub> | PM 10         | PM 2.5       | SO <sub>2</sub> | Fuel             | Kilometers Driven     |
|---------------------------------------------|-----------------|-----------------|-----------------|-----------------|---------------|--------------|-----------------|------------------|-----------------------|
| Light-duty Euro 1 petrol passenger vehicles | 1,277.65        | 186.45          | 13.96           | 267.36          | 2.53          | 1.36         | 0.76            | 12,828.90        | 187,527,197.36        |
| Light-duty Euro 3 petrol passenger vehicles | 136.78          | 44.37           | 1.12            | 37.29           | 1.95          | 1.05         | 0.59            | 9,971.07         | 144,736,670.17        |
| Light-duty non-catalytic passenger vehicles | 1,154.29        | 314.35          | 0.07            | 130.18          | 0.48          | 0.26         | 0.2             | 3,391.46         | 35,940,927.57         |
| Medium-duty Euro 1 diesel vehicles          | 1.18            | 0.32            | 0               | 2.97            | 0.22          | 0.22         | 0.13            | 184.52           | 2,509,055.04          |
| Medium-duty Euro 2 diesel vehicles          | 0.93            | 0.26            | 0               | 2.34            | 0.18          | 0.18         | 0.1             | 145.78           | 1,984,694.81          |
| Medium-duty Euro 3 diesel vehicles          | 1.73            | 0.36            | 0               | 4.43            | 0.26          | 0.26         | 0.23            | 328.46           | 4,429,323.36          |
| Medium-duty non-standard diesel vehicles    | 0.11            | 0.01            | 0               | 0.17            | 0.03          | 0.03         | 0.01            | 7.89             | 96,639.78             |
| Medium-duty Euro 1 petrol vehicles          | 44.66           | 1.85            | 0.59            | 3.73            | 0             | 0            | 0.05            | 819.97           | 8,209,012.46          |
| Medium-duty Euro 2 petrol vehicles          | 0.87            | 0.01            | 0.04            | 0.05            | 0             | 0            | 0               | 28.66            | 300,657.11            |
| Medium-duty Euro 3 petrol vehicles          | 2.62            | 0.03            | 0.01            | 0.1             | 0             | 0            | 0.01            | 100.89           | 1,057,668.69          |
| Medium-duty non-catalytic petrol vehicles   | 34.06           | 3.6             | 0               | 5.54            | 0             | 0            | 0.01            | 162.91           | 1,999,011.73          |
| Street Dust                                 |                 |                 |                 |                 | 308.32        | 44.23        |                 |                  |                       |
| <b>TOTAL</b>                                | <b>6,061.54</b> | <b>1,066.41</b> | <b>27.78</b>    | <b>980.3</b>    | <b>332.07</b> | <b>63.16</b> | <b>11.31</b>    | <b>62,305.57</b> | <b>768,827,178.30</b> |

| Copiapó                        | CO   | COV  | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel  | Kilometers Driven |
|--------------------------------|------|------|-----------------|-----------------|-------|--------|-----------------|-------|-------------------|
| Euro 1 diesel interurban buses | 0.45 | 0.18 | 0               | 1.84            | 0.1   | 0.09   | 0.03            | 49.68 | 207,504.47        |
| Euro 2 diesel interurban buses | 0.55 | 0.17 | 0               | 2.87            | 0.07  | 0.06   | 0.05            | 68.39 | 287,828.77        |
| Euro 3 diesel interurban buses | 1.78 | 0.42 | 0               | 6.97            | 0.2   | 0.18   | 0.04            | 54.88 | 732,959.33        |

| Copiapó                                  | CO   | COV  | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel   | Kilometers Driven |
|------------------------------------------|------|------|-----------------|-----------------|-------|--------|-----------------|--------|-------------------|
| Non-standard diesel interurban buses     | 1.09 | 0.37 | 0               | 4.58            | 0.24  | 0.23   | 0.07            | 101.16 | 391,581.01        |
| Tendered Euro 1 diesel urban buses       | 1.7  | 0.57 | 0               | 6.38            | 0.33  | 0.31   | 0.1             | 139.4  | 694,387.63        |
| Tendered Euro 2 diesel urban buses       | 2.39 | 0.55 | 0               | 9.81            | 0.24  | 0.21   | 0.13            | 181.16 | 963,182.81        |
| Tendered Euro 3 diesel urban buses       | 7.37 | 1.49 | 0               | 29.59           | 0.64  | 0.58   | 0.31            | 436.24 | 2,452,756.26      |
| Tendered non-standard diesel urban buses | 9.78 | 6.56 | 0               | 18.07           | 1.98  | 1.95   | 0.22            | 316.26 | 1,310,376.63      |
| Light-duty Euro 1 diesel trucks          | 0.15 | 0.05 | 0               | 0.75            | 0.03  | 0.03   | 0.02            | 23.06  | 233,185.26        |
| Light-duty Euro 2 diesel trucks          | 0.26 | 0.07 | 0               | 1.64            | 0.04  | 0.03   | 0.03            | 46.14  | 488,412.92        |
| Light-duty Euro 3 diesel trucks          | 0.21 | 0.05 | 0               | 0.92            | 0.06  | 0.06   | 0.03            | 35.96  | 359,638.93        |
| Light-duty non-standard diesel trucks    | 0.46 | 0.28 | 0               | 1.12            | 0.09  | 0.09   | 0.02            | 29.53  | 249,427.01        |
| Medium-duty Euro 1 diesel trucks         | 0.1  | 0.04 | 0               | 0.48            | 0.02  | 0.02   | 0.01            | 14.38  | 90,227.46         |
| Medium-duty Euro 2 diesel trucks         | 0.18 | 0.05 | 0               | 1.07            | 0.02  | 0.02   | 0.02            | 28.98  | 188,983.89        |
| Medium-duty Euro 3 diesel trucks         | 0.15 | 0.03 | 0               | 0.63            | 0.02  | 0.01   | 0.02            | 22.31  | 139,156.77        |
| Medium-duty non-standard diesel trucks   | 0.22 | 0.09 | 0               | 0.86            | 0.04  | 0.04   | 0.01            | 17.66  | 96,511.96         |
| Heavy-duty Euro 1 diesel trucks          | 1.62 | 0.6  | 0               | 6.88            | 0.37  | 0.35   | 0.13            | 187.21 | 740,405.66        |
| Heavy-duty Euro 2 diesel trucks          | 5.62 | 1.72 | 0.01            | 30.34           | 0.75  | 0.67   | 0.52            | 749.18 | 2,920,489.04      |
| Heavy-duty Euro 3 diesel trucks          | 5.39 | 1.21 | 0.01            | 18.95           | 0.63  | 0.56   | 0.42            | 603.54 | 2,282,917.42      |
| Heavy-duty non-standard diesel trucks    | 1.59 | 0.53 | 0               | 7.76            | 0.37  | 0.36   | 0.12            | 176.77 | 596,437.86        |

| Copiapó                                                              | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|----------------------------------------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Euro 1 Four-stroke motorcycles                                       | 93.27  | 8.09  | 0.02            | 2.39            | 0.05  | 0.03   | 0.01            | 225.61   | 7,906,103.35      |
| Non-standard four-stroke motorcycles                                 | 22.5   | 1.67  | 0               | 0.15            | 0.01  | 0      | 0               | 27.17    | 922,378.69        |
| Euro 1 two-stroke motorcycles                                        | 0.79   | 0.59  | 0               | 0               | 0.01  | 0.01   | 0               | 2.43     | 101,882.78        |
| Non-standard two-stroke motorcycles                                  | 0.27   | 0.11  | 0               | 0               | 0     | 0      | 0               | 0.37     | 11,886.32         |
| Euro 1 diesel shared taxis                                           | 0.91   | 0.12  | 0               | 1.35            | 0.13  | 0.12   | 0.06            | 83.63    | 1,552,191.34      |
| Euro 3 diesel shared taxis                                           | 0.68   | 0.14  | 0               | 3.62            | 0.19  | 0.16   | 0.12            | 174.81   | 3,663,171.42      |
| Euro 1 petrol shared taxis                                           | 550.37 | 45.88 | 1.68            | 74.79           | 0.63  | 0.34   | 0.09            | 1,571.84 | 45,634,422.85     |
| Euro 3 petrol shared taxis                                           | 74.48  | 5.89  | 0.12            | 12.32           | 0.59  | 0.32   | 0.09            | 1,505.18 | 43,150,916.14     |
| Euro 3 diesel rental cars                                            | 0      | 0     | 0               | 0.03            | 0     | 0      | 0               | 1.9      | 35,258.81         |
| Euro 1 petrol rental cars                                            | 1.59   | 0.25  | 0.02            | 0.4             | 0     | 0      | 0               | 17.25    | 291,199.50        |
| Euro 3 petrol rental cars                                            | 0.68   | 0.09  | 0               | 0.11            | 0.01  | 0      | 0               | 23.85    | 400,399.31        |
| Light-duty Euro 2 diesel commercial vehicles used by companies       | 0      | 0     | 0               | 0.01            | 0     | 0      | 0               | 0.56     | 8,002.13          |
| Light-duty Euro 5 diesel commercial vehicles used by companies       | 0      | 0     | 0               | 0               | 0     | 0      | 0               | 0.17     | 2,439.68          |
| Light-duty non-standard diesel commercial vehicles used by companies | 1.9    | 0.27  | 0               | 0.56            | 0.29  | 0.27   | 0               | 76.13    | 28,514.92         |
| Light-duty Euro 1 petrol commercial vehicles used by companies       | 14.82  | 2.44  | 0               | 1.32            | 0     | 0      | 0               | 70.67    | 11,788.51         |

| Copiapó                                                               | CO       | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|-----------------------------------------------------------------------|----------|--------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Light-duty Euro 2 petrol commercial vehicles used by companies        | 0.01     | 0      | 0               | 0               | 0     | 0      | 0               | 0.2      | 2,205.47          |
| Light-duty Euro 3 petrol commercial vehicles used by companies        | 9.23     | 0.95   | 0               | 0.17            | 0     | 0      | 0               | 136.19   | 22,718.25         |
| Light-duty Euro 4 petrol commercial vehicles used by companies        | 0.04     | 0      | 0               | 0               | 0     | 0      | 0               | 2.87     | 31,247.36         |
| Light-duty non-catalytic petrol commercial vehicles used by companies | 240.34   | 168.75 | 0               | 1.22            | 0     | 0      | 0               | 422.73   | 77,874.43         |
| Light-duty Euro 1 diesel privately used commercial vehicles           | 9.85     | 2.69   | 0.02            | 24.03           | 2.06  | 1.94   | 0.89            | 1,287.46 | 19,386,418.65     |
| Light-duty Euro 2 diesel privately used commercial vehicles           | 2.2      | 0.63   | 0               | 5.7             | 0.41  | 0.41   | 0.24            | 342.89   | 4,893,921.06      |
| Light-duty Euro 3 diesel privately used commercial vehicles           | 7.31     | 1.52   | 0.02            | 18.34           | 1.33  | 1.22   | 0.82            | 1,183.33 | 17,691,167.02     |
| Light-duty non-standard diesel privately used commercial vehicles     | 1.69     | 0.19   | 0               | 2.49            | 0.44  | 0.43   | 0.08            | 115.05   | 1,466,166.34      |
| Light-duty Euro 1 petrol privately used commercial vehicles           | 1,032.40 | 24.06  | 3.2             | 46.82           | 0.65  | 0.35   | 0.24            | 3,960.27 | 48,314,685.81     |
| Light-duty Euro 2 petrol privately used commercial vehicles           | 7.27     | 0.1    | 0.2             | 0.27            | 0     | 0      | 0.01            | 124.71   | 1,348,812.35      |
| Light-duty Euro 3 petrol privately used commercial vehicles           | 20.84    | 0.74   | 0.09            | 0.88            | 0.1   | 0.05   | 0.04            | 674.38   | 7,313,801.70      |
| Light-duty non-catalytic petrol privately used commercial vehicles    | 270.88   | 50.24  | 0.03            | 56.36           | 0.19  | 0.1    | 0.06            | 1,070.99 | 14,094,809.90     |

| Copiapó                                       | CO              | COV           | NH <sub>3</sub> | NO <sub>x</sub> | PM 10         | PM 2.5       | SO <sub>2</sub> | Fuel             | Kilometers Driven     |
|-----------------------------------------------|-----------------|---------------|-----------------|-----------------|---------------|--------------|-----------------|------------------|-----------------------|
| Light-duty Euro 1 diesel passenger vehicles   | 1.61            | 0.24          | 0               | 2.29            | 0.28          | 0.26         | 0.12            | 190.59           | 3,420,104.36          |
| Light-duty Euro 1 diesel passenger vehicles   | 0.86            | 0.17          | 0.01            | 3.99            | 0.26          | 0.22         | 0.19            | 292.61           | 5,253,562.46          |
| Light-duty Pre euro diesel passenger vehicles | 0.29            | 0.07          | 0               | 0.26            | 0.09          | 0.09         | 0.02            | 25.24            | 453,035.69            |
| Light-duty Euro 1 petrol passenger vehicles   | 713.71          | 102.64        | 6.1             | 128.1           | 1.27          | 0.68         | 0.29            | 4,919.77         | 94,445,704.26         |
| Light-duty Euro 3 petrol passenger vehicles   | 60.2            | 20.41         | 0.64            | 16.71           | 0.85          | 0.46         | 0.2             | 3,355.68         | 63,081,088.21         |
| Light-duty non-catalytic passenger vehicles   | 918.53          | 242.7         | 0.04            | 93.41           | 0.34          | 0.18         | 0.12            | 1,999.10         | 25,443,554.10         |
| Medium-duty Euro 1 diesel vehicles            | 0               | 0             | 0               | 0.01            | 0             | 0            | 0               | 0.5              | 7,269.30              |
| Medium-duty Euro 2 diesel vehicles            | 0               | 0             | 0               | 0               | 0             | 0            | 0               | 0.13             | 1,861.60              |
| Medium-duty Euro 3 diesel vehicles            | 0               | 0             | 0               | 0.01            | 0             | 0            | 0               | 0.46             | 6,633.64              |
| Medium-duty non-standard diesel vehicles      | 0               | 0             | 0               | 0               | 0             | 0            | 0               | 0.04             | 567.56                |
| Medium-duty Euro 1 petrol vehicles            | 0.08            | 0             | 0               | 0.01            | 0             | 0            | 0               | 1.66             | 18,116.50             |
| Medium-duty Euro 2 petrol vehicles            | 0               | 0             | 0               | 0               | 0             | 0            | 0               | 0.05             | 513.07                |
| Medium-duty Euro 3 petrol vehicles            | 0.01            | 0             | 0               | 0               | 0             | 0            | 0               | 0.25             | 2,742.45              |
| Medium-duty non-catalytic petrol vehicles     | 0.08            | 0.01          | 0               | 0.01            | 0             | 0            | 0               | 0.41             | 5,285.12              |
| Street Dust                                   |                 |               |                 |                 | 175.74        | 25.21        |                 |                  |                       |
| <b>TOTAL</b>                                  | <b>4,100.74</b> | <b>696.73</b> | <b>12.23</b>    | <b>649.66</b>   | <b>192.17</b> | <b>38.74</b> | <b>6.01</b>     | <b>27,171.04</b> | <b>425,930,793.55</b> |

| La Serena-Coquimbo                       | CO    | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|------------------------------------------|-------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Euro 1 diesel interurban buses           | 0.64  | 0.24  | 0               | 3.21            | 0.15  | 0.14   | 0.07            | 93.16    | 467,601.41        |
| Euro 2 diesel interurban buses           | 0.94  | 0.27  | 0               | 5.82            | 0.15  | 0.13   | 0.11            | 154.23   | 773,162.76        |
| Euro 3 diesel interurban buses           | 2.24  | 0.52  | 0               | 9.52            | 0.3   | 0.26   | 0.03            | 39.58    | 1,564,844.35      |
| Non-standard diesel interurban buses     | 2.26  | 0.71  | 0               | 12.48           | 0.57  | 0.53   | 0.21            | 296.19   | 1,365,766.50      |
| Tendered Euro 1 diesel urban buses       | 6.42  | 2.24  | 0.01            | 27.61           | 1.42  | 1.31   | 0.57            | 815.71   | 4,190,943.92      |
| Tendered Euro 2 diesel urban buses       | 10.47 | 2.56  | 0.02            | 50.83           | 1.36  | 1.17   | 0.92            | 1,310.94 | 6,929,580.83      |
| Tendered Euro 3 diesel urban buses       | 25.18 | 5.07  | 0.03            | 99.06           | 2.8   | 2.42   | 1.96            | 2,806.13 | 14,025,139.33     |
| Tendered non-standard diesel urban buses | 61.68 | 39.35 | 0.03            | 121.07          | 12.22 | 11.88  | 2.12            | 3,030.55 | 12,240,875.89     |
| Light-duty Euro 1 diesel trucks          | 0.86  | 0.28  | 0               | 5.1             | 0.2   | 0.18   | 0.11            | 155.03   | 1,508,863.47      |
| Light-duty Euro 2 diesel trucks          | 1.68  | 0.4   | 0.01            | 11.99           | 0.28  | 0.24   | 0.24            | 344.39   | 3,482,578.88      |
| Light-duty Euro 3 diesel trucks          | 1.27  | 0.27  | 0.01            | 6.77            | 0.45  | 0.43   | 0.19            | 275.95   | 2,667,182.94      |
| Light-duty non-standard diesel trucks    | 3.32  | 1.78  | 0.01            | 9.99            | 0.65  | 0.63   | 0.18            | 253.8    | 2,137,556.58      |
| Medium-duty Euro 1 diesel trucks         | 0.62  | 0.21  | 0               | 3.42            | 0.14  | 0.13   | 0.07            | 102.93   | 672,410.03        |
| Medium-duty Euro 2 diesel trucks         | 1.3   | 0.31  | 0               | 8.17            | 0.19  | 0.17   | 0.16            | 229.38   | 1,551,976.71      |
| Medium-duty Euro 3 diesel trucks         | 1.03  | 0.21  | 0               | 4.83            | 0.12  | 0.11   | 0.13            | 182.57   | 1,188,603.60      |
| Medium-duty non-standard diesel trucks   | 1.83  | 0.67  | 0               | 8.16            | 0.31  | 0.3    | 0.11            | 164.05   | 952,580.87        |
| Heavy-duty Euro 1 diesel trucks          | 2.81  | 0.93  | 0.01            | 13.63           | 0.64  | 0.59   | 0.28            | 399.07   | 1,754,200.09      |

| La Serena-Coquimbo                                             |  | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|----------------------------------------------------------------|--|--------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Heavy-duty Euro 2 diesel trucks                                |  | 13.54  | 3.72  | 0.03            | 77.46           | 1.99  | 1.76   | 1.49            | 2,127.18 | 8,498,124.86      |
| Heavy-duty Euro 3 diesel trucks                                |  | 15.39  | 3.27  | 0.03            | 59.21           | 1.89  | 1.66   | 1.51            | 2,160.94 | 8,381,178.01      |
| Heavy-duty non-standard diesel trucks                          |  | 2.82   | 0.82  | 0               | 15.96           | 0.7   | 0.66   | 0.26            | 375.77   | 1,442,342.25      |
| Euro 1 Four-stroke motorcycles                                 |  | 255.48 | 19.89 | 0.04            | 7.39            | 0.13  | 0.07   | 0.04            | 611.15   | 20,263,002.63     |
| Non-standard four-stroke motorcycles                           |  | 51.5   | 3.16  | 0               | 0.41            | 0.01  | 0.01   | 0               | 60.61    | 2,069,268.61      |
| Euro 1 two-stroke motorcycles                                  |  | 4.34   | 3.79  | 0               | 0.02            | 0.05  | 0.05   | 0               | 16.13    | 634,235.24        |
| Non-standard two-stroke motorcycles                            |  | 1.58   | 0.59  | 0               | 0               | 0.01  | 0.01   | 0               | 2.09     | 64,768.44         |
| Euro 1 diesel shared taxis                                     |  | 15.63  | 2.18  | 0.03            | 24.97           | 2.79  | 2.57   | 1.29            | 1,853.78 | 34,430,403.59     |
| Euro 3 diesel shared taxis                                     |  | 4.57   | 1     | 0.04            | 31.02           | 1.81  | 1.56   | 1.46            | 2,083.37 | 38,672,721.23     |
| Euro 1 petrol shared taxis                                     |  | 501.04 | 41.52 | 5.45            | 98.09           | 1.01  | 0.54   | 0.28            | 4,678.54 | 73,656,475.34     |
| Euro 3 petrol shared taxis                                     |  | 107.85 | 7.02  | 0.54            | 18.31           | 0.93  | 0.5    | 0.26            | 4,359.42 | 68,123,015.04     |
| Euro 1 diesel rental cars                                      |  | 0.02   | 0     | 0               | 0.04            | 0     | 0      | 0               | 2.98     | 58,307.03         |
| Euro 3 diesel rental cars                                      |  | 0.01   | 0     | 0               | 0.07            | 0     | 0      | 0               | 5.39     | 104,952.64        |
| Euro 1 petrol rental cars                                      |  | 12.71  | 1.57  | 0.23            | 3.44            | 0.04  | 0.02   | 0.01            | 148.29   | 2,612,154.68      |
| Euro 3 petrol rental cars                                      |  | 4.47   | 0.38  | 0.05            | 0.61            | 0.03  | 0.02   | 0.01            | 140.26   | 2,460,556.44      |
| Light-duty Euro 2 diesel commercial vehicles used by companies |  | 0.03   | 0.01  | 0               | 0.08            | 0.01  | 0.01   | 0               | 4.92     | 72,818.18         |
| Light-duty Euro 5 diesel commercial vehicles used by companies |  | 0.01   | 0     | 0               | 0.01            | 0     | 0      | 0               | 1.61     | 23,791.13         |



| La Serena-Coquimbo                                                    | CO       | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|-----------------------------------------------------------------------|----------|--------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Light-duty non-standard diesel commercial vehicles used by companies  | 2.14     | 0.29   | 0               | 0.87            | 0.37  | 0.34   | 0.01            | 93.32    | 270,371.22        |
| Light-duty Euro 1 petrol commercial vehicles used by companies        | 13.49    | 2.2    | 0.01            | 1.22            | 0     | 0      | 0               | 70.69    | 101,232.68        |
| Light-duty Euro 2 petrol commercial vehicles used by companies        | 0.04     | 0      | 0               | 0               | 0     | 0      | 0               | 1.86     | 21,961.04         |
| Light-duty Euro 3 petrol commercial vehicles used by companies        | 11.42    | 1.15   | 0.01            | 0.23            | 0     | 0      | 0               | 183.02   | 262,087.66        |
| Light-duty Euro 4 petrol commercial vehicles used by companies        | 0.29     | 0      | 0.01            | 0.01            | 0     | 0      | 0               | 28.59    | 337,410.19        |
| Light-duty non-catalytic petrol commercial vehicles used by companies | 265.67   | 181.63 | 0               | 4.72            | 0.01  | 0.01   | 0               | 503.62   | 801,481.64        |
| Light-duty Euro 1 diesel privately used commercial vehicles           | 17.87    | 5.23   | 0.04            | 46.98           | 3.88  | 3.62   | 2               | 2,870.64 | 40,441,021.80     |
| Light-duty Euro 2 diesel privately used commercial vehicles           | 3.63     | 1.05   | 0.01            | 9.64            | 0.7   | 0.7    | 0.41            | 591.34   | 8,727,779.29      |
| Light-duty Euro 3 diesel privately used commercial vehicles           | 11.51    | 2.55   | 0.03            | 31.12           | 2.21  | 2      | 1.58            | 2,265.47 | 32,405,922.42     |
| Light-duty non-standard diesel privately used commercial vehicles     | 3.17     | 0.34   | 0               | 3.9             | 0.9   | 0.88   | 0.15            | 216.57   | 2,851,536.37      |
| Light-duty Euro 1 petrol privately used commercial vehicles           | 1,970.55 | 42.17  | 7.61            | 90.45           | 1.32  | 0.71   | 0.57            | 9,536.75 | 96,063,299.90     |
| Light-duty Euro 2 petrol privately used commercial vehicles           | 10.16    | 0.16   | 0.38            | 0.56            | 0     | 0      | 0.01            | 223.67   | 2,632,187.56      |

| La Serena-Coquimbo                                                 |  | CO       | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel      | Kilometers Driven |
|--------------------------------------------------------------------|--|----------|--------|-----------------|-----------------|-------|--------|-----------------|-----------|-------------------|
| Light-duty Euro 3 petrol privately used commercial vehicles        |  | 23.08    | 1.02   | 0.22            | 1.27            | 0.17  | 0.09   | 0.06            | 1,045.10  | 12,133,460.33     |
| Light-duty non-catalytic petrol privately used commercial vehicles |  | 454.42   | 79.86  | 0.06            | 138.57          | 0.43  | 0.23   | 0.15            | 2,426.36  | 31,413,077.59     |
| Light-duty Euro 1 diesel passenger vehicles                        |  | 4.04     | 0.6    | 0.01            | 6.85            | 0.88  | 0.81   | 0.39            | 574.04    | 10,961,720.96     |
| Light-duty Euro 1 diesel passenger vehicles                        |  | 1.41     | 0.31   | 0.01            | 9.45            | 0.61  | 0.53   | 0.47            | 690.02    | 13,107,419.17     |
| Light-duty Pre euro diesel passenger vehicles                      |  | 1.34     | 0.29   | 0               | 1.26            | 0.4   | 0.4    | 0.08            | 118.85    | 2,308,958.14      |
| Light-duty Euro 1 petrol passenger vehicles                        |  | 1,517.48 | 183.1  | 19.41           | 278.84          | 3.41  | 1.84   | 0.95            | 15,929.74 | 248,667,788.95    |
| Light-duty Euro 3 petrol passenger vehicles                        |  | 107.42   | 28.52  | 1.3             | 24.85           | 1.95  | 1.05   | 0.55            | 9,183.83  | 142,653,965.12    |
| Light-duty non-catalytic passenger vehicles                        |  | 2,022.08 | 413.37 | 0.13            | 239             | 0.92  | 0.5    | 0.35            | 5,897.89  | 67,414,585.05     |
| Medium-duty Euro 1 diesel vehicles                                 |  | 0.03     | 0.01   | 0               | 0.08            | 0.01  | 0.01   | 0               | 4.82      | 71,471.12         |
| Medium-duty Euro 2 diesel vehicles                                 |  | 0.01     | 0      | 0               | 0.02            | 0     | 0      | 0               | 1.04      | 15,424.54         |
| Medium-duty Euro 3 diesel vehicles                                 |  | 0.02     | 0      | 0               | 0.05            | 0     | 0      | 0               | 3.87      | 57,270.75         |
| Medium-duty non-standard diesel vehicles                           |  | 0.01     | 0      | 0               | 0.01            | 0     | 0      | 0               | 0.38      | 5,039.50          |
| Medium-duty Euro 1 petrol vehicles                                 |  | 0.52     | 0.03   | 0.02            | 0.07            | 0     | 0      | 0               | 14.39     | 169,771.97        |
| Medium-duty Euro 2 petrol vehicles                                 |  | 0.01     | 0      | 0               | 0               | 0     | 0      | 0               | 0.39      | 4,651.85          |
| Medium-duty Euro 3 petrol vehicles                                 |  | 0.03     | 0      | 0               | 0               | 0     | 0      | 0               | 1.82      | 21,443.38         |
| Medium-duty non-catalytic petrol vehicles                          |  | 0.68     | 0.07   | 0               | 0.16            | 0     | 0      | 0               | 4.01      | 55,516.10         |

| La Serena-Coquimbo                       |                 |                 |                 |                 |               |               |                 |                  |                         |
|------------------------------------------|-----------------|-----------------|-----------------|-----------------|---------------|---------------|-----------------|------------------|-------------------------|
|                                          | CO              | COV             | NH <sub>3</sub> | NO <sub>x</sub> | PM 10         | PM 2.5        | SO <sub>2</sub> | Fuel             | Kilometers Driven       |
| Street Dust                              |                 |                 |                 |                 | 583.12        | 83.66         |                 |                  |                         |
| <b>TOTAL</b>                             | <b>7,558.04</b> | <b>1,088.92</b> | <b>35.86</b>    | <b>1,628.97</b> | <b>634.66</b> | <b>127.45</b> | <b>21.84</b>    | <b>81,768.20</b> | <b>1,033,019,839.80</b> |
| Greater Valparaíso                       |                 |                 |                 |                 |               |               |                 |                  |                         |
|                                          | CO              | COV             | NH <sub>3</sub> | NO <sub>x</sub> | PM 10         | PM 2.5        | SO <sub>2</sub> | Fuel Consumption | Kilometers Driven       |
| Tendered Euro 1 diesel urban buses       | 8.2             | 3.01            | 0.01            | 38.94           | 1.91          | 1.75          | 0.73            | 1,047.65         | 6,162,043.38            |
| Tendered Euro 2 diesel urban buses       | 59.46           | 15.23           | 0.09            | 305.18          | 7.95          | 6.8           | 5.14            | 7,343.36         | 41,970,362.63           |
| Tendered Euro 3 diesel urban buses       | 163.57          | 34.82           | 0.22            | 667.12          | 19.48         | 16.63         | 13.71           | 19,588.10        | 104,138,531.78          |
| Tendered non-standard diesel urban buses | 18.96           | 12.24           | 0.01            | 43.72           | 3.75          | 3.61          | 0.71            | 1,013.89         | 4,929,634.82            |
| Light-duty Euro 1 diesel trucks          | 0.21            | 0.07            | 0               | 1.21            | 0.05          | 0.04          | 0.03            | 35.89            | 344,897.31              |
| Light-duty Euro 2 diesel trucks          | 0.4             | 0.1             | 0               | 2.72            | 0.06          | 0.06          | 0.05            | 77.34            | 760,954.82              |
| Light-duty Euro 3 diesel trucks          | 0.23            | 0.05            | 0               | 1.19            | 0.08          | 0.07          | 0.03            | 45.68            | 436,716.92              |
| Light-duty non-standard diesel trucks    | 0.75            | 0.42            | 0               | 2.16            | 0.15          | 0.14          | 0.04            | 55.21            | 447,046.61              |
| Medium-duty Euro 1 diesel trucks         | 0.08            | 0.03            | 0               | 0.39            | 0.02          | 0.02          | 0.01            | 11.56            | 74,025.69               |
| Medium-duty Euro 2 diesel trucks         | 0.15            | 0.04            | 0               | 0.91            | 0.02          | 0.02          | 0.02            | 24.62            | 163,324.57              |
| Medium-duty Euro 3 diesel trucks         | 0.09            | 0.02            | 0               | 0.41            | 0.01          | 0.01          | 0.01            | 14.67            | 93,733.03               |
| Medium-duty non-standard diesel trucks   | 0.21            | 0.08            | 0               | 0.85            | 0.03          | 0.03          | 0.01            | 16.81            | 95,950.10               |
| Heavy-duty Euro 1 diesel trucks          | 0.41            | 0.14            | 0               | 1.97            | 0.09          | 0.09          | 0.04            | 57.42            | 251,292.96              |
| Heavy-duty Euro 2 diesel trucks          | 1.06            | 0.25            | 0               | 6.01            | 0.17          | 0.15          | 0.11            | 162.71           | 733,110.87              |
| Heavy-duty Euro 3 diesel trucks          | 0.91            | 0.18            | 0               | 3.72            | 0.12          | 0.1           | 0.09            | 133.67           | 585,657.99              |

| Greater Valparaíso                                             |        |       |                 |                 |       |        |                 |                  |                   |
|----------------------------------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|------------------|-------------------|
|                                                                | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel Consumption | Kilometers Driven |
| Heavy-duty non-standard diesel trucks                          | 0.72   | 0.21  | 0               | 4               | 0.18  | 0.17   | 0.07            | 93.72            | 357,209.83        |
| Euro 1 Four-stroke motorcycles                                 | 605.7  | 43.43 | 0.09            | 20.3            | 0.3   | 0.16   | 0.09            | 1,529.05         | 46,373,949.92     |
| Non-standard four-stroke motorcycles                           | 177.69 | 9.76  | 0.01            | 1.56            | 0.04  | 0.02   | 0.01            | 203.44           | 6,770,151.61      |
| Euro 1 two-stroke motorcycles                                  | 3.95   | 4.21  | 0               | 0.03            | 0.06  | 0.06   | 0               | 18.58            | 714,640.42        |
| Non-standard two-stroke motorcycles                            | 2.61   | 0.93  | 0               | 0.01            | 0.02  | 0.02   | 0               | 3.42             | 104,330.64        |
| Euro 1 compressed natural gas shared taxis                     | 12.72  | 1.58  | 0               | 2.71            | 0.11  | 0.06   | 0.06            | 373.47           | 7,870,629.83      |
| Euro 1 diesel shared taxis                                     | 2.86   | 0.41  | 0.01            | 5.01            | 0.6   | 0.55   | 0.27            | 382.58           | 7,713,217.36      |
| Euro 3 diesel shared taxis                                     | 1.31   | 0.3   | 0.01            | 10.51           | 0.64  | 0.55   | 0.49            | 707.74           | 14,062,191.90     |
| Euro 1 petrol shared taxis                                     | 804.99 | 90.32 | 10.17           | 264.99          | 1.78  | 0.96   | 0.48            | 7,936.38         | 130,022,805.73    |
| Euro 3 petrol shared taxis                                     | 227.18 | 16.51 | 1.41            | 52.19           | 1.93  | 1.04   | 0.52            | 8,678.12         | 140,989,219.95    |
| Euro 1 compressed natural gas rental cars                      | 0.06   | 0     | 0               | 0.01            | 0     | 0      | 0               | 1.57             | 32,274.56         |
| Euro 1 diesel rental cars                                      | 0.02   | 0     | 0               | 0.05            | 0.01  | 0.01   | 0               | 4.07             | 80,686.41         |
| Euro 3 diesel rental cars                                      | 0.01   | 0     | 0               | 0.06            | 0     | 0      | 0               | 4.06             | 80,686.41         |
| Euro 1 petrol rental cars                                      | 23.3   | 3.06  | 0.45            | 10.4            | 0.07  | 0.04   | 0.02            | 268.61           | 4,857,322.22      |
| Euro 3 petrol rental cars                                      | 9.3    | 0.7   | 0.13            | 1.5             | 0.06  | 0.03   | 0.02            | 257.71           | 4,647,537.26      |
| Light-duty Euro 1 diesel commercial vehicles used by companies | 0      | 0     | 0               | 0               | 0     | 0      | 0               | 0.22             | 784.28            |
| Light-duty Euro 2 diesel commercial vehicles used by companies | 0.02   | 0.01  | 0               | 0.05            | 0     | 0      | 0               | 3.11             | 45,303.97         |

| Greater Valparaíso                                                          | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel Consumption | Kilometers Driven |
|-----------------------------------------------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|------------------|-------------------|
| Light-duty Euro 5 diesel commercial vehicles used by companies              | 0      | 0     | 0               | 0.01            | 0     | 0      | 0               | 0.75             | 10,841.58         |
| Light-duty non-standard diesel commercial vehicles used by companies        | 2.48   | 0.34  | 0               | 0.84            | 0.4   | 0.37   | 0.01            | 103.28           | 162,854.40        |
| Light-duty Euro 1 petrol commercial vehicles used by companies              | 30.87  | 5.07  | 0.01            | 2.77            | 0     | 0      | 0               | 153.11           | 113,490.60        |
| Light-duty Euro 2 petrol commercial vehicles used by companies              | 0.04   | 0     | 0               | 0               | 0     | 0      | 0               | 1.82             | 22,559.72         |
| Light-duty Euro 3 petrol commercial vehicles used by companies              | 17.89  | 1.83  | 0.01            | 0.35            | 0     | 0      | 0               | 273.42           | 202,668.37        |
| Light-duty Euro 4 petrol commercial vehicles used by companies              | 0.21   | 0     | 0.01            | 0.01            | 0     | 0      | 0               | 21.1             | 260,889.98        |
| Light-duty non-catalytic petrol commercial vehicles used by companies       | 391.77 | 272   | 0               | 4.4             | 0.01  | 0      | 0               | 710.34           | 583,046.43        |
| Light-duty Euro 1 compressed natural gas privately used commercial vehicles | 0.52   | 0.04  | 0               | 0.09            | 0     | 0      | 0               | 13.2             | 270,829.18        |
| Light-duty Euro 1 diesel privately used commercial vehicles                 | 40.58  | 11.08 | 0.09            | 102.6           | 9.07  | 8.5    | 4.41            | 6,321.03         | 90,090,528.74     |
| Light-duty Euro 2 diesel privately used commercial vehicles                 | 7.03   | 1.81  | 0.02            | 17.33           | 1.41  | 1.41   | 0.75            | 1,075.39         | 15,644,367.74     |
| Light-duty Euro 3 diesel privately used commercial vehicles                 | 20.6   | 4.18  | 0.06            | 53              | 4.07  | 3.71   | 2.72            | 3,900.98         | 56,236,880.01     |
| Light-duty non-standard diesel privately used commercial vehicles           | 4.21   | 0.43  | 0               | 4.85            | 1.21  | 1.19   | 0.2             | 289.68           | 3,743,815.08      |

| Greater Valparaíso                                                 |          |          |                 |                 |       |        |                 |           |                | Fuel Consumption | Kilometers Driven |
|--------------------------------------------------------------------|----------|----------|-----------------|-----------------|-------|--------|-----------------|-----------|----------------|------------------|-------------------|
|                                                                    | CO       | COV      | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> |           |                |                  |                   |
| Light-duty Euro 1 petrol privately used commercial vehicles        | 5,730.59 | 126.23   | 17.01           | 347.52          | 2.76  | 1.49   | 1.08            | 18,072.97 | 201,337,593.94 |                  |                   |
| Light-duty Euro 2 petrol privately used commercial vehicles        | 27.38    | 0.52     | 1.07            | 1.82            | 0     | 0      | 0.04            | 630.39    | 7,790,321.27   |                  |                   |
| Light-duty Euro 3 petrol privately used commercial vehicles        | 66.94    | 3.12     | 0.97            | 4.12            | 0.54  | 0.29   | 0.19            | 3,231.82  | 39,190,574.04  |                  |                   |
| Light-duty non-catalytic petrol privately used commercial vehicles | 948.35   | 154.64   | 0.14            | 333.72          | 0.96  | 0.52   | 0.31            | 5,121.41  | 69,985,441.90  |                  |                   |
| Light-duty Euro 1 compressed natural gas passenger vehicles        | 3.03     | 0.22     | 0               | 0.45            | 0.02  | 0.01   | 0.01            | 74.43     | 1,468,492.75   |                  |                   |
| Light-duty Euro 1 diesel passenger vehicles                        | 8.36     | 1.23     | 0.03            | 16.14           | 2.21  | 2.04   | 0.9             | 1,322.80  | 25,868,064.05  |                  |                   |
| Light-duty Euro 1 diesel passenger vehicles                        | 3.71     | 0.87     | 0.04            | 30.23           | 2     | 1.73   | 1.46            | 2,150.85  | 41,892,386.15  |                  |                   |
| Light-duty Pre euro diesel passenger vehicles                      | 1.35     | 0.28     | 0               | 1.36            | 0.42  | 0.42   | 0.09            | 124.34    | 2,501,278.72   |                  |                   |
| Light-duty Euro 1 petrol passenger vehicles                        | 4,793.76 | 661.62   | 77.13           | 1,341.97        | 12.61 | 6.79   | 3.31            | 55,364.46 | 920,874,024.68 |                  |                   |
| Light-duty Euro 3 petrol passenger vehicles                        | 431.73   | 87.67    | 9.99            | 76.78           | 7.3   | 3.93   | 1.92            | 32,184.81 | 533,046,730.90 |                  |                   |
| Light-duty non-catalytic passenger vehicles                        | 6,700.83 | 1,243.24 | 0.49            | 934.32          | 3.39  | 1.83   | 1.23            | 20,542.02 | 247,578,187.75 |                  |                   |
| Medium-duty Euro 1 compressed natural gas vehicles                 | 0        | 0        | 0               | 0               | 0     | 0      | 0               | 0         | 2,720.35       |                  |                   |
| Medium-duty Euro 1 diesel vehicles                                 | 0.41     | 0.1      | 0               | 1               | 0.08  | 0.08   | 0.04            | 62.21     | 904,915.54     |                  |                   |
| Medium-duty Euro 2 diesel vehicles                                 | 0.07     | 0.02     | 0               | 0.17            | 0.01  | 0.01   | 0.01            | 10.8      | 157,140.06     |                  |                   |

| Greater Valparaíso                                                      |                  |                 |                 |                 |               |               |                 |                   |                         |
|-------------------------------------------------------------------------|------------------|-----------------|-----------------|-----------------|---------------|---------------|-----------------|-------------------|-------------------------|
|                                                                         | CO               | COV             | NH <sub>3</sub> | NO <sub>x</sub> | PM 10         | PM 2.5        | SO <sub>2</sub> | Fuel Consumption  | Kilometers Driven       |
| Medium-duty Euro 3 diesel vehicles                                      | 0.21             | 0.04            | 0               | 0.53            | 0.03          | 0.03          | 0.03            | 38.83             | 564,872.10              |
| Medium-duty non-standard diesel vehicles                                | 0.04             | 0               | 0               | 0.05            | 0.01          | 0.01          | 0               | 2.9               | 37,604.80               |
| Medium-duty Euro 1 petrol vehicles                                      | 5.89             | 0.29            | 0.19            | 0.89            | 0             | 0             | 0.01            | 163.59            | 2,022,338.20            |
| Medium-duty Euro 2 petrol vehicles                                      | 0.14             | 0               | 0.01            | 0.01            | 0             | 0             | 0               | 6.33              | 78,249.99               |
| Medium-duty Euro 3 petrol vehicles                                      | 0.6              | 0.01            | 0.01            | 0.04            | 0             | 0             | 0               | 31.84             | 393,650.25              |
| Medium-duty non-catalytic petrol vehicles                               | 8.56             | 0.78            | 0               | 2.19            | 0             | 0             | 0               | 48.42             | 702,969.72              |
| Street Dust                                                             |                  |                 |                 |                 | 898.32        | 128.88        |                 |                   |                         |
| <b>TOTAL</b>                                                            | <b>21,375.26</b> | <b>2,815.73</b> | <b>119.92</b>   | <b>4,729.42</b> | <b>986.54</b> | <b>196.45</b> | <b>41.52</b>    | <b>202,143.79</b> | <b>2,789,650,554.82</b> |
| Greater Santiago                                                        |                  |                 |                 |                 |               |               |                 |                   |                         |
|                                                                         | CO               | COV             | NH <sub>3</sub> | NO <sub>x</sub> | PM 10         | PM 2.5        | SO <sub>2</sub> | Fuel Consumption  | Kilometers Driven       |
| Tendered Euro 1 diesel urban rigid buses - Transantiago - Feeder line 2 | 0.09             | 0.04            | 0               | 0.43            | 0.02          | 0.02          | 0               | 9.52              | 47,416.74               |
| Tendered Euro 2 diesel urban rigid buses - Transantiago - Feeder line 2 | 11.47            | 5.59            | 0.02            | 47.7            | 1.98          | 1.66          | 0.24            | 2,390.46          | 6,804,302.80            |
| Tendered Euro 3 diesel urban rigid buses - Transantiago - Feeder line 2 | 21.28            | 10.78           | 0.05            | 85.73           | 3.88          | 3.2           | 0.61            | 6,062.80          | 16,263,943.44           |
| Tendered Euro 2 diesel urban rigid buses - Transantiago - Feeder line 3 | 18.91            | 9.44            | 0.03            | 76.87           | 3.2           | 2.71          | 0.38            | 3,815.19          | 10,315,335.28           |
| Tendered Euro 3 diesel urban rigid buses - Transantiago - Feeder line 3 | 34.16            | 17.8            | 0.07            | 134.12          | 6.08          | 5.06          | 0.94            | 9,383.15          | 23,743,690.74           |

| Greater Santiago                                                               | CO    | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel Consumption | Kilometers Driven |
|--------------------------------------------------------------------------------|-------|-------|-----------------|-----------------|-------|--------|-----------------|------------------|-------------------|
| Tendered Euro 1 diesel urban rigid buses - Transantiago - Feeder line 4        | 0.05  | 0.02  | 0               | 0.23            | 0.01  | 0.01   | 0               | 5.04             | 24,038.58         |
| Tendered Euro 2 diesel urban rigid buses - Transantiago - Feeder line 4        | 8.41  | 4.1   | 0.01            | 34.78           | 1.44  | 1.21   | 0.17            | 1,737.38         | 4,835,760.25      |
| Tendered Euro 3 diesel urban rigid buses - Transantiago - Feeder line 4        | 6.36  | 3.11  | 0.02            | 26.25           | 1.18  | 0.97   | 0.19            | 1,871.63         | 5,188,326.18      |
| Tendered Euro 2 diesel urban rigid buses - Transantiago - Feeder line 5        | 28.03 | 14.63 | 0.04            | 109.89          | 4.64  | 3.96   | 0.54            | 5,378.47         | 13,545,373.31     |
| Tendered Euro 2 diesel urban rigid buses - Transantiago - Feeder line 6        | 8.4   | 4.34  | 0.01            | 33.29           | 1.4   | 1.19   | 0.16            | 1,636.54         | 4,226,486.33      |
| Tendered Euro 3 diesel urban rigid buses - Transantiago - Feeder line 6        | 11.74 | 6.21  | 0.02            | 45.58           | 2.07  | 1.73   | 0.32            | 3,176.01         | 7,874,640.46      |
| Tendered Euro 2 diesel urban rigid buses - Transantiago - Feeder line 7        | 16.65 | 8.43  | 0.03            | 66.97           | 2.8   | 2.38   | 0.33            | 3,311.78         | 8,789,132.02      |
| Tendered Euro 3 diesel urban rigid buses - Transantiago - Feeder line 7        | 10.84 | 5.47  | 0.02            | 43.76           | 1.97  | 1.63   | 0.31            | 3,094.99         | 8,259,249.89      |
| Tendered Euro 2 diesel urban rigid buses - Transantiago - Feeder line 8        | 6.95  | 3.48  | 0.01            | 28.2            | 1.18  | 1      | 0.14            | 1,399.15         | 3,780,414.66      |
| Tendered Euro 3 diesel urban rigid buses - Transantiago - Feeder line 8        | 4.56  | 2.28  | 0.01            | 18.56           | 0.84  | 0.69   | 0.13            | 1,316.89         | 3,571,988.95      |
| Tendered Euro 3 diesel urban rigid buses - Transantiago - Feeder line 9        | 23.19 | 11.85 | 0.05            | 92.84           | 4.2   | 3.47   | 0.65            | 6,548.47         | 17,325,931.10     |
| Buses licitados urbanos diesel - Transantiago - Troncal 1 - Articulados Euro 3 | 49.64 | 7.85  | 0.05            | 174.39          | 4.39  | 3.97   | 0.58            | 5,780.66         | 15,201,146.46     |



| Greater Santiago                                                                   | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel Consumption | Kilometers Driven |
|------------------------------------------------------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|------------------|-------------------|
| Tendered Euro 1 diesel urban rigid buses - Transantiago - Trunk line 1             | 1.51   | 0.62  | 0               | 7.2             | 0.32  | 0.27   | 0.02            | 158.27           | 773,976.32        |
| Tendered Euro 2 diesel urban rigid buses - Transantiago - Trunk line 1             | 4.62   | 2.2   | 0.01            | 19.64           | 0.81  | 0.68   | 0.1             | 992.15           | 2,943,455.36      |
| Tendered Euro 3 diesel urban rigid buses - Transantiago - Trunk line 1             | 39.91  | 20.92 | 0.08            | 156.87          | 7.13  | 5.92   | 1.1             | 10,991.75        | 28,250,135.90     |
| Tendered Euro 3 diesel urban articulated buses - Transantiago - Trunk line 2       | 170.36 | 27.12 | 0.13            | 593.99          | 14.11 | 12.9   | 1.85            | 18,522.13        | 44,080,923.93     |
| Tendered Euro 1 diesel urban rigid buses - Transantiago - Trunk line 2             | 0.07   | 0.03  | 0               | 0.31            | 0.01  | 0.01   | 0               | 6.72             | 33,310.11         |
| Tendered Euro 2 diesel urban rigid buses - Transantiago - Trunk line 2             | 0.13   | 0.06  | 0               | 0.55            | 0.02  | 0.02   | 0               | 27.61            | 83,275.27         |
| Tendered Euro 3 diesel urban rigid buses with filter - Transantiago - Trunk line 2 | 90.22  | 49.3  | 0.18            | 346.74          | 4.87  | 3.08   | 2.42            | 24,152.07        | 61,607,041.67     |
| Tendered Euro 1 diesel urban rigid buses with filter - Transantiago - Trunk line 3 | 0.87   | 0.36  | 0               | 4.16            | 0.18  | 0.16   | 0.01            | 91.46            | 455,117.82        |
| Tendered Euro 2 diesel urban rigid buses - Transantiago - Trunk line 3             | 131.88 | 70.5  | 0.19            | 512.52          | 21.83 | 18.63  | 2.51            | 25,056.44        | 63,885,988.31     |
| Tendered Euro 3 diesel urban articulated buses - Transantiago - Trunk line 4       | 114.85 | 17.99 | 0.09            | 397.76          | 9.55  | 8.73   | 1.25            | 12,535.74        | 30,009,437.18     |
| Tendered Euro 1 diesel urban rigid buses - Transantiago - Trunk line 4             | 0.85   | 0.34  | 0               | 4.15            | 0.18  | 0.16   | 0.01            | 92.05            | 476,421.60        |
| Tendered Euro 2 diesel urban rigid buses - Transantiago - Trunk line 4             | 42.45  | 22.12 | 0.07            | 168.88          | 7.15  | 6.06   | 0.83            | 8,338.46         | 22,521,013.94     |

| Greater Santiago                                                       | CO     | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM2.5 | SO <sub>2</sub> | Fuel Consumption | Kilometers Driven |
|------------------------------------------------------------------------|--------|--------|-----------------|-----------------|-------|-------|-----------------|------------------|-------------------|
| Tendered Euro 3 diesel urban rigid buses - Transantiago - Trunk line 4 | 25.45  | 13.19  | 0.06            | 101.79          | 4.65  | 3.83  | 0.72            | 7,195.11         | 19,654,410.49     |
| Tendered Euro 2 diesel urban rigid buses - Transantiago - Trunk line 5 | 5.45   | 2.69   | 0.01            | 22.57           | 0.94  | 0.79  | 0.11            | 1,130.78         | 3,228,372.58      |
| Tendered Euro 3 diesel urban rigid buses - Transantiago - Trunk line 5 | 79.95  | 44     | 0.15            | 302.78          | 13.91 | 11.66 | 2.09            | 20,924.59        | 50,365,445.36     |
| Light-duty Euro 1 diesel trucks                                        | 79.2   | 30.32  | 0.29            | 336.07          | 18.08 | 17.11 | 1.06            | 10,616.08        | 98,404,644.57     |
| Light-duty Euro 2 diesel trucks                                        | 196.49 | 61.92  | 0.87            | 1,079.61        | 26.69 | 23.77 | 3.06            | 30,604.90        | 293,805,174.98    |
| Light-duty Euro 3 diesel trucks                                        | 164.8  | 39.06  | 0.61            | 604.62          | 41.14 | 39.08 | 2.26            | 22,614.55        | 207,069,328.54    |
| Light-duty non-standard diesel trucks                                  | 181.78 | 121.61 | 0.24            | 383.42          | 34.44 | 33.65 | 1.07            | 10,682.83        | 79,635,466.86     |
| Medium-duty Euro 1 diesel trucks                                       | 20.79  | 7.58   | 0.05            | 97.48           | 4.47  | 4.3   | 0.3             | 2,972.49         | 17,616,174.71     |
| Medium-duty Euro 2 diesel trucks                                       | 58.49  | 16.75  | 0.16            | 327.93          | 7.31  | 6.79  | 0.9             | 9,043.08         | 52,573,137.78     |
| Medium-duty Euro 3 diesel trucks                                       | 46.27  | 9.99   | 0.11            | 183.02          | 4.93  | 4.56  | 0.66            | 6,553.31         | 37,054,125.86     |
| Medium-duty non-standard diesel trucks                                 | 34.64  | 13.97  | 0.04            | 131.11          | 5.76  | 5.62  | 0.27            | 2,735.01         | 14,256,475.89     |
| Heavy-duty Euro 1 diesel trucks                                        | 40.73  | 14.82  | 0.06            | 175.62          | 9.27  | 8.76  | 0.52            | 5,159.79         | 18,876,876.40     |
| Heavy-duty Euro 2 diesel trucks                                        | 81.17  | 24.24  | 0.13            | 447.07          | 11.43 | 10.25 | 1.21            | 12,074.45        | 43,214,513.50     |
| Heavy-duty Euro 3 diesel trucks                                        | 86.53  | 19.14  | 0.11            | 309.59          | 10.15 | 9.1   | 1.1             | 11,007.32        | 38,216,773.95     |
| Heavy-duty non-standard diesel trucks                                  | 46.11  | 15.26  | 0.05            | 227             | 10.87 | 10.4  | 0.54            | 5,446.21         | 17,261,287.26     |

| Greater Santiago                                               | CO        | COV      | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel Consumption | Kilometers Driven |
|----------------------------------------------------------------|-----------|----------|-----------------|-----------------|-------|--------|-----------------|------------------|-------------------|
| Euro 1 Four-stroke motorcycles                                 | 12,532.15 | 1,066.15 | 2.02            | 354.16          | 6.72  | 3.58   | 1.89            | 31,543.26        | 1,034,423,017.93  |
| Non-standard four-stroke motorcycles                           | 2,099.03  | 135.58   | 0.17            | 16.4            | 0.56  | 0.3    | 0.15            | 2,458.87         | 86,427,037.34     |
| Euro 1 two-stroke motorcycles                                  | 67.13     | 45.2     | 0.02            | 0.26            | 0.66  | 0.63   | 0.01            | 191.05           | 7,742,516.92      |
| Non-standard two-stroke motorcycles                            | 15.4      | 5.8      | 0               | 0.04            | 0.13  | 0.13   | 0               | 20.31            | 646,921.82        |
| Euro 1 compressed natural gas shared taxis                     | 25.74     | 4.5      | 0               | 6.18            | 0.24  | 0.13   | 0.14            | 852.93           | 17,385,725.45     |
| Euro 1 diesel shared taxis                                     | 7.26      | 1.01     | 0.02            | 10.79           | 1.23  | 1.12   | 0.09            | 857.41           | 16,532,438.13     |
| Euro 3 diesel shared taxis                                     | 2.4       | 0.52     | 0.02            | 16.22           | 0.96  | 0.82   | 0.11            | 1,133.69         | 21,438,840.22     |
| Euro 1 petrol shared taxis                                     | 3,282.52  | 253.13   | 31.06           | 615.68          | 6.22  | 3.35   | 1.92            | 32,022.17        | 454,268,739.38    |
| Euro 3 petrol shared taxis                                     | 870.37    | 44.68    | 1.54            | 165.04          | 8.48  | 4.57   | 2.65            | 44,139.73        | 618,739,843.90    |
| Euro 1 compressed natural gas rental cars                      | 6.98      | 0.73     | 0               | 1.43            | 0.05  | 0.03   | 0.03            | 176.61           | 3,621,601.50      |
| Euro 1 diesel rental cars                                      | 1.43      | 0.21     | 0               | 2.45            | 0.33  | 0.3    | 0.02            | 193.45           | 3,817,363.78      |
| Euro 3 diesel rental cars                                      | 0.52      | 0.13     | 0.01            | 4.11            | 0.27  | 0.23   | 0.03            | 281.57           | 5,554,753.67      |
| Euro 1 petrol rental cars                                      | 1,282.85  | 118.19   | 17.66           | 326.8           | 3.29  | 1.77   | 0.83            | 13,819.27        | 240,151,337.54    |
| Euro 3 petrol rental cars                                      | 686.14    | 36.81    | 5.66            | 92.77           | 5.3   | 2.86   | 1.38            | 23,091.07        | 387,217,709.47    |
| Non-catalytic petrol rental cars                               | 0.62      | 0.09     | 0               | 0.09            | 0     | 0      | 0               | 1.9              | 24,470.28         |
| Light-duty Euro 1 diesel commercial vehicles used by companies | 0.01      | 0        | 0               | 0.03            | 0     | 0      | 0               | 1.7              | 33,208.47         |

| Greater Santiago                                                            | CO       | COV      | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel Consumption | Kilometers Driven |
|-----------------------------------------------------------------------------|----------|----------|-----------------|-----------------|-------|--------|-----------------|------------------|-------------------|
| Light-duty Euro 2 diesel commercial vehicles used by companies              | 6.63     | 1.74     | 0.01            | 16.37           | 1.29  | 1.29   | 0.1             | 980.73           | 14,095,809.18     |
| Light-duty Euro 5 diesel commercial vehicles used by companies              | 0.18     | 0.02     | 0               | 0.34            | 0.01  | 0.01   | 0               | 41.75            | 600,124.45        |
| Light-duty non-standard diesel commercial vehicles used by companies        | 95.58    | 14.56    | 0.05            | 90.72           | 30.06 | 28.54  | 0.36            | 4,978.02         | 46,440,857.69     |
| Light-duty Euro 1 petrol commercial vehicles used by companies              | 1,089.79 | 99.28    | 2.39            | 46.03           | 0.45  | 0.24   | 0.17            | 4,908.96         | 32,700,854.00     |
| Light-duty Euro 2 petrol commercial vehicles used by companies              | 20.09    | 0.35     | 1.14            | 1.25            | 0     | 0      | 0.04            | 712.34           | 8,197,747.82      |
| Light-duty Euro 3 petrol commercial vehicles used by companies              | 193.96   | 7.33     | 0.28            | 2.67            | 0.23  | 0.12   | 0.09            | 2,523.34         | 16,810,601.86     |
| Light-duty Euro 4 petrol commercial vehicles used by companies              | 54.94    | 0.53     | 0.82            | 2.19            | 0.67  | 0.36   | 0.25            | 4,238.30         | 48,747,660.20     |
| Light-duty non-catalytic petrol commercial vehicles used by companies       | 7,385.83 | 2,688.91 | 0.25            | 626.62          | 1.76  | 0.95   | 0.57            | 16,945.53        | 128,436,124.92    |
| Light-duty Euro 1 compressed natural gas privately used commercial vehicles | 1.09     | 0.11     | 0               | 0.2             | 0.01  | 0      | 0               | 27.82            | 572,099.09        |
| Light-duty Euro 1 diesel privately used commercial vehicles                 | 422.13   | 115.87   | 0.82            | 1,043.77        | 89.95 | 84.59  | 6.31            | 63,303.88        | 839,961,499.03    |
| Light-duty Euro 2 diesel privately used commercial vehicles                 | 116.26   | 30.63    | 0.24            | 286.23          | 22.39 | 22.39  | 1.72            | 17,183.70        | 242,836,577.39    |
| Light-duty Euro 3 diesel privately used commercial vehicles                 | 329.3    | 68.28    | 0.78            | 833.93          | 61.02 | 55.93  | 6               | 60,211.95        | 800,210,595.23    |

| Greater Santiago                                                   | CO        | COV      | NH <sub>3</sub> | NO <sub>x</sub> | PM 10  | PM2.5 | SO <sub>2</sub> | Fuel Consumption | Kilometers Driven |
|--------------------------------------------------------------------|-----------|----------|-----------------|-----------------|--------|-------|-----------------|------------------|-------------------|
| Light-duty non-standard diesel privately used commercial vehicles  | 12.02     | 1.29     | 0.01            | 16.29           | 3.3    | 3.23  | 0.08            | 806.19           | 10,338,647.42     |
| Light-duty Euro 1 petrol privately used commercial vehicles        | 46,414.05 | 939.33   | 158.9           | 2,013.61        | 30.32  | 16.33 | 13.68           | 228,134.43       | 2,213,397,743.75  |
| Light-duty Euro 2 petrol privately used commercial vehicles        | 750.7     | 9.82     | 19.73           | 33.41           | 0      | 0     | 0.74            | 12,384.22        | 141,226,746.81    |
| Light-duty Euro 3 petrol privately used commercial vehicles        | 1,782.58  | 36.16    | 7.21            | 61.3            | 7.72   | 4.16  | 3.26            | 54,414.37        | 563,433,896.87    |
| Light-duty non-catalytic petrol privately used commercial vehicles | 4,738.92  | 631.87   | 0.57            | 1,316.00        | 3.97   | 2.14  | 1.34            | 22,303.12        | 289,611,861.71    |
| Light-duty Euro 1 compressed natural gas passenger vehicles        | 5.27      | 0.52     | 0               | 0.81            | 0.03   | 0.02  | 0.02            | 126.52           | 2,507,654.13      |
| Light-duty Euro 1 diesel passenger vehicles                        | 76.81     | 11.51    | 0.19            | 127.67          | 17.42  | 16.09 | 0.98            | 10,103.25        | 196,344,925.24    |
| Light-duty Euro 1 diesel passenger vehicles                        | 47.15     | 11.22    | 0.4             | 307.21          | 20.61  | 17.92 | 2.08            | 21,366.20        | 404,926,173.50    |
| Light-duty Pre euro diesel passenger vehicles                      | 6.41      | 1.44     | 0.01            | 6.14            | 2.02   | 2.02  | 0.06            | 566.97           | 10,712,522.78     |
| Light-duty Euro 1 petrol passenger vehicles                        | 57,545.60 | 5,885.34 | 677.86          | 10,078.71       | 129.63 | 69.83 | 36.68           | 613,012.98       | 9,461,822,003.05  |
| Light-duty Euro 3 petrol passenger vehicles                        | 4,610.59  | 652.06   | 50.28           | 837.59          | 83.87  | 45.18 | 23.87           | 398,975.97       | 6,122,134,585.08  |
| Light-duty non-catalytic passenger vehicles                        | 29,327.23 | 4,385.81 | 1.88            | 3,293.14        | 13.13  | 7.07  | 5.07            | 84,706.47        | 958,575,230.40    |
| Medium-duty Euro 1 diesel vehicles                                 | 19.76     | 5.18     | 0.04            | 48.65           | 3.84   | 3.84  | 0.29            | 2,910.49         | 41,816,169.92     |
| Medium-duty Euro 2 diesel vehicles                                 | 5.7       | 1.49     | 0.01            | 14.05           | 1.11   | 1.11  | 0.08            | 840.19           | 12,091,508.58     |

| Greater Santiago                                                                      | CO                | COV              | NH <sub>3</sub> | NO <sub>x</sub>  | PM 10           | PM 2.5          | SO <sub>2</sub> | Fuel Consumption    | Kilometers Driven        |
|---------------------------------------------------------------------------------------|-------------------|------------------|-----------------|------------------|-----------------|-----------------|-----------------|---------------------|--------------------------|
| Medium-duty Euro 3 diesel vehicles                                                    | 15.43             | 3.06             | 0.04            | 38.93            | 2.45            | 2.45            | 0.28            | 2,772.21            | 39,837,374.52            |
| Medium-duty non-standard diesel vehicles                                              | 0.6               | 0.06             | 0               | 0.81             | 0.16            | 0.16            | 0               | 39.99               | 514,792.01               |
| Medium-duty Euro 1 petrol vehicles                                                    | 485.66            | 21.19            | 8.05            | 49.91            | 0               | 0               | 0.59            | 9,896.11            | 110,179,873.72           |
| Medium-duty Euro 2 petrol vehicles                                                    | 17.18             | 0.3              | 0.98            | 1.08             | 0               | 0               | 0.04            | 608.35              | 7,032,099.89             |
| Medium-duty Euro 3 petrol vehicles                                                    | 58.57             | 0.7              | 0.48            | 2.65             | 0               | 0               | 0.15            | 2,428.93            | 28,051,079.00            |
| Medium-duty non-catalytic petrol vehicles                                             | 217.67            | 21.43            | 0.03            | 42.79            | 0               | 0               | 0.06            | 1,063.23            | 14,420,281.53            |
| Tendered Euro 4 diesel urban rigid buses with filter<br>- Transantiago - Trunk line 2 | 0.88              | 0.41             | 0               | 3.54             | 0.07            | 0.04            | 0.04            | 364.46              | 1,099,233.58             |
| Street Dust                                                                           |                   |                  |                 |                  | 6,846.50        | 982.26          |                 |                     |                          |
| <b>TOTAL</b>                                                                          | <b>178,741.42</b> | <b>18,122.04</b> | <b>995.76</b>   | <b>30,819.10</b> | <b>7,719.90</b> | <b>1,669.26</b> | <b>145.94</b>   | <b>2,111,309.43</b> | <b>27,103,859,963.40</b> |

| Rancagua                             | CO   | COV  | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel Consumption | Kilometers Driven |
|--------------------------------------|------|------|-----------------|-----------------|-------|--------|-----------------|------------------|-------------------|
| Euro 1 diesel interurban buses       | 0.5  | 0.2  | 0               | 2.23            | 0.12  | 0.11   | 0.05            | 65.87            | 288,382.02        |
| Euro 2 diesel interurban buses       | 0.39 | 0.12 | 0               | 2.22            | 0.06  | 0.05   | 0.04            | 59.41            | 260,652.98        |
| Euro 3 diesel interurban buses       | 2.11 | 0.5  | 0               | 8.16            | 0.26  | 0.23   | 0.05            | 77.58            | 1,048,157.72      |
| Non-standard diesel interurban buses | 1.19 | 0.4  | 0               | 5.61            | 0.28  | 0.27   | 0.1             | 137.4            | 540,716.26        |
| Tendered Euro 1 diesel urban buses   | 7.22 | 2.52 | 0.01            | 30.56           | 1.58  | 1.46   | 0.63            | 898              | 4,584,173.65      |
| Tendered Euro 2 diesel urban buses   | 5.87 | 1.47 | 0.01            | 29.24           | 0.78  | 0.67   | 0.54            | 774.42           | 4,143,387.86      |

| Rancagua                                 | CO    | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|------------------------------------------|-------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Tendered Euro 3 diesel urban buses       | 30.84 | 6.13  | 0.05            | 117.37          | 3.38  | 2.92   | 2.57            | 3,674.26 | 16,661,708.29     |
| Tendered non-standard diesel urban buses | 41.48 | 26.44 | 0.02            | 82.5            | 8.15  | 7.92   | 1.55            | 2,215.40 | 8,595,325.21      |
| Euro 1 diesel rural buses                | 0.78  | 0.26  | 0               | 3.67            | 0.17  | 0.16   | 0.08            | 109.92   | 480,239.44        |
| Euro 2 diesel rural buses                | 0.61  | 0.16  | 0               | 3.5             | 0.09  | 0.08   | 0.07            | 96.97    | 434,062.59        |
| Euro 3 diesel rural buses                | 3.22  | 0.64  | 0               | 12.74           | 0.37  | 0.32   | 0.31            | 444.78   | 1,745,485.68      |
| Non-standard diesel rural buses          | 3.41  | 1.26  | 0               | 11.98           | 0.59  | 0.57   | 0.18            | 251.31   | 900,448.91        |
| Light-duty Euro 1 diesel trucks          | 0.61  | 0.22  | 0               | 3.27            | 0.14  | 0.13   | 0.07            | 101.15   | 1,014,615.30      |
| Light-duty Euro 2 diesel trucks          | 1.46  | 0.41  | 0.01            | 9.35            | 0.23  | 0.2    | 0.19            | 267.43   | 2,785,118.81      |
| Light-duty Euro 3 diesel trucks          | 0.82  | 0.19  | 0               | 3.77            | 0.27  | 0.25   | 0.11            | 150.84   | 1,496,557.49      |
| Light-duty non-standard diesel trucks    | 2.25  | 1.35  | 0               | 5.82            | 0.43  | 0.42   | 0.11            | 152.92   | 1,293,634.41      |
| Medium-duty Euro 1 diesel trucks         | 0.5   | 0.18  | 0               | 2.58            | 0.11  | 0.1    | 0.05            | 77.32    | 497,805.79        |
| Medium-duty Euro 2 diesel trucks         | 1.22  | 0.31  | 0               | 7.45            | 0.16  | 0.15   | 0.14            | 205.53   | 1,366,476.80      |
| Medium-duty Euro 3 diesel trucks         | 0.7   | 0.15  | 0               | 3.14            | 0.08  | 0.07   | 0.08            | 114.76   | 734,263.50        |
| Medium-duty non-standard diesel trucks   | 1.33  | 0.51  | 0               | 5.52            | 0.22  | 0.22   | 0.08            | 112.22   | 634,702.33        |
| Heavy-duty Euro 1 diesel trucks          | 0.26  | 0.09  | 0               | 1.2             | 0.06  | 0.05   | 0.02            | 35.2     | 146,829.75        |
| Heavy-duty Euro 2 diesel trucks          | 1.14  | 0.29  | 0               | 6.58            | 0.17  | 0.15   | 0.13            | 178.99   | 767,709.80        |
| Heavy-duty Euro 3 diesel trucks          | 1.05  | 0.22  | 0               | 4.18            | 0.13  | 0.11   | 0.11            | 151.23   | 629,270.36        |

| Rancagua                                                             | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|----------------------------------------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Heavy-duty non-standard diesel trucks                                | 0.63   | 0.19  | 0               | 3.43            | 0.15  | 0.15   | 0.06            | 81.05    | 293,659.50        |
| Euro 1 Four-stroke motorcycles                                       | 269.89 | 21.4  | 0.04            | 7.82            | 0.14  | 0.07   | 0.04            | 650.52   | 21,771,913.47     |
| Non-standard four-stroke motorcycles                                 | 72.59  | 4.26  | 0.01            | 0.61            | 0.02  | 0.01   | 0.01            | 84.93    | 3,081,786.16      |
| Euro 1 two-stroke motorcycles                                        | 2.64   | 2.08  | 0               | 0.01            | 0.03  | 0.03   | 0               | 8.83     | 350,612.63        |
| Non-standard two-stroke motorcycles                                  | 1.2    | 0.43  | 0               | 0               | 0.01  | 0.01   | 0               | 1.56     | 49,628.76         |
| Euro 1 compressed natural gas shared taxis                           | 0.97   | 0.16  | 0               | 0.26            | 0.01  | 0      | 0.01            | 32.53    | 667,083.50        |
| Euro 1 diesel shared taxis                                           | 2.28   | 0.32  | 0               | 3.3             | 0.37  | 0.34   | 0.18            | 266.24   | 4,874,840.56      |
| Euro 3 diesel shared taxis                                           | 0.78   | 0.17  | 0.01            | 4.89            | 0.29  | 0.25   | 0.24            | 350.94   | 6,311,635.76      |
| Euro 1 petrol shared taxis                                           | 435.98 | 42.69 | 4.31            | 84.03           | 0.84  | 0.45   | 0.26            | 4,386.46 | 61,063,792.77     |
| Euro 3 petrol shared taxis                                           | 53.93  | 4.83  | 0.11            | 10.13           | 0.5   | 0.27   | 0.16            | 2,616.37 | 36,535,649.38     |
| Euro 3 diesel rental cars                                            | 0      | 0     | 0               | 0.01            | 0     | 0      | 0               | 0.75     | 11,377.87         |
| Euro 1 petrol rental cars                                            | 2.5    | 1.73  | 0.04            | 1.09            | 0.01  | 0      | 0               | 23.71    | 420,866.74        |
| Euro 3 petrol rental cars                                            | 0.5    | 0.19  | 0               | 0.14            | 0     | 0      | 0               | 9.63     | 170,621.65        |
| Light-duty Euro 2 diesel commercial vehicles used by companies       | 0.6    | 0.17  | 0               | 1.6             | 0.12  | 0.12   | 0.07            | 96.76    | 1,479,476.83      |
| Light-duty Euro 5 diesel commercial vehicles used by companies       | 0.05   | 0     | 0               | 0.1             | 0     | 0      | 0.01            | 11.87    | 181,690.13        |
| Light-duty non-standard diesel commercial vehicles used by companies | 8.19   | 0.98  | 0               | 6.92            | 1.93  | 1.87   | 0.24            | 466.03   | 4,665,542.95      |



| Rancagua                                                              | CO       | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|-----------------------------------------------------------------------|----------|--------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Light-duty Euro 1 petrol commercial vehicles used by companies        | 53.66    | 5.95   | 0.22            | 4.03            | 0.03  | 0.02   | 0.01            | 357.19   | 2,527,439.58      |
| Light-duty Euro 2 petrol commercial vehicles used by companies        | 0.99     | 0.02   | 0.08            | 0.09            | 0     | 0      | 0               | 48.02    | 590,492.95        |
| Light-duty Euro 3 petrol commercial vehicles used by companies        | 18.46    | 1.47   | 0.06            | 0.55            | 0.05  | 0.02   | 0.02            | 471.51   | 3,332,067.32      |
| Light-duty Euro 4 petrol commercial vehicles used by companies        | 5.98     | 0.07   | 0.14            | 0.31            | 0.1   | 0.05   | 0.04            | 601.63   | 7,257,871.73      |
| Light-duty non-catalytic petrol commercial vehicles used by companies | 613.62   | 362.23 | 0.03            | 65.94           | 0.19  | 0.1    | 0.06            | 1,773.54 | 13,999,873.62     |
| Light-duty Euro 1 diesel privately used commercial vehicles           | 9.38     | 2.7    | 0.02            | 24.06           | 2.07  | 1.93   | 1.02            | 1,483.26 | 21,380,794.45     |
| Light-duty Euro 2 diesel privately used commercial vehicles           | 1.78     | 0.51   | 0               | 4.72            | 0.35  | 0.35   | 0.2             | 286.34   | 4,362,970.65      |
| Light-duty Euro 3 diesel privately used commercial vehicles           | 4.85     | 1.06   | 0.01            | 12.82           | 0.94  | 0.85   | 0.65            | 938.85   | 13,744,113.78     |
| Light-duty non-standard diesel privately used commercial vehicles     | 0.6      | 0.06   | 0               | 0.69            | 0.17  | 0.17   | 0.03            | 39.85    | 536,483.41        |
| Light-duty Euro 1 petrol privately used commercial vehicles           | 1,029.15 | 22.05  | 3.38            | 42.77           | 0.56  | 0.3    | 0.22            | 3,726.43 | 41,241,900.00     |
| Light-duty Euro 2 petrol privately used commercial vehicles           | 3.48     | 0.07   | 0.25            | 0.27            | 0     | 0      | 0.01            | 141.93   | 1,741,361.12      |
| Light-duty Euro 3 petrol privately used commercial vehicles           | 12.11    | 0.77   | 0.14            | 0.99            | 0.1   | 0.05   | 0.04            | 619.76   | 7,445,525.10      |

| Rancagua                                                           | CO              | COV             | NH <sub>3</sub> | NO <sub>x</sub> | PM 10        | PM 2.5       | SO <sub>2</sub> | Fuel             | Kilometers Driven     |
|--------------------------------------------------------------------|-----------------|-----------------|-----------------|-----------------|--------------|--------------|-----------------|------------------|-----------------------|
| Light-duty non-catalytic petrol privately used commercial vehicles | 122.13          | 36.62           | 0.02            | 46.91           | 0.13         | 0.07         | 0.04            | 703.35           | 9,815,859.13          |
| Light-duty Euro 1 diesel passenger vehicles                        | 2.42            | 0.37            | 0.01            | 3.76            | 0.51         | 0.47         | 0.21            | 325.3            | 6,128,068.21          |
| Light-duty Euro 1 diesel passenger vehicles                        | 1.46            | 0.3             | 0.01            | 7.14            | 0.49         | 0.42         | 0.34            | 535.74           | 9,950,404.68          |
| Light-duty Pre euro diesel passenger vehicles                      | 0.26            | 0.05            | 0               | 0.26            | 0.08         | 0.08         | 0.02            | 23.71            | 480,592.96            |
| Light-duty Euro 1 petrol passenger vehicles                        | 1,102.96        | 206.43          | 15.65           | 261.67          | 2.65         | 1.43         | 0.72            | 12,118.06        | 194,743,850.90        |
| Light-duty Euro 3 petrol passenger vehicles                        | 118.04          | 42.43           | 1.42            | 33.9            | 1.54         | 0.83         | 0.42            | 7,038.70         | 113,336,859.53        |
| Light-duty non-catalytic passenger vehicles                        | 1,250.30        | 480.23          | 0.09            | 187.84          | 0.62         | 0.33         | 0.23            | 3,795.27         | 45,487,436.64         |
| Medium-duty Euro 1 diesel vehicles                                 | 0.05            | 0.02            | 0               | 0.15            | 0.01         | 0.01         | 0.01            | 8.81             | 135,757.47            |
| Medium-duty Euro 2 diesel vehicles                                 | 0.01            | 0               | 0               | 0.03            | 0            | 0            | 0               | 1.8              | 27,673.41             |
| Medium-duty Euro 3 diesel vehicles                                 | 0.03            | 0.01            | 0               | 0.08            | 0            | 0            | 0               | 5.66             | 87,268.32             |
| Medium-duty non-standard diesel vehicles                           | 0               | 0               | 0               | 0               | 0            | 0            | 0               | 0.25             | 3,398.49              |
| Medium-duty Euro 1 petrol vehicles                                 | 0.68            | 0.04            | 0.02            | 0.11            | 0            | 0            | 0               | 20.96            | 261,865.66            |
| Medium-duty Euro 2 petrol vehicles                                 | 0.02            | 0               | 0               | 0               | 0            | 0            | 0               | 0.88             | 11,045.09             |
| Medium-duty Euro 3 petrol vehicles                                 | 0.06            | 0               | 0               | 0               | 0            | 0            | 0               | 3.78             | 47,275.40             |
| Medium-duty non-catalytic petrol vehicles                          | 0.68            | 0.07            | 0               | 0.19            | 0            | 0            | 0               | 4.24             | 62,325.85             |
| Street Dust                                                        |                 |                 |                 |                 | 479.74       | 68.83        |                 |                  |                       |
| <b>TOTAL</b>                                                       | <b>5,314.87</b> | <b>1,287.15</b> | <b>26.22</b>    | <b>1,186.22</b> | <b>512.6</b> | <b>96.52</b> | <b>12.8</b>     | <b>54,515.90</b> | <b>691,720,479.06</b> |

| Talca                                    | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|------------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Tendered Euro 1 diesel urban buses       | 12.82  | 4.37  | 0.01            | 48.38           | 2.46  | 2.32   | 0.63            | 902.15   | 4,795,479.21      |
| Tendered Euro 2 diesel urban buses       | 12.07  | 2.85  | 0.01            | 49.98           | 1.19  | 1.06   | 0.59            | 849.21   | 4,700,519.02      |
| Tendered Euro 3 diesel urban buses       | 19.79  | 3.95  | 0.02            | 78.63           | 1.75  | 1.57   | 0.88            | 1,252.11 | 6,837,118.61      |
| Tendered non-standard diesel urban buses | 103.49 | 70.54 | 0.02            | 186.49          | 21.23 | 20.92  | 1.63            | 2,332.93 | 11,490,158.16     |
| Euro 1 diesel rural buses                | 0.46   | 0.15  | 0               | 1.99            | 0.1   | 0.09   | 0.04            | 57.89    | 237,605.06        |
| Euro 2 diesel rural buses                | 0.41   | 0.1   | 0               | 2.07            | 0.05  | 0.05   | 0.04            | 55.43    | 232,900.00        |
| Euro 3 diesel rural buses                | 0.64   | 0.13  | 0               | 2.52            | 0.07  | 0.06   | 0.06            | 84.04    | 338,763.64        |
| Non-standard diesel rural buses          | 2.41   | 0.9   | 0               | 7.96            | 0.42  | 0.4    | 0.11            | 163.26   | 569,311.14        |
| Light-duty Euro 1 diesel trucks          | 1.29   | 0.51  | 0.01            | 5.61            | 0.3   | 0.28   | 0.13            | 179.16   | 1,794,346.87      |
| Light-duty Euro 2 diesel trucks          | 1.76   | 0.55  | 0.01            | 9.94            | 0.25  | 0.22   | 0.2             | 283.02   | 2,982,384.72      |
| Light-duty Euro 3 diesel trucks          | 1.04   | 0.25  | 0               | 3.94            | 0.28  | 0.26   | 0.11            | 151.42   | 1,507,579.03      |
| Light-duty non-standard diesel trucks    | 6.76   | 4.56  | 0.01            | 14.09           | 1.28  | 1.25   | 0.28            | 392.89   | 3,162,638.83      |
| Medium-duty Euro 1 diesel trucks         | 2.08   | 0.78  | 0               | 9.07            | 0.45  | 0.43   | 0.19            | 275.68   | 1,613,636.28      |
| Medium-duty Euro 2 diesel trucks         | 2.87   | 0.83  | 0.01            | 16.08           | 0.35  | 0.33   | 0.31            | 438.85   | 2,682,025.55      |
| Medium-duty Euro 3 diesel trucks         | 1.7    | 0.37  | 0               | 6.61            | 0.18  | 0.17   | 0.16            | 232.92   | 1,355,749.13      |
| Medium-duty non-standard diesel trucks   | 7.77   | 3.29  | 0.01            | 26.79           | 1.28  | 1.25   | 0.4             | 566.5    | 2,844,126.08      |
| Heavy-duty Euro 1 diesel trucks          | 0.21   | 0.08  | 0               | 0.86            | 0.05  | 0.04   | 0.02            | 25.67    | 89,215.94         |

| Talca                                      | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel   | Kilometers Driven |
|--------------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|--------|-------------------|
| Heavy-duty Euro 2 diesel trucks            | 0.18   | 0.06  | 0               | 1.02            | 0.03  | 0.02   | 0.02            | 27.81  | 100,367.93        |
| Heavy-duty Euro 3 diesel trucks            | 0.15   | 0.03  | 0               | 0.54            | 0.02  | 0.02   | 0.01            | 19.3   | 66,911.95         |
| Heavy-duty non-standard diesel trucks      | 0.29   | 0.1   | 0               | 1.38            | 0.07  | 0.07   | 0.02            | 33.68  | 100,367.93        |
| Euro 1 Four-stroke motorcycles             | 177.84 | 17.39 | 0.03            | 3.8             | 0.1   | 0.05   | 0.03            | 428.92 | 16,044,597.37     |
| Non-standard four-stroke motorcycles       | 57.87  | 4.91  | 0               | 0.32            | 0.02  | 0.01   | 0               | 71.43  | 2,461,299.68      |
| Euro 1 two-stroke motorcycles              | 1.66   | 1.06  | 0               | 0               | 0.02  | 0.01   | 0               | 4.2    | 186,117.32        |
| Non-standard two-stroke motorcycles        | 0.63   | 0.28  | 0               | 0               | 0.01  | 0.01   | 0               | 0.86   | 28,551.08         |
| Euro 1 compressed natural gas shared taxis | 0.25   | 0.05  | 0               | 0.06            | 0     | 0      | 0               | 6.81   | 132,766.13        |
| Euro 1 diesel shared taxis                 | 12.96  | 1.8   | 0.01            | 20.75           | 1.75  | 1.63   | 0.45            | 647.46 | 17,525,130.50     |
| Euro 3 diesel shared taxis                 | 2.65   | 0.53  | 0.01            | 12.88           | 0.63  | 0.56   | 0.33            | 473.62 | 11,771,930.43     |
| Euro 1 petrol shared taxis                 | 195.22 | 17.69 | 0.63            | 27.85           | 0.23  | 0.12   | 0.04            | 733.66 | 16,640,022.05     |
| Euro 3 petrol shared taxis                 | 12.77  | 1.3   | 0.02            | 2.32            | 0.11  | 0.06   | 0.03            | 427.13 | 8,142,989.50      |
| Euro 1 compressed natural gas rental cars  | 0.09   | 0.01  | 0               | 0.03            | 0     | 0      | 0               | 2.3    | 46,684.70         |
| Euro 1 diesel rental cars                  | 0.05   | 0.01  | 0               | 0.06            | 0.01  | 0.01   | 0               | 5.15   | 93,889.83         |
| Euro 3 diesel rental cars                  | 0.01   | 0     | 0               | 0.06            | 0     | 0      | 0               | 4.3    | 78,241.52         |
| Euro 1 petrol rental cars                  | 11.08  | 1.86  | 0.13            | 2.66            | 0.03  | 0.01   | 0.01            | 117.07 | 1,914,072.80      |
| Euro 3 petrol rental cars                  | 1.59   | 0.25  | 0               | 0.31            | 0.01  | 0.01   | 0               | 62.12  | 1,011,501.82      |

| Talca                                                                       | CO     | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|-----------------------------------------------------------------------------|--------|--------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Light-duty Euro 1 diesel commercial vehicles used by companies              | 0      | 0      | 0               | 0               | 0     | 0      | 0               | 0.13     | 282,99            |
| Light-duty Euro 2 diesel commercial vehicles used by companies              | 0.01   | 0      | 0               | 0.03            | 0     | 0      | 0               | 1.94     | 27,261.52         |
| Light-duty Euro 5 diesel commercial vehicles used by companies              | 0      | 0      | 0               | 0.01            | 0     | 0      | 0               | 0.84     | 11,791.31         |
| Light-duty non-standard diesel commercial vehicles used by companies        | 1.76   | 0.25   | 0               | 0.6             | 0.28  | 0.26   | 0               | 72.03    | 77,634.01         |
| Light-duty Euro 1 petrol commercial vehicles used by companies              | 13.95  | 2.29   | 0               | 1.24            | 0     | 0      | 0               | 68.21    | 33,581.66         |
| Light-duty Euro 2 petrol commercial vehicles used by companies              | 0.03   | 0      | 0               | 0               | 0     | 0      | 0               | 0.81     | 8,206.75          |
| Light-duty Euro 3 petrol commercial vehicles used by companies              | 28.4   | 2.9    | 0               | 0.54            | 0     | 0      | 0               | 427.47   | 210,451.37        |
| Light-duty Euro 4 petrol commercial vehicles used by companies              | 0.29   | 0      | 0               | 0.01            | 0     | 0      | 0               | 19.33    | 196,018.79        |
| Light-duty non-catalytic petrol commercial vehicles used by companies       | 453.34 | 315.02 | 0               | 3.29            | 0.01  | 0      | 0               | 813.18   | 442,976.07        |
| Light-duty Euro 1 compressed natural gas privately used commercial vehicles | 0.07   | 0.01   | 0               | 0.02            | 0     | 0      | 0               | 2.27     | 46,294.19         |
| Light-duty Euro 1 diesel privately used commercial vehicles                 | 17.76  | 4.81   | 0.03            | 42.43           | 3.57  | 3.38   | 1.46            | 2,097.72 | 32,066,440.54     |
| Light-duty Euro 2 diesel privately used commercial vehicles                 | 2.01   | 0.6    | 0               | 5.3             | 0.36  | 0.36   | 0.22            | 320.68   | 4,470,972.53      |

| Talca                                                              | CO       | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel      | Kilometers Driven |
|--------------------------------------------------------------------|----------|--------|-----------------|-----------------|-------|--------|-----------------|-----------|-------------------|
| Light-duty Euro 3 diesel privately used commercial vehicles        | 5.17     | 1.12   | 0.01            | 13.28           | 0.92  | 0.84   | 0.63            | 904.92    | 12,700,038.68     |
| Light-duty non-standard diesel privately used commercial vehicles  | 2.25     | 0.26   | 0               | 3.72            | 0.56  | 0.55   | 0.11            | 154.2     | 1,939,675.99      |
| Light-duty Euro 1 petrol privately used commercial vehicles        | 1,069.99 | 33.8   | 3.93            | 51.1            | 0.96  | 0.51   | 0.38            | 6,265.68  | 72,465,837.52     |
| Light-duty Euro 2 petrol privately used commercial vehicles        | 8.18     | 0.11   | 0.2             | 0.23            | 0     | 0      | 0.01            | 132.87    | 1,345,932.83      |
| Light-duty Euro 3 petrol privately used commercial vehicles        | 16.54    | 0.55   | 0.02            | 0.61            | 0.07  | 0.04   | 0.03            | 547.55    | 5,493,577.09      |
| Light-duty non-catalytic petrol privately used commercial vehicles | 881.54   | 138.34 | 0.06            | 112.09          | 0.45  | 0.24   | 0.16            | 2,654.28  | 34,427,445.60     |
| Light-duty Euro 1 compressed natural gas passenger vehicles        | 2.81     | 0.37   | 0               | 0.43            | 0.02  | 0.01   | 0.01            | 72.89     | 1,322,733.18      |
| Light-duty Euro 1 diesel passenger vehicles                        | 3.24     | 0.47   | 0.01            | 4.12            | 0.49  | 0.45   | 0.22            | 343.83    | 6,024,596.89      |
| Light-duty Euro 1 diesel passenger vehicles                        | 1.12     | 0.22   | 0.01            | 4.6             | 0.29  | 0.25   | 0.22            | 344.59    | 6,024,596.89      |
| Light-duty Pre euro diesel passenger vehicles                      | 0.73     | 0.18   | 0               | 0.62            | 0.23  | 0.23   | 0.04            | 63.11     | 1,061,463.27      |
| Light-duty Euro 1 petrol passenger vehicles                        | 1,597.84 | 235.01 | 9.89            | 267.33          | 2.47  | 1.33   | 0.6             | 10,079.98 | 187,018,912.49    |
| Light-duty Euro 3 petrol passenger vehicles                        | 64.01    | 24.66  | 0.15            | 20.24           | 0.88  | 0.48   | 0.22            | 3,737.00  | 67,101,476.93     |
| Light-duty non-catalytic passenger vehicles                        | 3,709.87 | 944.3  | 0.12            | 272.49          | 1.1   | 0.59   | 0.39            | 6,531.59  | 83,098,766.20     |
| Medium-duty Euro 1 compressed natural gas vehicles                 | 0        | 0      | 0               | 0               | 0     | 0      | 0               | 0         | 108.36            |

| Talca                                     | CO              | COV             | NH <sub>3</sub> | NO <sub>x</sub> | PM 10         | PM 2.5       | SO <sub>2</sub> | Fuel             | Kilometers Driven     |
|-------------------------------------------|-----------------|-----------------|-----------------|-----------------|---------------|--------------|-----------------|------------------|-----------------------|
| Medium-duty Euro 1 diesel vehicles        | 0.03            | 0.01            | 0               | 0.09            | 0.01          | 0.01         | 0               | 5.35             | 75,054.21             |
| Medium-duty Euro 2 diesel vehicles        | 0               | 0               | 0               | 0.01            | 0             | 0            | 0               | 0.74             | 10,438.24             |
| Medium-duty Euro 3 diesel vehicles        | 0.01            | 0               | 0               | 0.03            | 0             | 0            | 0               | 2.12             | 29,725.51             |
| Medium-duty non-standard diesel vehicles  | 0.01            | 0               | 0               | 0.01            | 0             | 0            | 0               | 0.36             | 4,514.81              |
| Medium-duty Euro 1 petrol vehicles        | 0.89            | 0.04            | 0.01            | 0.07            | 0             | 0            | 0               | 16.72            | 169,612.41            |
| Medium-duty Euro 2 petrol vehicles        | 0.01            | 0               | 0               | 0               | 0             | 0            | 0               | 0.31             | 3,142.31              |
| Medium-duty Euro 3 petrol vehicles        | 0.04            | 0               | 0               | 0               | 0             | 0            | 0               | 1.27             | 12,858.18             |
| Medium-duty non-catalytic petrol vehicles | 1.45            | 0.17            | 0               | 0.2             | 0             | 0            | 0               | 6.78             | 80,580.34             |
| Street Dust                               |                 |                 |                 |                 | 275.48        | 39.52        |                 |                  |                       |
| <b>TOTAL</b>                              | <b>8,536.21</b> | <b>1,847.00</b> | <b>15.4</b>     | <b>1,349.77</b> | <b>322.85</b> | <b>82.36</b> | <b>11.44</b>    | <b>46,999.70</b> | <b>641,581,999.48</b> |

| Chillán                              | CO   | COV  | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel   | Kilometers Driven |
|--------------------------------------|------|------|-----------------|-----------------|-------|--------|-----------------|--------|-------------------|
| Euro 1 diesel interurban buses       | 1.65 | 0.66 | 0               | 6.6             | 0.37  | 0.35   | 0.14            | 197.68 | 741,606.72        |
| Euro 2 diesel interurban buses       | 1.86 | 0.58 | 0               | 9.57            | 0.24  | 0.21   | 0.18            | 251.6  | 930,643.70        |
| Euro 3 diesel interurban buses       | 1.58 | 0.38 | 0               | 5.93            | 0.19  | 0.17   | 0.05            | 66.34  | 697,982.79        |
| Non-standard diesel interurban buses | 8.01 | 2.82 | 0.01            | 29.91           | 1.67  | 1.62   | 0.43            | 609.39 | 2,093,948.44      |
| Tendered Euro 1 diesel urban buses   | 6.45 | 2.12 | 0.01            | 24.01           | 1.27  | 1.19   | 0.4             | 577.63 | 2,901,396.81      |
| Tendered Euro 2 diesel urban buses   | 8.36 | 1.87 | 0.01            | 33.9            | 0.87  | 0.77   | 0.47            | 678    | 3,640,968.44      |

| Chillán                                  | CO    | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|------------------------------------------|-------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Tendered Euro 3 diesel urban buses       | 5.93  | 1.14  | 0.01            | 22.53           | 0.6   | 0.52   | 0.39            | 555.82   | 2,730,726.39      |
| Tendered non-standard diesel urban buses | 65.1  | 42.66 | 0.02            | 112.03          | 13.18 | 12.96  | 1.37            | 1,958.39 | 8,192,179.44      |
| Light-duty Euro 1 diesel trucks          | 0.76  | 0.3   | 0               | 3.56            | 0.18  | 0.17   | 0.08            | 113.69   | 1,135,581.16      |
| Light-duty Euro 2 diesel trucks          | 1.14  | 0.35  | 0.01            | 6.54            | 0.16  | 0.14   | 0.13            | 183.51   | 1,906,830.06      |
| Light-duty Euro 3 diesel trucks          | 0.61  | 0.14  | 0               | 2.45            | 0.18  | 0.17   | 0.07            | 96.73    | 960,512.41        |
| Light-duty non-standard diesel trucks    | 3.59  | 2.4   | 0.01            | 7.67            | 0.68  | 0.67   | 0.15            | 210.43   | 1,698,640.19      |
| Medium-duty Euro 1 diesel trucks         | 0.84  | 0.31  | 0               | 3.93            | 0.18  | 0.17   | 0.08            | 119.41   | 722,158.64        |
| Medium-duty Euro 2 diesel trucks         | 1.24  | 0.35  | 0               | 7.14            | 0.15  | 0.14   | 0.14            | 196.19   | 1,212,624.74      |
| Medium-duty Euro 3 diesel trucks         | 0.68  | 0.15  | 0               | 2.82            | 0.07  | 0.07   | 0.07            | 101.26   | 610,825.86        |
| Medium-duty non-standard diesel trucks   | 2.71  | 1.11  | 0               | 9.94            | 0.45  | 0.44   | 0.15            | 210.25   | 1,080,229.00      |
| Heavy-duty Euro 1 diesel trucks          | 0.53  | 0.2   | 0               | 2.33            | 0.12  | 0.11   | 0.05            | 69.51    | 253,769.30        |
| Heavy-duty Euro 2 diesel trucks          | 1.32  | 0.4   | 0               | 7.42            | 0.18  | 0.16   | 0.14            | 202.5    | 741,787.19        |
| Heavy-duty Euro 3 diesel trucks          | 1.05  | 0.23  | 0               | 3.89            | 0.13  | 0.11   | 0.1             | 141.6    | 507,538.60        |
| Heavy-duty non-standard diesel trucks    | 0.61  | 0.21  | 0               | 3.06            | 0.15  | 0.14   | 0.05            | 74.32    | 234,248.59        |
| Euro 1 Four-stroke motorcycles           | 91.11 | 8.8   | 0.02            | 1.9             | 0.05  | 0.03   | 0.01            | 214.96   | 7,797,951.55      |
| Non-standard four-stroke motorcycles     | 26.63 | 2.26  | 0               | 0.15            | 0.01  | 0      | 0               | 33.04    | 1,117,952.75      |
| Euro 1 two-stroke motorcycles            | 1.72  | 0.99  | 0               | 0               | 0.01  | 0.01   | 0               | 3.91     | 164,806.54        |
| Non-standard two-stroke motorcycles      | 0.55  | 0.24  | 0               | 0               | 0     | 0      | 0               | 0.74     | 23,627.48         |





| Chillán                                                               | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|-----------------------------------------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Light-duty non-catalytic petrol commercial vehicles used by companies | 124.79 | 87.57 | 0               | 0.62            | 0     | 0      | 0               | 219.72   | 41,002.70         |
| Light-duty Euro 1 diesel privately used commercial vehicles           | 9.94   | 2.68  | 0.02            | 23.69           | 1.99  | 1.88   | 0.98            | 1,400.80 | 16,966,149.42     |
| Light-duty Euro 2 diesel privately used commercial vehicles           | 1.16   | 0.36  | 0               | 3.15            | 0.21  | 0.21   | 0.14            | 193.73   | 2,617,419.26      |
| Light-duty Euro 3 diesel privately used commercial vehicles           | 2.82   | 0.63  | 0.01            | 7.44            | 0.5   | 0.46   | 0.38            | 550.57   | 6,957,815.89      |
| Light-duty non-standard diesel privately used commercial vehicles     | 1.4    | 0.16  | 0               | 2.25            | 0.36  | 0.35   | 0.07            | 97.48    | 1,195,727.49      |
| Light-duty Euro 1 petrol privately used commercial vehicles           | 545.8  | 17.66 | 2.3             | 25.4            | 0.51  | 0.28   | 0.25            | 4,234.99 | 37,368,836.75     |
| Light-duty Euro 2 petrol privately used commercial vehicles           | 4.93   | 0.07  | 0.12            | 0.17            | 0     | 0      | 0               | 78.56    | 772,044.50        |
| Light-duty Euro 3 petrol privately used commercial vehicles           | 11     | 0.33  | 0.01            | 0.37            | 0.05  | 0.02   | 0.02            | 352.22   | 3,370,633.42      |
| Light-duty non-catalytic petrol privately used commercial vehicles    | 451.71 | 64.99 | 0.03            | 53.96           | 0.23  | 0.12   | 0.1             | 1,634.80 | 16,533,051.35     |
| Light-duty Euro 1 diesel passenger vehicles                           | 1.63   | 0.23  | 0               | 2.17            | 0.25  | 0.23   | 0.12            | 184.83   | 3,217,180.54      |
| Light-duty Euro 1 diesel passenger vehicles                           | 0.71   | 0.14  | 0               | 3.49            | 0.21  | 0.18   | 0.18            | 263.23   | 4,500,278.96      |
| Light-duty Pre euro diesel passenger vehicles                         | 0.54   | 0.13  | 0               | 0.46            | 0.16  | 0.16   | 0.03            | 46.68    | 764,198.36        |
| Light-duty Euro 1 petrol passenger vehicles                           | 816.8  | 91.45 | 5.11            | 114.81          | 1.19  | 0.64   | 0.37            | 6,157.31 | 87,080,871.33     |
| Light-duty Euro 3 petrol passenger vehicles                           | 27.64  | 8.6   | 0.06            | 7.48            | 0.5   | 0.27   | 0.16            | 2,685.00 | 36,247,531.18     |

| Chillán                                     | CO              | COV           | NH <sub>3</sub> | NO <sub>x</sub> | PM 10         | PM 2.5       | SO <sub>2</sub> | Fuel             | Kilometers Driven     |
|---------------------------------------------|-----------------|---------------|-----------------|-----------------|---------------|--------------|-----------------|------------------|-----------------------|
| Light-duty non-catalytic passenger vehicles | 1,617.62        | 293.68        | 0.06            | 101.73          | 0.47          | 0.26         | 0.22            | 3,755.77         | 34,643,657.61         |
| Medium-duty Euro 1 diesel vehicles          | 0.01            | 0             | 0               | 0.02            | 0             | 0            | 0               | 1.19             | 16,288.99             |
| Medium-duty Euro 2 diesel vehicles          | 0               | 0             | 0               | 0               | 0             | 0            | 0               | 0.18             | 2,512.95              |
| Medium-duty Euro 3 diesel vehicles          | 0               | 0             | 0               | 0.01            | 0             | 0            | 0               | 0.49             | 6,680.11              |
| Medium-duty non-standard diesel vehicles    | 0               | 0             | 0               | 0               | 0             | 0            | 0               | 0.09             | 1,148.00              |
| Medium-duty Euro 1 petrol vehicles          | 0.18            | 0.01          | 0               | 0.02            | 0             | 0            | 0               | 3.65             | 35,877.36             |
| Medium-duty Euro 2 petrol vehicles          | 0               | 0             | 0               | 0               | 0             | 0            | 0               | 0.08             | 741.23                |
| Medium-duty Euro 3 petrol vehicles          | 0.01            | 0             | 0               | 0               | 0             | 0            | 0               | 0.33             | 3,236.10              |
| Medium-duty non-catalytic petrol vehicles   | 0.28            | 0.03          | 0               | 0.04            | 0             | 0            | 0               | 1.38             | 15,873.18             |
| Street Dust                                 |                 |               |                 |                 | 330.67        | 47.44        |                 |                  |                       |
| <b>TOTAL</b>                                | <b>4,198.03</b> | <b>668.01</b> | <b>9.28</b>     | <b>717.41</b>   | <b>360.05</b> | <b>74.09</b> | <b>8.32</b>     | <b>32,231.43</b> | <b>356,982,499.43</b> |

| Greater Concepción                       | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel      | Kilometers Driven |
|------------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|-----------|-------------------|
| Tendered Euro 1 diesel urban buses       | 49.28  | 17.03 | 0.06            | 207.37          | 10.7  | 9.87   | 4.11            | 5,870.38  | 30,318,608.16     |
| Tendered Euro 2 diesel urban buses       | 149.78 | 34.68 | 0.18            | 644.81          | 16.69 | 14.66  | 10.47           | 14,950.38 | 74,148,770.62     |
| Tendered Euro 3 diesel urban buses       | 442.64 | 86.1  | 0.47            | 1,693.13        | 43.64 | 38.43  | 29.13           | 41,617.83 | 190,479,955.13    |
| Tendered non-standard diesel urban buses | 136.13 | 86.4  | 0.06            | 276.1           | 26.85 | 26.04  | 4.98            | 7,116.09  | 29,769,357.83     |
| Light-duty Euro 1 diesel trucks          | 3.21   | 1.12  | 0.01            | 16.84           | 0.74  | 0.69   | 0.36            | 515.66    | 4,947,501.28      |

| Greater Concepción                     | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel      | Kilometers Driven |
|----------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|-----------|-------------------|
| Light-duty Euro 2 diesel trucks        | 5.8    | 1.67  | 0.03            | 35.04           | 0.84  | 0.74   | 0.69            | 983.49    | 9,703,563.73      |
| Light-duty Euro 3 diesel trucks        | 3.47   | 0.78  | 0.02            | 15.89           | 1.06  | 1.01   | 0.43            | 620.26    | 5,904,696.28      |
| Light-duty non-standard diesel trucks  | 14.47  | 8.96  | 0.02            | 35.44           | 2.78  | 2.71   | 0.66            | 938.37    | 7,424,243.43      |
| Medium-duty Euro 1 diesel trucks       | 3.99   | 1.41  | 0.01            | 20.43           | 0.87  | 0.83   | 0.43            | 615.57    | 3,840,458.47      |
| Medium-duty Euro 2 diesel trucks       | 7.34   | 1.94  | 0.02            | 43.2            | 0.97  | 0.9    | 0.83            | 1,192.64  | 7,532,314.08      |
| Medium-duty Euro 3 diesel trucks       | 4.62   | 0.96  | 0.01            | 20.09           | 0.52  | 0.47   | 0.52            | 739.71    | 4,583,473.47      |
| Medium-duty non-standard diesel trucks | 13.02  | 5.1   | 0.02            | 52.21           | 2.17  | 2.12   | 0.74            | 1,062.04  | 5,763,009.84      |
| Heavy-duty Euro 1 diesel trucks        | 35.58  | 12.91 | 0.05            | 153.43          | 8.17  | 7.71   | 3.01            | 4,305.22  | 17,057,147.54     |
| Heavy-duty Euro 2 diesel trucks        | 81.18  | 25.43 | 0.11            | 430.86          | 10.88 | 9.81   | 7.64            | 10,919.17 | 39,168,264.61     |
| Heavy-duty Euro 3 diesel trucks        | 51.33  | 11.39 | 0.07            | 182.94          | 6     | 5.38   | 4.23            | 6,036.20  | 22,742,864.43     |
| Heavy-duty non-standard diesel trucks  | 78.44  | 26.92 | 0.07            | 359.43          | 18    | 17.29  | 5.77            | 8,240.65  | 25,901,594.99     |
| Euro 1 Four-stroke motorcycles         | 522.6  | 38.87 | 0.08            | 16.08           | 0.26  | 0.14   | 0.08            | 1,262.85  | 40,743,974.52     |
| Non-standard four-stroke motorcycles   | 192.03 | 10.79 | 0.02            | 1.65            | 0.05  | 0.03   | 0.01            | 222.42    | 7,595,335.89      |
| Euro 1 two-stroke motorcycles          | 5.48   | 5.13  | 0               | 0.03            | 0.07  | 0.07   | 0               | 22.27     | 861,107.32        |
| Non-standard two-stroke motorcycles    | 3.98   | 1.43  | 0               | 0.01            | 0.03  | 0.03   | 0               | 5.21      | 160,524.35        |
| Euro 1 diesel shared taxis             | 4.48   | 0.62  | 0.01            | 6.47            | 0.71  | 0.65   | 0.35            | 496.69    | 9,105,299.51      |
| Euro 3 diesel shared taxis             | 1.05   | 0.22  | 0.01            | 6.64            | 0.39  | 0.33   | 0.32            | 463.66    | 8,443,803.61      |



| Greater Concepción                                                          | CO       | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel      | Kilometers Driven |
|-----------------------------------------------------------------------------|----------|--------|-----------------|-----------------|-------|--------|-----------------|-----------|-------------------|
| Light-duty non-catalytic petrol commercial vehicles used by companies       | 661.04   | 463.67 | 0               | 4.22            | 0     | 0      | 0               | 1,169.26  | 356,246.06        |
| Light-duty Euro 1 compressed natural gas privately used commercial vehicles | 0.03     | 0      | 0               | 0.01            | 0     | 0      | 0               | 0.74      | 15,428.68         |
| Light-duty Euro 1 diesel privately used commercial vehicles                 | 46.41    | 13.07  | 0.1             | 117.52          | 9.85  | 9.24   | 5.08            | 7,270.99  | 95,920,101.83     |
| Light-duty Euro 2 diesel privately used commercial vehicles                 | 9.04     | 2.55   | 0.02            | 23.8            | 1.77  | 1.77   | 1.02            | 1,461.03  | 21,893,151.25     |
| Light-duty Euro 3 diesel privately used commercial vehicles                 | 19.78    | 4.35   | 0.06            | 53.35           | 3.8   | 3.45   | 2.73            | 3,907.78  | 55,620,390.46     |
| Light-duty non-standard diesel privately used commercial vehicles           | 3.13     | 0.33   | 0               | 3.59            | 0.91  | 0.89   | 0.15            | 213.89    | 2,832,174.42      |
| Light-duty Euro 1 petrol privately used commercial vehicles                 | 6,329.71 | 144.66 | 24.77           | 282.51          | 4.44  | 2.39   | 2.12            | 35,293.16 | 324,218,297.87    |
| Light-duty Euro 2 petrol privately used commercial vehicles                 | 64.08    | 1.05   | 2.74            | 3.98            | 0     | 0      | 0.09            | 1,524.76  | 18,617,677.57     |
| Light-duty Euro 3 petrol privately used commercial vehicles                 | 217.09   | 6.78   | 0.85            | 8.05            | 1.05  | 0.56   | 0.44            | 7,414.80  | 76,294,824.03     |
| Light-duty non-catalytic petrol privately used commercial vehicles          | 1,387.62 | 216.26 | 0.16            | 331.65          | 1.1   | 0.59   | 0.4             | 6,690.81  | 79,935,992.51     |
| Light-duty Euro 1 compressed natural gas passenger vehicles                 | 0.19     | 0.02   | 0               | 0.03            | 0     | 0      | 0               | 5.19      | 103,111.90        |
| Light-duty Euro 1 diesel passenger vehicles                                 | 6.79     | 1.01   | 0.02            | 12.44           | 1.64  | 1.5    | 0.7             | 1,034.79  | 20,292,995.33     |
| Light-duty Euro 1 diesel passenger vehicles                                 | 2.31     | 0.53   | 0.02            | 17.58           | 1.15  | 0.99   | 0.86            | 1,266.89  | 24,714,126.85     |

| Greater Concepción                                 | CO               | COV             | NH <sub>3</sub> | NO <sub>x</sub> | PM 10           | PM 2.5        | SO <sub>2</sub> | Fuel              | Kilometers Driven       |
|----------------------------------------------------|------------------|-----------------|-----------------|-----------------|-----------------|---------------|-----------------|-------------------|-------------------------|
| Light-duty Pre euro diesel passenger vehicles      | 0.84             | 0.17            | 0               | 0.82            | 0.25            | 0.25          | 0.05            | 75.35             | 1,517,609.13            |
| Light-duty Euro 1 petrol passenger vehicles        | 5,209.87         | 562.05          | 56.89           | 846.64          | 10.39           | 5.59          | 3.17            | 53,033.65         | 758,078,722.66          |
| Light-duty Euro 3 petrol passenger vehicles        | 311.04           | 77.41           | 3.26            | 69.27           | 6.06            | 3.26          | 1.86            | 31,171.22         | 442,143,835.75          |
| Light-duty non-catalytic passenger vehicles        | 6,361.08         | 1,099.61        | 0.37            | 609.45          | 2.55            | 1.37          | 1.09            | 18,217.65         | 185,910,763.25          |
| Medium-duty Euro 1 compressed natural gas vehicles | 0                | 0               | 0               | 0               | 0               | 0             | 0               | 0                 | 18.34                   |
| Medium-duty Euro 1 diesel vehicles                 | 0.05             | 0.01            | 0               | 0.12            | 0.01            | 0.01          | 0.01            | 7.64              | 114,043.85              |
| Medium-duty Euro 2 diesel vehicles                 | 0.01             | 0               | 0               | 0.03            | 0               | 0             | 0               | 1.74              | 25,993.27               |
| Medium-duty Euro 3 diesel vehicles                 | 0.02             | 0               | 0               | 0.06            | 0               | 0             | 0               | 4.43              | 66,129.66               |
| Medium-duty non-standard diesel vehicles           | 0                | 0               | 0               | 0               | 0               | 0             | 0               | 0.25              | 3,356.93                |
| Medium-duty Euro 1 petrol vehicles                 | 1.03             | 0.06            | 0.04            | 0.17            | 0               | 0             | 0               | 31.19             | 385,478.14              |
| Medium-duty Euro 2 petrol vehicles                 | 0.04             | 0               | 0               | 0               | 0               | 0             | 0               | 1.79              | 22,104.37               |
| Medium-duty Euro 3 petrol vehicles                 | 0.13             | 0               | 0               | 0.01            | 0               | 0             | 0               | 7.34              | 90,710.45               |
| Medium-duty non-catalytic petrol vehicles          | 1.08             | 0.11            | 0               | 0.29            | 0               | 0             | 0               | 6.55              | 95,039.60               |
| Street Dust                                        |                  |                 |                 |                 | 1,904.63        | 273.26        |                 |                   |                         |
| <b>TOTAL</b>                                       | <b>22,835.84</b> | <b>3,012.49</b> | <b>92.97</b>    | <b>6,667.31</b> | <b>2,103.54</b> | <b>446.12</b> | <b>94.93</b>    | <b>283,101.33</b> | <b>2,725,305,114.60</b> |

| Los Angeles                              | CO   | COV  | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel   | Kilometers Driven |
|------------------------------------------|------|------|-----------------|-----------------|-------|--------|-----------------|--------|-------------------|
| Euro 1 diesel interurban buses           | 0.09 | 0.04 | 0               | 0.41            | 0.02  | 0.02   | 0.01            | 11.39  | 50,796.79         |
| Euro 2 diesel interurban buses           | 0.09 | 0.03 | 0               | 0.5             | 0.01  | 0.01   | 0.01            | 12.78  | 56,823.52         |
| Euro 3 diesel interurban buses           | 0.14 | 0.03 | 0               | 0.55            | 0.02  | 0.02   | 0               | 3.87   | 72,320.85         |
| Non-standard diesel interurban buses     | 0.12 | 0.04 | 0               | 0.57            | 0.03  | 0.03   | 0.01            | 13.4   | 55,101.60         |
| Tendered Euro 1 diesel urban buses       | 2.09 | 0.71 | 0               | 8.24            | 0.43  | 0.4    | 0.16            | 222.23 | 1,098,645.15      |
| Tendered Euro 2 diesel urban buses       | 2.28 | 0.54 | 0               | 10.1            | 0.26  | 0.23   | 0.17            | 237.68 | 1,228,992.87      |
| Tendered Euro 3 diesel urban buses       | 3.28 | 0.65 | 0               | 12.68           | 0.34  | 0.29   | 0.22            | 317.43 | 1,564,172.80      |
| Tendered non-standard diesel urban buses | 6.46 | 4.15 | 0               | 12.3            | 1.28  | 1.25   | 0.21            | 300.09 | 1,191,750.67      |
| Euro 1 diesel rural buses                | 0.81 | 0.27 | 0               | 3.55            | 0.17  | 0.16   | 0.07            | 105.24 | 446,175.22        |
| Euro 2 diesel rural buses                | 0.82 | 0.2  | 0               | 4.24            | 0.11  | 0.1    | 0.08            | 116.41 | 499,111.26        |
| Euro 3 diesel rural buses                | 1.22 | 0.24 | 0               | 4.7             | 0.14  | 0.12   | 0.11            | 159.33 | 635,232.54        |
| Non-standard diesel rural buses          | 1.86 | 0.69 | 0               | 6.39            | 0.32  | 0.31   | 0.09            | 134.06 | 483,986.68        |
| Light-duty Euro 1 diesel trucks          | 0.39 | 0.14 | 0               | 2.08            | 0.09  | 0.08   | 0.05            | 66.07  | 608,202.40        |
| Light-duty Euro 2 diesel trucks          | 1.05 | 0.28 | 0.01            | 6.47            | 0.16  | 0.14   | 0.13            | 188.61 | 1,779,886.55      |
| Light-duty Euro 3 diesel trucks          | 0.98 | 0.22 | 0               | 4.46            | 0.29  | 0.27   | 0.12            | 173.97 | 1,596,531.29      |
| Light-duty non-standard diesel trucks    | 1.57 | 0.93 | 0               | 4.16            | 0.3   | 0.29   | 0.08            | 115.34 | 863,110.76        |
| Medium-duty Euro 1 diesel trucks         | 0.42 | 0.15 | 0               | 2.11            | 0.09  | 0.09   | 0.05            | 66.87  | 393,408.16        |



| Los Angeles                            | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|----------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Medium-duty Euro 2 diesel trucks       | 1.15   | 0.3   | 0               | 6.62            | 0.15  | 0.14   | 0.13            | 189.71   | 1,151,297.48      |
| Medium-duty Euro 3 diesel trucks       | 1.11   | 0.23  | 0               | 4.7             | 0.12  | 0.11   | 0.12            | 177.2    | 1,032,696.41      |
| Medium-duty non-standard diesel trucks | 1.25   | 0.49  | 0               | 5.07            | 0.21  | 0.2    | 0.08            | 107.62   | 558,292.46        |
| Heavy-duty Euro 1 diesel trucks        | 0.18   | 0.06  | 0               | 0.83            | 0.04  | 0.04   | 0.02            | 24.53    | 97,819.53         |
| Heavy-duty Euro 2 diesel trucks        | 1.56   | 0.43  | 0               | 8.6             | 0.23  | 0.21   | 0.16            | 226.17   | 919,503.59        |
| Heavy-duty Euro 3 diesel trucks        | 1.54   | 0.33  | 0               | 5.78            | 0.19  | 0.16   | 0.14            | 201.62   | 792,338.20        |
| Heavy-duty non-standard diesel trucks  | 0.25   | 0.08  | 0               | 1.3             | 0.06  | 0.06   | 0.02            | 31.16    | 107,601.48        |
| Euro 1 Four-stroke motorcycles         | 99.43  | 7.96  | 0.02            | 2.97            | 0.05  | 0.03   | 0.01            | 248.35   | 8,066,511.88      |
| Non-standard four-stroke motorcycles   | 34.63  | 2.24  | 0               | 0.27            | 0.01  | 0      | 0               | 40.61    | 1,374,973.60      |
| Euro 1 two-stroke motorcycles          | 1.19   | 0.99  | 0               | 0.01            | 0.01  | 0.01   | 0               | 4.2      | 170,482.47        |
| Non-standard two-stroke motorcycles    | 0.69   | 0.27  | 0               | 0               | 0.01  | 0.01   | 0               | 0.92     | 29,059.51         |
| Euro 1 diesel shared taxis             | 2.76   | 0.38  | 0               | 4.01            | 0.41  | 0.38   | 0.19            | 269.19   | 4,930,817.54      |
| Euro 3 diesel shared taxis             | 1.35   | 0.28  | 0.01            | 7.38            | 0.4   | 0.35   | 0.29            | 413.42   | 8,096,280.77      |
| Euro 1 petrol shared taxis             | 240.18 | 21.58 | 1.36            | 38.78           | 0.35  | 0.19   | 0.09            | 1,442.22 | 25,628,075.41     |
| Euro 3 petrol shared taxis             | 22.87  | 2.08  | 0.03            | 4.27            | 0.2   | 0.11   | 0.05            | 867.64   | 14,914,201.09     |
| Euro 1 diesel rental cars              | 0.01   | 0     | 0               | 0.02            | 0     | 0      | 0               | 1.94     | 36,173.02         |
| Euro 3 diesel rental cars              | 0.02   | 0     | 0               | 0.09            | 0.01  | 0.01   | 0               | 6.45     | 120,576.72        |

| Los Angeles                                                           | CO     | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|-----------------------------------------------------------------------|--------|--------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Euro 1 petrol rental cars                                             | 7.4    | 1.55   | 0.11            | 2.18            | 0.02  | 0.01   | 0               | 81.09    | 1,415,733.44      |
| Euro 3 petrol rental cars                                             | 2.85   | 0.43   | 0.03            | 0.47            | 0.02  | 0.01   | 0               | 81.34    | 1,415,733.44      |
| Light-duty Euro 2 diesel commercial vehicles used by companies        | 0      | 0      | 0               | 0.01            | 0     | 0      | 0               | 0.45     | 6,429.84          |
| Light-duty Euro 5 diesel commercial vehicles used by companies        | 0      | 0      | 0               | 0               | 0     | 0      | 0               | 0.07     | 948.24            |
| Light-duty non-standard diesel commercial vehicles used by companies  | 1.91   | 0.27   | 0               | 0.54            | 0.29  | 0.27   | 0               | 76.01    | 12,340.10         |
| Light-duty Euro 1 petrol commercial vehicles used by companies        | 17.81  | 2.94   | 0               | 1.59            | 0     | 0      | 0               | 84.34    | 6,053.14          |
| Light-duty Euro 2 petrol commercial vehicles used by companies        | 0      | 0      | 0               | 0               | 0     | 0      | 0               | 0.14     | 1,584.73          |
| Light-duty Euro 3 petrol commercial vehicles used by companies        | 25.87  | 2.68   | 0               | 0.48            | 0     | 0      | 0               | 379.73   | 27,252.13         |
| Light-duty Euro 4 petrol commercial vehicles used by companies        | 0.03   | 0      | 0               | 0               | 0     | 0      | 0               | 2.3      | 26,459.76         |
| Light-duty non-catalytic petrol commercial vehicles used by companies | 482.09 | 339.33 | 0               | 2.11            | 0     | 0      | 0               | 843.2    | 66,792.39         |
| Light-duty Euro 1 diesel privately used commercial vehicles           | 12.48  | 3.28   | 0.02            | 29.59           | 2.63  | 2.49   | 1.17            | 1,683.02 | 23,784,530.49     |
| Light-duty Euro 2 diesel privately used commercial vehicles           | 2.64   | 0.71   | 0.01            | 6.62            | 0.51  | 0.51   | 0.29            | 411.05   | 5,859,994.53      |
| Light-duty Euro 3 diesel privately used commercial vehicles           | 4.25   | 0.88   | 0.01            | 10.77           | 0.8   | 0.74   | 0.56            | 801.13   | 11,092,441.98     |

| Los Angeles                                                        | CO       | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|--------------------------------------------------------------------|----------|--------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Light-duty non-standard diesel privately used commercial vehicles  | 1        | 0.11   | 0               | 1.32            | 0.27  | 0.27   | 0.05            | 69.05    | 878,402.88        |
| Light-duty Euro 1 petrol privately used commercial vehicles        | 1,323.74 | 31.09  | 3.84            | 59.33           | 0.8   | 0.43   | 0.3             | 4,965.27 | 60,039,299.95     |
| Light-duty Euro 2 petrol privately used commercial vehicles        | 6.82     | 0.09   | 0.2             | 0.31            | 0     | 0      | 0.01            | 125.64   | 1,444,281.47      |
| Light-duty Euro 3 petrol privately used commercial vehicles        | 12.77    | 0.54   | 0.1             | 0.67            | 0.07  | 0.04   | 0.03            | 479.2    | 5,441,134.32      |
| Light-duty non-catalytic petrol privately used commercial vehicles | 503.04   | 91.79  | 0.04            | 99.73           | 0.33  | 0.18   | 0.11            | 1,892.70 | 24,496,780.86     |
| Light-duty Euro 1 diesel passenger vehicles                        | 1.44     | 0.22   | 0               | 2.1             | 0.29  | 0.27   | 0.12            | 183.26   | 3,267,629.04      |
| Light-duty Euro 1 diesel passenger vehicles                        | 0.8      | 0.16   | 0               | 3.45            | 0.24  | 0.21   | 0.17            | 264.44   | 4,714,549.42      |
| Light-duty Pre euro diesel passenger vehicles                      | 0.24     | 0.05   | 0               | 0.23            | 0.08  | 0.08   | 0.02            | 22.09    | 416,459.00        |
| Light-duty Euro 1 petrol passenger vehicles                        | 846.84   | 149.13 | 6.85            | 173.08          | 1.44  | 0.77   | 0.33            | 5,626.30 | 107,431,935.80    |
| Light-duty Euro 3 petrol passenger vehicles                        | 48.06    | 18.96  | 0.49            | 15.16           | 0.55  | 0.3    | 0.13            | 2,278.43 | 40,927,565.61     |
| Light-duty non-catalytic passenger vehicles                        | 1,960.29 | 661.96 | 0.08            | 201.91          | 0.68  | 0.37   | 0.23            | 3,878.21 | 50,907,903.14     |
| Medium-duty Euro 1 diesel vehicles                                 | 0.01     | 0      | 0               | 0.03            | 0     | 0      | 0               | 1.62     | 23,261.08         |
| Medium-duty Euro 2 diesel vehicles                                 | 0        | 0      | 0               | 0.01            | 0     | 0      | 0               | 0.39     | 5,652.54          |
| Medium-duty Euro 3 diesel vehicles                                 | 0        | 0      | 0               | 0.01            | 0     | 0      | 0               | 0.75     | 10,848.32         |
| Medium-duty non-standard diesel vehicles                           | 0        | 0      | 0               | 0               | 0     | 0      | 0               | 0.06     | 833.61            |
| Medium-duty Euro 1 petrol vehicles                                 | 0.22     | 0.01   | 0               | 0.03            | 0     | 0      | 0               | 5.11     | 58,717.95         |

| Los Angeles                               | CO              | COV             | NH <sub>3</sub> | NO <sub>x</sub> | PM 10         | PM 2.5       | SO <sub>2</sub> | Fuel             | Kilometers Driven     |
|-------------------------------------------|-----------------|-----------------|-----------------|-----------------|---------------|--------------|-----------------|------------------|-----------------------|
| Medium-duty Euro 2 petrol vehicles        | 0               | 0               | 0               | 0               | 0             | 0            | 0               | 0.12             | 1,393.15              |
| Medium-duty Euro 3 petrol vehicles        | 0.01            | 0               | 0               | 0               | 0             | 0            | 0               | 0.46             | 5,321.39              |
| Medium-duty non-catalytic petrol vehicles | 0.34            | 0.03            | 0               | 0.07            | 0             | 0            | 0               | 1.78             | 23,957.65             |
| Street Dust                               |                 |                 |                 | 137.88          |               | 19.78        |                 |                  |                       |
| <b>TOTAL</b>                              | <b>5,696.79</b> | <b>1,353.21</b> | <b>13.28</b>    | <b>785.97</b>   | <b>153.45</b> | <b>32.54</b> | <b>6.39</b>     | <b>30,736.46</b> | <b>424,463,171.69</b> |

| Temuco-Padre Las Casas                   | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|------------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Tendered Euro 1 diesel urban buses       | 20.06  | 6.68  | 0.02            | 75.53           | 3.95  | 3.71   | 1.19            | 1,697.24 | 8,971,228.53      |
| Tendered Euro 2 diesel urban buses       | 30.81  | 6.94  | 0.03            | 123.96          | 3.13  | 2.78   | 1.63            | 2,325.94 | 12,700,548.10     |
| Tendered Euro 3 diesel urban buses       | 30.04  | 5.8   | 0.03            | 116.07          | 2.87  | 2.53   | 1.66            | 2,374.75 | 12,257,201.91     |
| Tendered non-standard diesel urban buses | 122.79 | 80.54 | 0.04            | 215.23          | 24.82 | 24.36  | 2.81            | 4,008.33 | 16,612,420.78     |
| Euro 1 diesel rural buses                | 1.09   | 0.36  | 0               | 5.14            | 0.24  | 0.23   | 0.11            | 152.22   | 688,284.86        |
| Euro 2 diesel rural buses                | 1.4    | 0.34  | 0               | 7.77            | 0.2   | 0.17   | 0.15            | 213.95   | 974,403.33        |
| Euro 3 diesel rural buses                | 1.46   | 0.29  | 0               | 5.96            | 0.18  | 0.16   | 0.15            | 214.73   | 940,389.21        |
| Non-standard diesel rural buses          | 4.55   | 1.68  | 0               | 16.27           | 0.79  | 0.76   | 0.24            | 338.11   | 1,274,527.53      |
| Light-duty Euro 1 diesel trucks          | 0.72   | 0.27  | 0               | 3.69            | 0.17  | 0.16   | 0.08            | 115.67   | 1,177,283.74      |
| Light-duty Euro 2 diesel trucks          | 0.99   | 0.29  | 0.01            | 6.16            | 0.15  | 0.13   | 0.12            | 175.89   | 1,857,924.40      |
| Light-duty Euro 3 diesel trucks          | 0.7    | 0.16  | 0               | 3.01            | 0.22  | 0.21   | 0.08            | 119.83   | 1,205,706.14      |

| Temuco-Padre Las Casas                 | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|----------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Light-duty non-standard diesel trucks  | 3.98   | 2.54  | 0.01            | 9.26            | 0.76  | 0.74   | 0.18            | 251.63   | 2,082,311.40      |
| Medium-duty Euro 1 diesel trucks       | 0.53   | 0.19  | 0               | 2.6             | 0.11  | 0.11   | 0.05            | 77.83    | 494,288.73        |
| Medium-duty Euro 2 diesel trucks       | 0.72   | 0.19  | 0               | 4.33            | 0.09  | 0.08   | 0.08            | 118.72   | 780,059.26        |
| Medium-duty Euro 3 diesel trucks       | 0.51   | 0.11  | 0               | 2.22            | 0.06  | 0.05   | 0.06            | 80.22    | 506,222.02        |
| Medium-duty non-standard diesel trucks | 1.96   | 0.78  | 0               | 7.71            | 0.33  | 0.32   | 0.11            | 158.95   | 874,269.32        |
| Heavy-duty Euro 1 diesel trucks        | 3.47   | 1.27  | 0               | 15.16           | 0.79  | 0.74   | 0.32            | 451.36   | 1,648,649.67      |
| Heavy-duty Euro 2 diesel trucks        | 2.45   | 0.71  | 0               | 13.98           | 0.35  | 0.31   | 0.27            | 383.1    | 1,465,466.30      |
| Heavy-duty Euro 3 diesel trucks        | 3.46   | 0.76  | 0.01            | 12.85           | 0.42  | 0.37   | 0.33            | 467.75   | 1,698,608.66      |
| Heavy-duty non-standard diesel trucks  | 2.47   | 0.81  | 0               | 12.65           | 0.59  | 0.56   | 0.21            | 304.39   | 999,181.65        |
| Euro 1 Four-stroke motorcycles         | 111.03 | 9.78  | 0.02            | 2.58            | 0.06  | 0.03   | 0.02            | 255.71   | 9,406,251.89      |
| Non-standard four-stroke motorcycles   | 23.78  | 1.82  | 0               | 0.16            | 0.01  | 0      | 0               | 29.14    | 1,046,465.46      |
| Euro 1 two-stroke motorcycles          | 0.75   | 0.46  | 0               | 0               | 0.01  | 0.01   | 0               | 1.84     | 76,598.14         |
| Non-standard two-stroke motorcycles    | 0.2    | 0.08  | 0               | 0               | 0     | 0      | 0               | 0.26     | 8,521.71          |
| Euro 1 petrol shared taxis             | 458.21 | 40.58 | 2.34            | 70.61           | 0.61  | 0.33   | 0.16            | 2,686.38 | 44,776,045.64     |
| Euro 3 petrol shared taxis             | 42     | 3.88  | 0.06            | 8.63            | 0.37  | 0.2    | 0.1             | 1,644.41 | 27,144,684.96     |
| Non-catalytic petrol shared taxis      | 8.22   | 1.34  | 0               | 0.91            | 0     | 0      | 0               | 23.96    | 285,399.73        |
| Euro 1 petrol rental cars              | 8.81   | 2.49  | 0.12            | 2.54            | 0.02  | 0.01   | 0.01            | 95.04    | 1,596,520.49      |

| Temuco-Padre Las Casas                                                |  | CO       | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|-----------------------------------------------------------------------|--|----------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Euro 3 petrol rental cars                                             |  | 2.63     | 0.61  | 0.01            | 0.62            | 0.02  | 0.01   | 0.01            | 84.33    | 1,411,998.03      |
| Non-catalytic petrol rental cars                                      |  | 0.33     | 0.21  | 0               | 0.05            | 0     | 0      | 0               | 0.97     | 12,034.07         |
| Light-duty Euro 2 diesel commercial vehicles used by companies        |  | 0        | 0     | 0               | 0               | 0     | 0      | 0               | 0.11     | 1,610.38          |
| Light-duty Euro 5 diesel commercial vehicles used by companies        |  | 0        | 0     | 0               | 0               | 0     | 0      | 0               | 0.03     | 497.32            |
| Light-duty non-standard diesel commercial vehicles used by companies  |  | 0.62     | 0.09  | 0               | 0.18            | 0.09  | 0.09   | 0               | 24.55    | 6,441.50          |
| Light-duty Euro 1 petrol commercial vehicles used by companies        |  | 95.14    | 15.71 | 0               | 8.49            | 0     | 0      | 0               | 452.24   | 52,597.70         |
| Light-duty Euro 2 petrol commercial vehicles used by companies        |  | 0.05     | 0     | 0               | 0               | 0     | 0      | 0               | 1.77     | 19,217.94         |
| Light-duty Euro 3 petrol commercial vehicles used by companies        |  | 27.98    | 2.89  | 0               | 0.52            | 0     | 0      | 0               | 412.02   | 47,920.51         |
| Light-duty Euro 4 petrol commercial vehicles used by companies        |  | 0.01     | 0     | 0               | 0               | 0     | 0      | 0               | 0.79     | 8,525.52          |
| Light-duty non-catalytic petrol commercial vehicles used by companies |  | 1,062.43 | 747.1 | 0               | 4.94            | 0     | 0      | 0               | 1,863.85 | 239,330.20        |
| Light-duty Euro 1 diesel privately used commercial vehicles           |  | 1.19     | 0.38  | 0               | 3.24            | 0.25  | 0.24   | 0.14            | 199.49   | 2,872,150.01      |
| Light-duty Euro 2 diesel privately used commercial vehicles           |  | 0.22     | 0.07  | 0               | 0.61            | 0.04  | 0.04   | 0.03            | 37.13    | 546,781.76        |
| Light-duty Euro 3 diesel privately used commercial vehicles           |  | 0.74     | 0.18  | 0               | 2.05            | 0.14  | 0.12   | 0.1             | 150.5    | 2,170,068.97      |

| Temuco-Padre Las Casas                                             | CO       | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|--------------------------------------------------------------------|----------|--------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Light-duty non-standard diesel privately used commercial vehicles  | 0.19     | 0.02   | 0               | 0.27            | 0.05  | 0.05   | 0.01            | 13.06    | 170,439.46        |
| Light-duty Euro 1 petrol privately used commercial vehicles        | 1,267.86 | 45.24  | 4.75            | 64.11           | 1.09  | 0.59   | 0.47            | 7,914.37 | 80,627,636.75     |
| Light-duty Euro 2 petrol privately used commercial vehicles        | 39.71    | 0.57   | 1.02            | 1.76            | 0     | 0      | 0.04            | 618.15   | 6,525,197.09      |
| Light-duty Euro 3 petrol privately used commercial vehicles        | 71.39    | 2.23   | 0.06            | 2.66            | 0.24  | 0.13   | 0.1             | 1,745.43 | 17,719,570.42     |
| Light-duty non-catalytic petrol privately used commercial vehicles | 322.99   | 73.82  | 0.03            | 61.25           | 0.22  | 0.12   | 0.08            | 1,360.57 | 16,143,877.27     |
| Light-duty Euro 1 diesel passenger vehicles                        | 0.26     | 0.04   | 0               | 0.31            | 0.04  | 0.04   | 0.02            | 29.07    | 485,606.59        |
| Light-duty Euro 1 diesel passenger vehicles                        | 0.15     | 0.03   | 0               | 0.45            | 0.03  | 0.03   | 0.02            | 36.95    | 612,109.14        |
| Light-duty Pre euro diesel passenger vehicles                      | 0.04     | 0.01   | 0               | 0.03            | 0.01  | 0.01   | 0               | 3.14     | 56,698.55         |
| Light-duty Euro 1 petrol passenger vehicles                        | 1,341.66 | 267.65 | 7.71            | 296.15          | 1.81  | 0.97   | 0.5             | 8,591.31 | 134,019,463.63    |
| Light-duty Euro 3 petrol passenger vehicles                        | 98.79    | 45.16  | 0.17            | 35.98           | 0.88  | 0.47   | 0.25            | 4,256.07 | 65,076,259.59     |
| Light-duty non-catalytic passenger vehicles                        | 1,371.49 | 607.62 | 0.06            | 138.73          | 0.44  | 0.24   | 0.18            | 3,028.27 | 32,816,920.32     |
| Medium-duty Euro 1 diesel vehicles                                 | 0        | 0      | 0               | 0.01            | 0     | 0      | 0               | 0.52     | 7,594.78          |
| Medium-duty Euro 2 diesel vehicles                                 | 0        | 0      | 0               | 0               | 0     | 0      | 0               | 0.1      | 1,434.57          |
| Medium-duty Euro 3 diesel vehicles                                 | 0        | 0      | 0               | 0.01            | 0     | 0      | 0               | 0.39     | 5,738.28          |
| Medium-duty non-standard diesel vehicles                           | 0        | 0      | 0               | 0               | 0     | 0      | 0               | 0.03     | 443.03            |
| Medium-duty Euro 1 petrol vehicles                                 | 0.84     | 0.04   | 0.02            | 0.09            | 0     | 0      | 0               | 19.69    | 213,202.28        |

| Temuco-Padre Las Casas                    |                 |                 |                 |                 |               |               |                 |                  |                       |
|-------------------------------------------|-----------------|-----------------|-----------------|-----------------|---------------|---------------|-----------------|------------------|-----------------------|
|                                           | CO              | COV             | NH <sub>3</sub> | NO <sub>x</sub> | PM 10         | PM 2.5        | SO <sub>2</sub> | Fuel             | Kilometers Driven     |
| Medium-duty Euro 2 petrol vehicles        | 0.04            | 0               | 0               | 0               | 0             | 0             | 0               | 1.58             | 17,119.89             |
| Medium-duty Euro 3 petrol vehicles        | 0.1             | 0               | 0               | 0               | 0             | 0             | 0               | 4.32             | 46,855.56             |
| Medium-duty non-catalytic petrol vehicles | 0.61            | 0.07            | 0               | 0.12            | 0             | 0             | 0               | 3.36             | 42,688.98             |
| Street Dust                               |                 |                 |                 |                 | 633.88        | 90.94         |                 |                  |                       |
| <b>TOTAL</b>                              | <b>6,594.62</b> | <b>1,980.89</b> | <b>16.54</b>    | <b>1,367.64</b> | <b>680.56</b> | <b>133.17</b> | <b>12.06</b>    | <b>49,621.51</b> | <b>515,527,493.60</b> |

| Valdivia                                 |       |       |                 |                 |       |        |                 |          |                   |
|------------------------------------------|-------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
|                                          | CO    | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
| Tendered Euro 1 diesel urban buses       | 2.6   | 0.91  | 0               | 11.38           | 0.58  | 0.53   | 0.23            | 333.29   | 1,797,482.81      |
| Tendered Euro 2 diesel urban buses       | 3.37  | 0.84  | 0.01            | 16.93           | 0.45  | 0.39   | 0.31            | 437.9    | 2,428,178.56      |
| Tendered Euro 3 diesel urban buses       | 5.13  | 1.05  | 0.01            | 20.26           | 0.6   | 0.51   | 0.43            | 617.33   | 3,185,013.42      |
| Tendered non-standard diesel urban buses | 34.74 | 22.72 | 0.02            | 67.16           | 6.94  | 6.78   | 1.03            | 1,477.27 | 6,023,144.19      |
| Light-duty Euro 1 diesel trucks          | 0.39  | 0.14  | 0               | 1.95            | 0.09  | 0.09   | 0.04            | 60.45    | 608,853.97        |
| Light-duty Euro 2 diesel trucks          | 0.42  | 0.12  | 0               | 2.65            | 0.06  | 0.06   | 0.05            | 74.97    | 789,948.96        |
| Light-duty Euro 3 diesel trucks          | 0.52  | 0.12  | 0               | 2.25            | 0.16  | 0.15   | 0.06            | 88.65    | 883,618.84        |
| Light-duty non-standard diesel trucks    | 1.95  | 1.22  | 0               | 4.68            | 0.37  | 0.36   | 0.09            | 124.84   | 1,045,979.84      |
| Medium-duty Euro 1 diesel trucks         | 0.3   | 0.11  | 0               | 1.46            | 0.07  | 0.06   | 0.03            | 43.59    | 270,489.87        |
| Medium-duty Euro 2 diesel trucks         | 0.33  | 0.09  | 0               | 2               | 0.04  | 0.04   | 0.04            | 54.37    | 350,943.25        |



| Valdivia                               | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|----------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Medium-duty Euro 3 diesel trucks       | 0.42   | 0.09  | 0               | 1.78            | 0.05  | 0.04   | 0.04            | 63.64    | 392,557.10        |
| Medium-duty non-standard diesel trucks | 1.08   | 0.43  | 0               | 4.18            | 0.18  | 0.18   | 0.06            | 86.15    | 464,687.70        |
| Heavy-duty Euro 1 diesel trucks        | 0.2    | 0.07  | 0               | 0.87            | 0.04  | 0.04   | 0.02            | 25.74    | 96,067.56         |
| Heavy-duty Euro 2 diesel trucks        | 0.25   | 0.07  | 0               | 1.43            | 0.04  | 0.03   | 0.03            | 39.11    | 150,963.30        |
| Heavy-duty Euro 3 diesel trucks        | 0.48   | 0.1   | 0               | 1.78            | 0.06  | 0.05   | 0.05            | 64.49    | 240,168.90        |
| Heavy-duty non-standard diesel trucks  | 0.14   | 0.05  | 0               | 0.71            | 0.03  | 0.03   | 0.01            | 17.04    | 54,895.75         |
| Euro 1 Four-stroke motorcycles         | 56.7   | 4.66  | 0.01            | 1.37            | 0.03  | 0.02   | 0.01            | 126.31   | 4,766,576.91      |
| Non-standard four-stroke motorcycles   | 14.88  | 1.06  | 0               | 0.12            | 0     | 0      | 0               | 18.17    | 699,854.57        |
| Euro 1 two-stroke motorcycles          | 0.98   | 0.57  | 0               | 0               | 0.01  | 0.01   | 0               | 2.3      | 94,975.38         |
| Non-standard two-stroke motorcycles    | 0.33   | 0.12  | 0               | 0               | 0     | 0      | 0               | 0.42     | 13,944.80         |
| Euro 1 diesel shared taxis             | 1.83   | 0.26  | 0               | 2.75            | 0.31  | 0.28   | 0.15            | 209.74   | 3,978,660.80      |
| Euro 3 diesel shared taxis             | 0.34   | 0.07  | 0               | 2.25            | 0.13  | 0.11   | 0.11            | 156.08   | 2,958,491.37      |
| Euro 1 petrol shared taxis             | 162.97 | 15.39 | 1.22            | 28.07           | 0.27  | 0.14   | 0.08            | 1,253.44 | 19,485,236.89     |
| Euro 3 petrol shared taxis             | 27.23  | 2.54  | 0.05            | 5.32            | 0.24  | 0.13   | 0.07            | 1,147.81 | 17,699,940.05     |
| Euro 1 diesel rental cars              | 0.32   | 0.05  | 0               | 0.47            | 0.06  | 0.05   | 0.03            | 40.58    | 775,456.64        |
| Euro 3 diesel rental cars              | 0.01   | 0     | 0               | 0.05            | 0     | 0      | 0               | 3.69     | 69,592.26         |
| Euro 1 petrol rental cars              | 6.65   | 1.64  | 0.1             | 1.9             | 0.02  | 0.01   | 0               | 74.56    | 1,331,139.39      |
| Euro 3 petrol rental cars              | 3.07   | 0.59  | 0.01            | 0.63            | 0.02  | 0.01   | 0.01            | 97.04    | 1,726,622.79      |

| Valdivia                                                              | CO     | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel   | Kilometers Driven |
|-----------------------------------------------------------------------|--------|--------|-----------------|-----------------|-------|--------|-----------------|--------|-------------------|
| Light-duty Euro 2 diesel commercial vehicles used by companies        | 0      | 0      | 0               | 0.01            | 0     | 0      | 0               | 0.41   | 6,473.56          |
| Light-duty Euro 5 diesel commercial vehicles used by companies        | 0      | 0      | 0               | 0               | 0     | 0      | 0               | 0.04   | 633.28            |
| Light-duty non-standard diesel commercial vehicles used by companies  | 1.39   | 0.2    | 0               | 0.39            | 0.21  | 0.2    | 0               | 55.33  | 12,683.25         |
| Light-duty Euro 1 petrol commercial vehicles used by companies        | 16.25  | 2.68   | 0               | 1.45            | 0     | 0      | 0               | 77.15  | 7,828.08          |
| Light-duty Euro 2 petrol commercial vehicles used by companies        | 0      | 0      | 0               | 0               | 0     | 0      | 0               | 0.11   | 1,284.16          |
| Light-duty Euro 3 petrol commercial vehicles used by companies        | 10.09  | 1.04   | 0               | 0.19            | 0     | 0      | 0               | 148.41 | 15,058.06         |
| Light-duty Euro 4 petrol commercial vehicles used by companies        | 0.02   | 0      | 0               | 0               | 0     | 0      | 0               | 2.16   | 25,208.18         |
| Light-duty non-catalytic petrol commercial vehicles used by companies | 307.02 | 216.06 | 0               | 1.4             | 0     | 0      | 0               | 538.06 | 60,267.43         |
| Light-duty Euro 1 diesel privately used commercial vehicles           | 6.26   | 1.88   | 0.01            | 16.23           | 1.31  | 1.22   | 0.61            | 890.25 | 13,776,579.72     |
| Light-duty Euro 2 diesel privately used commercial vehicles           | 1.34   | 0.44   | 0               | 3.86            | 0.25  | 0.25   | 0.16            | 230.52 | 3,587,196.44      |
| Light-duty Euro 3 diesel privately used commercial vehicles           | 2.33   | 0.56   | 0.01            | 6.5             | 0.44  | 0.39   | 0.31            | 457.82 | 6,931,552.09      |
| Light-duty non-standard diesel privately used commercial vehicles     | 0.39   | 0.04   | 0               | 0.49            | 0.11  | 0.11   | 0.02            | 25.84  | 356,710.75        |



| Valdivia                                  | CO              | COV           | NH <sub>3</sub> | NO <sub>x</sub> | PM 10         | PM 2.5       | SO <sub>2</sub> | Fuel             | Kilometers Driven     |
|-------------------------------------------|-----------------|---------------|-----------------|-----------------|---------------|--------------|-----------------|------------------|-----------------------|
| Medium-duty Euro 3 petrol vehicles        | 0.01            | 0             | 0               | 0               | 0             | 0            | 0               | 0.57             | 6,619.53              |
| Medium-duty non-catalytic petrol vehicles | 0.15            | 0.02          | 0               | 0.04            | 0             | 0            | 0               | 0.93             | 12,733.30             |
| Street Dust                               |                 |               |                 |                 | 198.75        | 28.51        |                 |                  |                       |
| <b>TOTAL</b>                              | <b>2,721.66</b> | <b>739.09</b> | <b>8.68</b>     | <b>517.17</b>   | <b>214.97</b> | <b>42.64</b> | <b>5.1</b>      | <b>21,779.81</b> | <b>290,527,852.92</b> |

| Osorno                                   | CO    | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|------------------------------------------|-------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Tendered Euro 1 diesel urban buses       | 7.73  | 2.8   | 0.01            | 31.92           | 1.52  | 1.44   | 0.34            | 487.89   | 3,080,366.65      |
| Tendered Euro 2 diesel urban buses       | 7.93  | 2.01  | 0.01            | 35.61           | 0.79  | 0.7    | 0.35            | 497.68   | 3,263,721.63      |
| Tendered Euro 3 diesel urban buses       | 12.21 | 2.65  | 0.01            | 51.5            | 1.1   | 0.97   | 0.49            | 701.87   | 4,510,536.69      |
| Tendered non-standard diesel urban buses | 87.22 | 63.08 | 0.02            | 184.65          | 18.1  | 17.85  | 1.16            | 1,657.45 | 9,314,441.94      |
| Euro 1 diesel rural buses                | 0.49  | 0.16  | 0               | 2.1             | 0.1   | 0.1    | 0.04            | 55.19    | 251,639.77        |
| Euro 2 diesel rural buses                | 0.47  | 0.12  | 0               | 2.37            | 0.06  | 0.05   | 0.04            | 57.19    | 266,618.31        |
| Euro 3 diesel rural buses                | 0.72  | 0.15  | 0               | 2.98            | 0.08  | 0.07   | 0.06            | 79       | 368,472.50        |
| Non-standard diesel rural buses          | 3.7   | 1.47  | 0               | 11.09           | 0.64  | 0.62   | 0.13            | 181.99   | 760,910.72        |
| Light-duty Euro 1 diesel trucks          | 0.38  | 0.15  | 0               | 1.67            | 0.09  | 0.08   | 0.03            | 42.79    | 477,704.98        |
| Light-duty Euro 2 diesel trucks          | 0.56  | 0.17  | 0               | 3.11            | 0.07  | 0.07   | 0.05            | 69.49    | 830,402.99        |
| Light-duty Euro 3 diesel trucks          | 0.39  | 0.09  | 0               | 1.59            | 0.1   | 0.09   | 0.03            | 45.92    | 511,188.95        |
| Light-duty non-standard diesel trucks    | 2.73  | 1.89  | 0               | 5.55            | 0.54  | 0.53   | 0.08            | 118.97   | 1,133,991.19      |
| Medium-duty Euro 1 diesel trucks         | 0.3   | 0.11  | 0               | 1.28            | 0.06  | 0.06   | 0.02            | 32.39    | 212,225.53        |

| Osorno                                 | CO     | COV  | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel   | Kilometers Driven |
|----------------------------------------|--------|------|-----------------|-----------------|-------|--------|-----------------|--------|-------------------|
| Medium-duty Euro 2 diesel trucks       | 0.44   | 0.13 | 0               | 2.41            | 0.05  | 0.05   | 0.04            | 52.63  | 368,915.39        |
| Medium-duty Euro 3 diesel trucks       | 0.32   | 0.07 | 0               | 1.22            | 0.03  | 0.03   | 0.02            | 34.79  | 227,101.14        |
| Medium-duty non-standard diesel trucks | 1.59   | 0.69 | 0               | 5.08            | 0.26  | 0.26   | 0.06            | 84.52  | 503,787.69        |
| Heavy-duty Euro 1 diesel trucks        | 0.8    | 0.3  | 0               | 3.14            | 0.19  | 0.18   | 0.05            | 77.94  | 307,812.26        |
| Heavy-duty Euro 2 diesel trucks        | 0.88   | 0.27 | 0               | 4.65            | 0.11  | 0.1    | 0.07            | 103.96 | 427,517.01        |
| Heavy-duty Euro 3 diesel trucks        | 1.78   | 0.41 | 0               | 6.09            | 0.2   | 0.18   | 0.12            | 166.4  | 666,926.57        |
| Heavy-duty non-standard diesel trucks  | 0.78   | 0.27 | 0               | 3.43            | 0.18  | 0.17   | 0.05            | 70.59  | 239,409.53        |
| Euro 1 Four-stroke motorcycles         | 30.05  | 2.36 | 0               | 0.77            | 0.02  | 0.01   | 0               | 67.36  | 2,560,707.33      |
| Non-standard four-stroke motorcycles   | 9.22   | 0.64 | 0               | 0.07            | 0     | 0      | 0               | 11.18  | 416,995.93        |
| Euro 1 two-stroke motorcycles          | 0.56   | 0.3  | 0               | 0               | 0     | 0      | 0               | 1.25   | 51,022.81         |
| Non-standard two-stroke motorcycles    | 0.2    | 0.07 | 0               | 0               | 0     | 0      | 0               | 0.25   | 8,308.76          |
| Euro 1 diesel shared taxis             | 7.48   | 1.04 | 0.01            | 13.06           | 1.05  | 0.98   | 0.25            | 354.1  | 10,954,292.59     |
| Euro 3 diesel shared taxis             | 2.02   | 0.39 | 0.01            | 10.06           | 0.47  | 0.41   | 0.21            | 307.8  | 9,004,313.84      |
| Euro 1 petrol shared taxis             | 192.14 | 15.5 | 0.56            | 25.23           | 0.21  | 0.12   | 0.03            | 548.03 | 15,599,829.96     |
| Euro 3 petrol shared taxis             | 20.58  | 1.44 | 0.02            | 3.42            | 0.16  | 0.09   | 0.03            | 438.17 | 11,699,872.47     |
| Euro 1 diesel rental cars              | 0.02   | 0    | 0               | 0.04            | 0     | 0      | 0               | 3.04   | 59,902.07         |
| Euro 3 diesel rental cars              | 0.01   | 0    | 0               | 0.04            | 0     | 0      | 0               | 3.08   | 59,902.07         |
| Euro 1 petrol rental cars              | 0.95   | 0.16 | 0.01            | 0.25            | 0     | 0      | 0               | 10.69  | 191,686.62        |

| Osorno                                                                | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel   | Kilometers Driven |
|-----------------------------------------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|--------|-------------------|
| Euro 3 petrol rental cars                                             | 0.35   | 0.04  | 0               | 0.06            | 0     | 0      | 0               | 11.07  | 197,676.83        |
| Light-duty Euro 2 diesel commercial vehicles used by companies        | 0      | 0     | 0               | 0               | 0     | 0      | 0               | 0.15   | 2,327.20          |
| Light-duty Euro 5 diesel commercial vehicles used by companies        | 0      | 0     | 0               | 0               | 0     | 0      | 0               | 0.04   | 657.22            |
| Light-duty non-standard diesel commercial vehicles used by companies  | 0.63   | 0.09  | 0               | 0.18            | 0.1   | 0.09   | 0               | 25.08  | 9,998.36          |
| Light-duty Euro 1 petrol commercial vehicles used by companies        | 7.87   | 1.3   | 0               | 0.7             | 0     | 0      | 0               | 37.57  | 6,669.16          |
| Light-duty Euro 2 petrol commercial vehicles used by companies        | 0.01   | 0     | 0               | 0               | 0     | 0      | 0               | 0.33   | 3,943.32          |
| Light-duty Euro 3 petrol commercial vehicles used by companies        | 5.94   | 0.61  | 0               | 0.11            | 0     | 0      | 0               | 87.82  | 15,590.11         |
| Light-duty Euro 4 petrol commercial vehicles used by companies        | 0.01   | 0     | 0               | 0               | 0     | 0      | 0               | 1.31   | 15,665.53         |
| Light-duty non-catalytic petrol commercial vehicles used by companies | 130.75 | 91.89 | 0               | 0.68            | 0     | 0      | 0               | 230.13 | 45,111.11         |
| Light-duty Euro 1 diesel privately used commercial vehicles           | 3.57   | 1.09  | 0.01            | 9.68            | 0.78  | 0.72   | 0.37            | 525.97 | 8,680,745.63      |
| Light-duty Euro 2 diesel privately used commercial vehicles           | 0.49   | 0.15  | 0               | 1.39            | 0.09  | 0.09   | 0.05            | 77.85  | 1,289,574.29      |
| Light-duty Euro 3 diesel privately used commercial vehicles           | 1.8    | 0.43  | 0.01            | 5.1             | 0.35  | 0.31   | 0.23            | 332.75 | 5,540,393.24      |
| Light-duty non-standard diesel privately used commercial vehicles     | 0.39   | 0.04  | 0               | 0.5             | 0.11  | 0.11   | 0.02            | 25.76  | 364,185.32        |



| Osorno                                    | CO              | COV           | NH <sub>3</sub> | NO <sub>x</sub> | PM 10         | PM 2.5       | SO <sub>2</sub> | Fuel             | Kilometers Driven     |
|-------------------------------------------|-----------------|---------------|-----------------|-----------------|---------------|--------------|-----------------|------------------|-----------------------|
| Medium-duty Euro 3 petrol vehicles        | 0.01            | 0             | 0               | 0               | 0             | 0            | 0               | 0.48             | 5,683.29              |
| Medium-duty non-catalytic petrol vehicles | 0.15            | 0.02          | 0               | 0.04            | 0             | 0            | 0               | 0.95             | 13,285.48             |
| Street Dust                               |                 |               |                 |                 | 423.95        | 60.82        |                 |                  |                       |
| <b>TOTAL</b>                              | <b>2,148.50</b> | <b>448.12</b> | <b>5.47</b>     | <b>629.41</b>   | <b>453.47</b> | <b>88.45</b> | <b>4.99</b>     | <b>15,533.74</b> | <b>224,641,327.47</b> |

| Puerto Montt                             | CO     | COV  | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel      | Kilometers Driven |
|------------------------------------------|--------|------|-----------------|-----------------|-------|--------|-----------------|-----------|-------------------|
| Euro 1 diesel interurban buses           | 1.43   | 0.56 | 0               | 6.45            | 0.33  | 0.31   | 0.13            | 191.19    | 859,462.82        |
| Euro 2 diesel interurban buses           | 2.53   | 0.77 | 0.01            | 14.69           | 0.38  | 0.33   | 0.28            | 395.17    | 1,775,283.83      |
| Euro 3 diesel interurban buses           | 9.89   | 2.34 | 0.02            | 39.46           | 1.27  | 1.11   | 0.2             | 283.72    | 5,734,448.33      |
| Non-standard diesel interurban buses     | 2.52   | 0.85 | 0               | 12.38           | 0.61  | 0.57   | 0.21            | 302.62    | 1,253,970.31      |
| Tendered Euro 1 diesel urban buses       | 16.47  | 5.59 | 0.03            | 65.38           | 3.45  | 3.2    | 1.31            | 1,872.78  | 8,927,520.42      |
| Tendered Euro 2 diesel urban buses       | 36.43  | 8.45 | 0.05            | 157.08          | 4.11  | 3.6    | 2.71            | 3,877.27  | 18,440,451.87     |
| Tendered Euro 3 diesel urban buses       | 133.55 | 25.8 | 0.16            | 504.36          | 13.35 | 11.72  | 9.12            | 13,033.91 | 59,565,584.08     |
| Tendered non-standard diesel urban buses | 71.69  | 45.8 | 0.04            | 134.7           | 14.15 | 13.8   | 2.47            | 3,531.07  | 13,025,398.37     |
| Light-duty Euro 1 diesel trucks          | 0.85   | 0.32 | 0               | 4.21            | 0.2   | 0.19   | 0.09            | 132.56    | 1,297,790.23      |
| Light-duty Euro 2 diesel trucks          | 1.43   | 0.43 | 0.01            | 8.55            | 0.21  | 0.18   | 0.17            | 245.52    | 2,475,205.65      |
| Light-duty Euro 3 diesel trucks          | 1.07   | 0.25 | 0.01            | 4.45            | 0.31  | 0.3    | 0.12            | 176.31    | 1,700,293.36      |
| Light-duty non-standard diesel trucks    | 3.9    | 2.5  | 0.01            | 8.98            | 0.74  | 0.72   | 0.17            | 245.55    | 1,956,089.74      |



| Puerto Montt                               | CO     | COV   | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
|--------------------------------------------|--------|-------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
| Medium-duty Euro 1 diesel trucks           | 0.82   | 0.29  | 0               | 3.98            | 0.18  | 0.17   | 0.08            | 120.81   | 745,525.56        |
| Medium-duty Euro 2 diesel trucks           | 1.42   | 0.39  | 0               | 8.29            | 0.18  | 0.17   | 0.16            | 229.84   | 1,421,900.88      |
| Medium-duty Euro 3 diesel trucks           | 1.05   | 0.22  | 0               | 4.43            | 0.11  | 0.11   | 0.11            | 161.49   | 976,746.57        |
| Medium-duty non-standard diesel trucks     | 2.68   | 1.08  | 0               | 10.25           | 0.45  | 0.43   | 0.15            | 214.43   | 1,123,690.76      |
| Heavy-duty Euro 1 diesel trucks            | 0.5    | 0.18  | 0               | 2.25            | 0.11  | 0.11   | 0.05            | 66.99    | 254,572.61        |
| Heavy-duty Euro 2 diesel trucks            | 0.74   | 0.21  | 0               | 4.27            | 0.11  | 0.09   | 0.08            | 117.59   | 454,237.39        |
| Heavy-duty Euro 3 diesel trucks            | 1.41   | 0.31  | 0               | 5.28            | 0.17  | 0.15   | 0.14            | 193.61   | 703,818.37        |
| Heavy-duty non-standard diesel trucks      | 0.79   | 0.26  | 0               | 4.1             | 0.19  | 0.18   | 0.07            | 99.12    | 324,455.29        |
| Euro 1 Four-stroke motorcycles             | 177.33 | 16.16 | 0.03            | 4               | 0.1   | 0.05   | 0.02            | 412.53   | 15,008,348.33     |
| Non-standard four-stroke motorcycles       | 55.14  | 4.11  | 0               | 0.39            | 0.02  | 0.01   | 0               | 67.38    | 2,476,226.32      |
| Euro 1 two-stroke motorcycles              | 3.36   | 1.81  | 0               | 0.01            | 0.03  | 0.02   | 0               | 7.29     | 299,045.54        |
| Non-standard two-stroke motorcycles        | 1.16   | 0.45  | 0               | 0               | 0.01  | 0.01   | 0               | 1.52     | 49,339.50         |
| Euro 1 compressed natural gas shared taxis | 0.11   | 0.02  | 0               | 0.03            | 0     | 0      | 0               | 3.33     | 66,390.48         |
| Euro 1 diesel shared taxis                 | 0.1    | 0.01  | 0               | 0.14            | 0.02  | 0.02   | 0.01            | 11.95    | 221,301.59        |
| Euro 3 diesel shared taxis                 | 0.17   | 0.04  | 0               | 1.03            | 0.06  | 0.05   | 0.05            | 75.17    | 1,372,069.81      |
| Euro 1 petrol shared taxis                 | 168.62 | 20.2  | 1.39            | 31.6            | 0.3   | 0.16   | 0.09            | 1,442.94 | 21,665,425.08     |
| Euro 3 petrol shared taxis                 | 27.91  | 3.7   | 0.04            | 5.67            | 0.25  | 0.13   | 0.07            | 1,220.35 | 18,058,209.36     |
| Euro 1 diesel rental cars                  | 0.01   | 0     | 0               | 0.01            | 0     | 0      | 0               | 0.66     | 12,201.62         |

| Puerto Montt                                                          |        |        |                 |                 |       |        |                 |          |                   |
|-----------------------------------------------------------------------|--------|--------|-----------------|-----------------|-------|--------|-----------------|----------|-------------------|
|                                                                       | CO     | COV    | NH <sub>3</sub> | NO <sub>x</sub> | PM 10 | PM 2.5 | SO <sub>2</sub> | Fuel     | Kilometers Driven |
| Euro 3 diesel rental cars                                             | 0      | 0      | 0               | 0.02            | 0     | 0      | 0               | 1.33     | 24,403.25         |
| Euro 1 petrol rental cars                                             | 8.1    | 1.63   | 0.11            | 2.18            | 0.02  | 0.01   | 0.01            | 89.19    | 1,514,932.05      |
| Euro 3 petrol rental cars                                             | 1.95   | 0.31   | 0.01            | 0.37            | 0.01  | 0.01   | 0               | 62.7     | 1,062,895.95      |
| Light-duty Euro 2 diesel commercial vehicles used by companies        | 0.01   | 0      | 0               | 0.01            | 0     | 0      | 0               | 0.88     | 12,851.07         |
| Light-duty Euro 5 diesel commercial vehicles used by companies        | 0      | 0      | 0               | 0               | 0     | 0      | 0               | 0.05     | 746.4             |
| Light-duty non-standard diesel commercial vehicles used by companies  | 3.74   | 0.53   | 0               | 1.06            | 0.58  | 0.53   | 0               | 148.71   | 30,423.94         |
| Light-duty Euro 1 petrol commercial vehicles used by companies        | 33.02  | 5.45   | 0               | 2.95            | 0     | 0      | 0               | 156.67   | 14,181.61         |
| Light-duty Euro 2 petrol commercial vehicles used by companies        | 0.01   | 0      | 0               | 0               | 0     | 0      | 0               | 0.24     | 2,612.40          |
| Light-duty Euro 3 petrol commercial vehicles used by companies        | 12.59  | 1.3    | 0               | 0.23            | 0     | 0      | 0               | 185      | 16,745.34         |
| Light-duty Euro 4 petrol commercial vehicles used by companies        | 0.05   | 0      | 0               | 0               | 0     | 0      | 0               | 4.25     | 46,098.35         |
| Light-duty non-catalytic petrol commercial vehicles used by companies | 491.37 | 345.72 | 0               | 2.2             | 0     | 0      | 0               | 860.67   | 85,998.34         |
| Light-duty Euro 1 diesel privately used commercial vehicles           | 13.33  | 3.78   | 0.02            | 32.93           | 2.72  | 2.56   | 1.39            | 2,008.89 | 25,587,625.61     |
| Light-duty Euro 2 diesel privately used commercial vehicles           | 3.14   | 0.95   | 0.01            | 8.43            | 0.57  | 0.57   | 0.36            | 513.62   | 7,121,170.12      |
| Light-duty Euro 3 diesel privately used commercial vehicles           | 6.85   | 1.51   | 0.02            | 17.74           | 1.23  | 1.12   | 0.9             | 1,302.26 | 16,887,292.28     |

[illegible]

| Puerto Montt                              | CO              | COV             | NH <sub>3</sub> | NO <sub>x</sub> | PM 10           | PM 2.5     | SO <sub>2</sub> | Fuel             | Kilometers Driven     |
|-------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------|-----------------|------------------|-----------------------|
| Medium-duty Euro 1 petrol vehicles        | 0.5             | 0.03            | 0.01            | 0.06            | 0               | 0          | 0               | 11.81            | 129,037.59            |
| Medium-duty Euro 2 petrol vehicles        | 0.01            | 0               | 0               | 0               | 0               | 0          | 0               | 0.36             | 3,919.82              |
| Medium-duty Euro 3 petrol vehicles        | 0.04            | 0               | 0               | 0               | 0               | 0          | 0               | 1.95             | 21,279.03             |
| Medium-duty non-catalytic petrol vehicles | 0.36            | 0.04            | 0               | 0.07            | 0               | 0          | 0               | 1.96             | 25,125.81             |
| Street Dust                               |                 |                 |                 |                 | 1,322.58        | 189.76     |                 |                  |                       |
| <b>TOTAL</b>                              | <b>3,704.92</b> | <b>1,026.66</b> | <b>12.46</b>    | <b>1,479.60</b> | <b>1,373.21</b> | <b>235</b> | <b>22.31</b>    | <b>54,026.20</b> | <b>485,646,547.14</b> |

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