

Israeli PRTR Release Estimation Techniques



Instructions for determining optimum method for calculating releases and transfers to the environment - Primary instructions

In accordance with the provisions of Section 6(B)

PROTECTION OF THE ENVIRONMENT (ENVIRONMENTAL EMISSIONS AND TRANSFERS– REPORTING AND REGISTRATION REQUIREMENTS) LAW, - 2012

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Instructions for determining optimum method for calculating emissions and transfers to the environment

The Ministry for Environmental Protection

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1. General

These provisions specify the optimal calculation method by which a plant owner is required to calculate the quantity of pollutants and waste that must be reported pursuant to the provisions of Section 3(B)(1), (2), (5) and (6) of the Environmental Protection Law (Releases and transfers to the Environment – Reporting and Recording Duties) 5772 – 2012 (hereinafter “**the Law**”).

The calculation of the quantities as set forth in Section 3(B)(1), (2), (5) and (6) of the Law is to be carried out in accordance with the instructions set forth in this document and according to **additional instructions** concerning an optimum calculation method that have been set forth for some of the fields or types of activity that are set forth in the second addendum to the Law (as specified in Table 1).

Some of the instructions guide a plant manager to use calculation tools (hereinafter “**computers**”) for calculating the quantity of releases and transfers of pollutants or waste. The list of calculators is set forth in Table 2.

The additional instructions by type of activity and the Calculators are published on the website of the Ministry for Environmental Protection (www.sviva.gov.il) and may be received by writing to the email address: mirsham@sviva.gov.il.

It is emphasized that the provisions of Section 9 of the Law state inter alia that a plant owner must save information, figures or calculations used as a basis for making out reports for 5 years.

Table 1 – list of types of activities for which there are additional instructions for determining an optimum calculation method

No.	Activity field or type	No. of item in the second addendum to the Law
1.	Fuel combustion – for generation of electricity	6
2.	Application of galvanization or metal coating (fused metal coats)	12
3.	Melting, including alloyage, of nonferrous metals, including recovered products and operation of nonferrous metal foundries	15
4.	Surface treatment of metals and plastics by chemical or electrolytic process	16
5.	Excavation and mining	18
6.	Asphalt production	19
7.	Production of organic or inorganic materials to an industrial scale by chemical or biological processing and production of chemicals to an industrial scale	27-46
8.	Operation of landfills	53
9.	Transit station for waste	54
10.	Effluent disposal or treatment	56
11.	Water desalination	68
12.	Facilities for intensive raising of swine or sows	69
13.	Facilities for raising of poultry	70
14.	Facilities for raising fish or mollusks	71
15.	Slaughtering of animals	72
16.	Production of food products, beverages or food for animals – treatment and processing of animal and plant raw materials	73
17.	Milk treatment and processing	74
18.	Emissions from storage and conveying activity	

Table 2: list of calculator

No.	Name of calculator
1.	Emissions from combustion of fuels at Israel Electric Corporation facilities calculator
2.	Emissions from fuel combustion – steam boilers calculator
3.	Emissions from mileage on unpaved roads calculator
4.	Emission of particles from heaps by wind erosion calculator
5.	Emissions of volatile materials into the air from chemical industry activity calculator
6.	Greenhouse gas emission calculator
7.	Emissions from filling of / storage in underground tanks calculator
8.	Emissions from cleaning of tanks calculator
9.	Emissions from filling / emptying storage tanks calculator
10.	Emissions from filling of tankers calculator
11.	Emissions from cleaning drums and cube tanks calculator
12.	Emissions from air emission sampling data calculator
13.	Emissions from air emission continuous monitoring data calculator
14.	Emissions from excavation processes calculator
15.	Releases and transfers from intensive poultry raising calculator
16.	Waste transfer calculator

2. Types of releases and transfers for reporting

Reporting in accordance with Section 3(B)(1), (2) and (5) of the Law will relate to releases and transfers as set forth in Table 3. It is emphasized that Table 3 is an accessory table that is intended to assist the reporting party to identify releases and transfers. To the extent that there are releases and transfers of additional types, these must also be reported.

Table 3. Types of releases and transfers that must be reported

Type of releases and transfers	Details
Point emissions	Emissions in to the environment that are channeled through a pipe that supports sampling, such as a chimney stack, scrubber, bag filter or effluent pipeline, irrespective of the pipe profile or shape. Include point source, channeled release and stack emissions
Diffuse	Non-point emissions, such as emissions caused by direct contact between volatile substances (partial vapor pressure higher than 0.3 kPa under standard conditions) or particulate matter into the environment. May be a result of planning of the facility and its elements, operation conditions (equipment and facility elements, cooling stacks), storage (such as tanks, drums, bulks, mounds, silos, pools and breathers), unloading and loading of materials, conveying on unpaved roads within the plant grounds and open combustion such as gas flares. May arrive from point sources, area sources or volumetric sources. Also called fugitive emissions.
Emission from equipment elements	A subtype of diffuse emissions. Emissions that result from a prolonged leak of material from an equipment element that contains a liquid or gas, such as tanks, pumps, couplings. In English: fugitive releases.
Exceptional	Emissions that form from conditions that deviate from standard operating conditions, such as: change in raw materials, change in the process conditions, startups, incapacitations, temporary shutdowns, maintenance, faults or accidents. Exceptional releases may form under expected or unexpected conditions.
Accidental	A subtype of exceptional releases. Emissions that form in unexpected events such as an accident or fault.
Transfers	Disposal of waste or dumping of effluents outside the plant grounds for disposal or treatment. Include waste forms from non-industrial activity (such as a dining room, offices) and effluents that are not industrial (such as sanitary effluents and pollutants that originate from supply water).
Other	Emissions or transfers of pollutants or waste that are not included in the categories above.

3. Stages of calculation of the quantities reported under Section 3 of the Law

For the purpose of calculation of the quantities reported under Section 3 of the Law, the following actions must be performed:

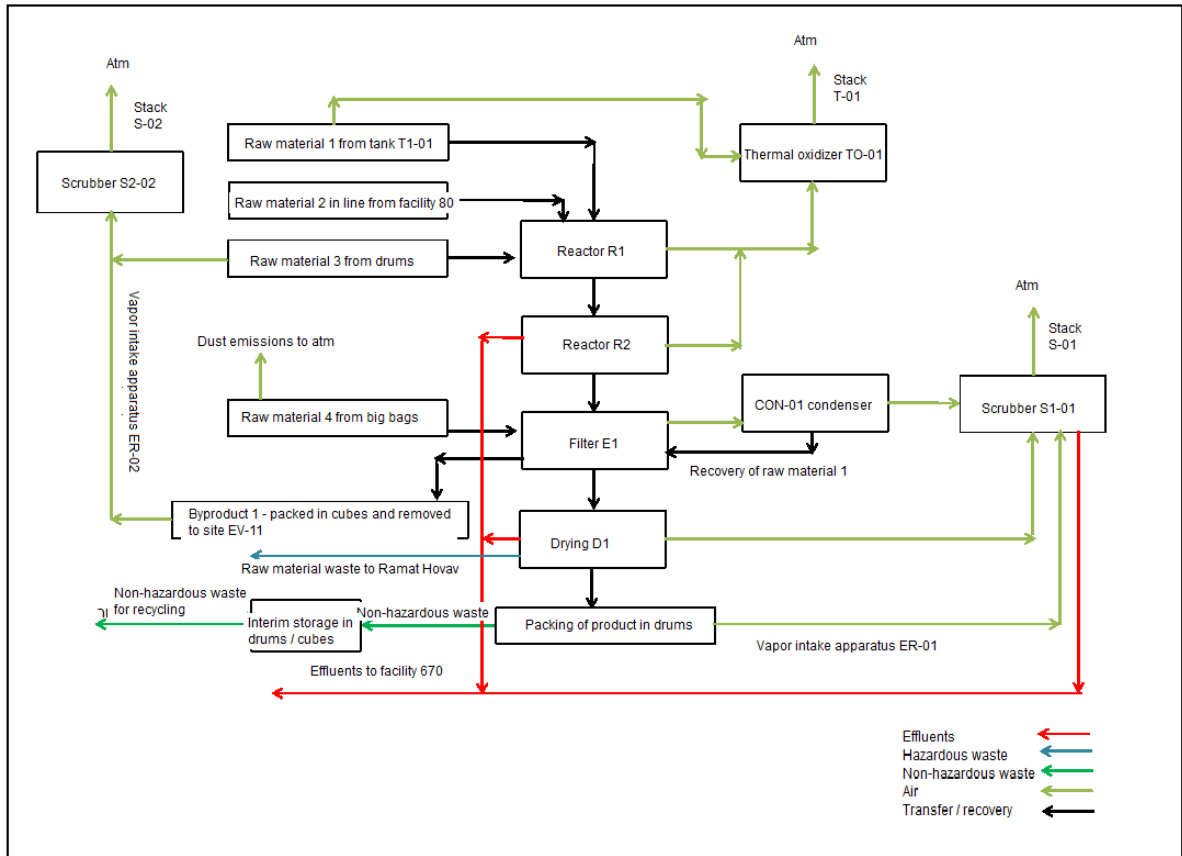
- A. Mapping of the processes that are performed at the plant and making out a flow chart of these processes.
- B. Identification of emission or transfer sources, based on the mapping that was done as set forth in Section A, and identification of the pollutants and waste that are emitted or transferred from these points.
- C. Determining an optimum calculation method for each pollutant that is emitted or transferred or transferred waste, according to the provisions set forth in Chapter 6 of these instructions.
- D. Calculation of the quantity of pollutant material or waste that are emitted or transferred, according to the optimum set calculation method.

4. Breakdown of the plant processes and making out a flow chart

A plant owner is to prepare a breakdown of facilities and processes of actions that are performed at the plant from which emissions or transfers are expected, in the following manner: for each process or facility, the type of process or facility, materials used in it (products, byproducts, raw materials and intermediate materials), the feed points, points for discharging materials, emission points and the points of connection to end systems, the emission sources (into the air, soil, sea, water source) or sources of transfer and treatment facilities relevant to it are to be elaborated. A flow chart of the process is to be attached for the foregoing that will elaborate all of the emission or transfer sources.

The mapping of the processes and the flow chart will be made for sources for emission or transfer. There is no need to map out stages in a process from which there is no emission to the environmental components or transfer of waste or effluents.

Figure 1 – example of a flow chart



5. Identification of sources for emission / transfer and identification of pollutants / waste

Based on the mapping of the processes according to Chapter 4, a plant owner is to prepare a table, in the form of Table 4 below, which specifies the various emission or transfer sources, for each emission or transfer source, specifying the pollutants (as defined by law) that are emitted or transferred from it, and the waste that is transferred from it.

Table 4. Breakdown of the plant emission or transfer sources

Source	Name of source	Tagging of source	Pollutant in the first addendum					Classification of wastes according to the European catalog of wastes
			Emission to air	Emission to sea	Emission to water source	Emission to soil	Transfer of effluents into a WWTP	
		1.	Pollutant x Pollutant y					
		2.						Classification A Classification B etc.

* Pursuant to Section 2 of the Law, running of effluents into a WWTP constitutes a transfer rather than a release and therefore is to be reported under a separate category.

6. Instructions for determining optimum calculation methods

The calculation of the optimum calculation method that matches each emission or transfer source and for each pollutant or waste, will be according to the prioritization shown in Table 5. See Chapter 7 for details and an explanation on optimum calculation methods.

A plant owner will determine an optimum calculation method according to the highest priority shown in the table (priority 1 being the highest and priority 9 being the lowest). A plant owner is allowed to set a optimum calculation method that differs from the prioritization shown in Table 5, in the following cases:

A. **There is no engineering – technical ability to implement the optimum calculation method.** For example, in the emission of volatile materials from a tank, direct measurement is impossible.

B. **There is a more precise method** – the optimum calculation method that is rated at a lower priority is more likely to calculate for that emission source or pollutant a more precise quantity. For example, the quantity of emission of sulfur oxides into the air from combustion facilities depends on a number of known parameters – the sulfur content in the oil and the combustion process, and therefore the execution of a mass balance for calculating this emission will be more precise than a calculation based on sampling data.

C. **The plant has no measurement data** (rows 1 to 3 in Table 5) – measurement is not required by law, as of the beginning of the year for which the plant is reporting, and the

plant owner does not have measurement data (except as set forth in Chapter 7.1.1 (calculation of NMVOC – Section C)).

Table 5: prioritization of optimum calculation methods

Priority	Optimum calculation method	Examples
1	Measurement – sampling / monitoring data	Point emissions into the air, running of effluents, for which there is sampling / monitoring data
2	Measurement combined with another optimum calculation method	Equipment and facility elements (LDAR – leak detection and repair review)
3	Indirect monitoring combined with another optimum calculation method	Flow rate, temperature data
4	Mass balance	Expected exceptional emissions, diffuse emissions
5	Special purpose model or calculator	Storage of volatile materials in tanks, emission of methane from landfills, calculators listed in Table 2
6	Ability to calculate according to a proven physical – chemical relationship between the process and emissions or transfers	
7	An emission factor that is specific to the emission source	
8	Other emission factors	Equipment elements and facilities (Protocol for Equipment Leak Emissions Estimates)
9	Engineering judgments	Unexpected exceptional emissions – accidental releases

A plant owner is to indicate the optimum calculation method established for each emission / transfer source in Table 4.

7. Breakdown and explanation of optimum calculation methods

The calculations of releases and transfers of pollutants will be carried out according to the instructions in this chapter.

For the purpose of a plant that performs activities as set forth in details 1, 4.1, 4.2, 4.3, 4.4, 4.5 and 4.6 of the third addendum to the Clean Air Law, 5768-2008, and which does not have information on the quantity of pollutants that are emitted from each diffuse emission source, a plant owner is allowed to make out his report of these emission sources based on a representative statistic calculation of these sources as long as it is based on representative data (such as a calculation for one tank using the Tanks software, for a number of tanks that have similar characteristics), to the extent that he does not have detailed calculations in his possession.

7.1 Direct measurement (sampling or continuous monitoring)

Direct measurement is divided into two primary points:

- Momentary or continuous sampling for a defined time (in a stack, at an effluent outlet and so on)
- Continuous monitoring at the emission source (continuous emission monitoring)

This calculation usually provides the most reliable and exact results, assuming that the equipment complies with common standards, is fit for use, calibrated for the correct emission rate, is suitable for the emission that is measured and if the sampling is performed at the proper frequency, in accordance with statutory requirements. This frequency must be determined on the merits of each case and faithfully represent the conditions of the facility and variance in emissions. All of the relevant sampling data that is in the possession of the plant must be used. All sampling is to be performed in accordance with the professional directions that have been provided by the Ministry for Environmental Protection.

In the case of the measuring result of a pollutant being lower than the test method's sensitivity threshold, but there is likely to be an emission of this pollutant from the emission source, the existence of the emission of the pollutant must be reported, without indicating the annual emission quantity, in accordance with the provisions of Section 3(B)(3) of the Law.

7.1.1 Calculation of emissions into the air from sampling results

Calculation of emissions into the air from sampling results by creating an emission factor

The calculation of the emission quantity for each pollutant will be made by creating a characteristic emission factor for the production process, and will be based on the stack sampling results, in the following manner:

A. Calculation of the mean emission rate for a pollutant based on averaging out the results of stack sampling results under characteristic operation conditions from the last four years and at least two sampling operations characteristic of the process (i.e. that did not involve material changes, such as addition / replacement of a treatment facility, a change in raw materials and so on since the sampling was performed).

B. The calculation of a characteristic emission factor for a pollutant in a process will be made using the emission rate ratio of the pollutant to the production rate at the time at which the sampling was performed.

C. The calculation of the annual emission quantity from the production process will be made by multiplying the characteristic emission factor by the annual product quantity at the plant. Equation 1 shows the manner of calculation of the specific emission factor (per product) from the sampling results and equation 2 shows the manner of applying the emission calculation using an emission factor.

Equation 1: calculation of specific emission factor from sampling results

$$EF_i = \frac{S_i}{A_h}$$

Where:

EF_i = The emission factor for the production process for pollutant I (kg of pollutant / kg of product).

S_i = Average emission rate per pollutant, calculated out of the sampling results (kg/ hour).

A_h = Average hourly production rate, calculated from the production data at the time at which the sampling was performed (kg of product / hour of activity).

Equation 2: calculation of emissions into the air using a specific emission factor that originates from sampling results

$$E_i = EF_i * A$$

Where:

E_i = annual emissions of pollutant i (kg / year).

E_{Fi} = the emission factor of pollutant i (kg of pollutant / kg of product), calculated using equation 1.

A = Total annual production for that facility/ies (kg / year)

For making the calculation, a calculator may be used for calculating annual emissions from sampling data (calculator 12 in Table 2).

Calculation of emissions into the air from sampling results by activity hours

In stacks that drain emissions from a number of production facilities and processes, it may not be possible to create a reliable coefficient for a pollutant emission rate for a production rate, as set forth above. In this case, the amount of emission of the pollutant is to be calculated based on the results of sampling of the stack according to Equation 3.

For calculating the emission rate of a pollutant, averaging of stack samples from the last four years is to be relied upon, covering at least two samples that characterize the process (i.e. in which no material modifications have been made, such as adding / replacing a treatment facility, changing of raw materials and so on).

Equation 3: calculation of emissions into the air using sampling data

$$E_i = S_i * \left(\frac{1}{10^6} \right) * OpHrs_i$$

Where:

E_i = Annual emission of pollutant i (kg/ year)

S_i = Emission rate of the pollutant (mg/ hour)

10^6 = mg to kg conversion factor

$OpHrs_i$ = number of hours of activity per year in which pollutant i is emitted

Calculation of emission into the air of NMVOC and other pollutants from TOC data

A plant that is required to perform TOC sampling and analysis as a measure of emission of volatile organic materials will use this information to calculate and report emission of NMVOCs and specific volatile organic pollutants that appear in the first addendum to the Law:

A. The TOC concentration will be converted into a volatile organic pollutant concentration, based on the molecular weight of the volatile organic compound that is in the emission from

the stack. In the case of more than one volatile organic compound in the emission, the emission will be calculated according to the proportion of the pollutant in the emission gases in the stack.

B. The TOC concentration will be converted to NMVOC based on the molecular weight of the primary volatile organic compounds, which characterize the emission from the stack.

C. Despite the provisions set forth in Chapter 6 (C), if the composition of organic compounds of the TOC is unknown, a single time analysis is required to characterize the composition of the materials. The report will be made in the future according to the findings of this analysis, as long as no significant change has been made in the process.

7.1.2 Calculation of emission into the air from continuous monitoring data

Calculation of emissions into the air from continuous monitoring data will be done using the calculator for calculating annual emissions from continuous monitoring data (calculator 13 in Table 2). To use the calculator, the monitoring data must be copied into the continuous monitoring calculator, from another Excel spreadsheet, as long as the source data is in the same format as the calculator (i.e. the same columns). The data must be of hourly resolution. For example – if the monitoring is carried out every five minutes, the data is to be converted to hourly resolution, by inputting it into the calculator (by calculating a weighted average of the concentration data with the flow rate data). In addition to the monitoring results, one must indicate in the column intended for this purpose whether the facility and monitoring instruments are active in each reported period.

To facilitate the input of data, the calculator automatically assesses whether the facility / monitoring device is active, according to the monitoring results, when inputting the data. However, the plant owner is responsible for assessing the correctness of the marking of the monitoring measures as active or incapacitated.

7.1.3 Calculation of releases and transfers to effluents from sampling data

The calculation of the releases and transfers to effluents by effluent sampling results will be carried out using equation 4.

Equation 4: calculation of emissions in effluents using sampling results

$$E_i = C_i * V * \frac{OpHrs}{10^6}$$

Where:

E_i = Emission of pollutant i (kg / year)

C_i = Concentration of pollutant i in effluents (mg/liter)

V = Hourly flow rate of the effluents (liters / hour)

$OpHrs$ = Production activity hours (hours/ year)

10^6 = conversion factor (mg/kg)

When calculating the releases and transfers to effluents, all samples from the reporting year that are in the possession of the plant are to be used. If there are less than three samples in the report year, at least three samples are to be used from the last two years, as long as these characterize a production process and no material changes have been made to it (such as replacement of a treatment facility, change in raw materials). To make the calculation, the results of the samples used must be averaged out.

7.2 Measurement data in combination with another optimum calculation method

7.2.1 Leaks into the air from equipment elements

The calculation of diffuse emissions of volatile organics into the air (from a partial vapor pressure of more than 0.3 kPa under standard conditions), the equipment elements in the production facility, including: couplings and flanges, valves and taps, compressors, pumps, mixing equipment, sampling points, pressure reduction devices (PRDs).

A plant that is required by law to estimate emissions from equipment elements as specified in the “procedure for executing a plan for leak detection and review (LDAR)” is to calculate the emission quantity of NMVOC or specific volatile pollutant as required in this procedure. A plant that is not required to perform a plan for detecting and handling equipment emissions is to calculate the emission quantity of NMVOCs or an individual volatile pollutant as set forth in Chapter 7.5.2.

7.3 Indirect monitoring

Indirect monitoring is based on a connection between the characteristics of the industrial process and the emissions. This method may be found to be precise in cases in which the characteristics that are required for evaluating the emission are already monitored for process control purposes.

This method may be applied in a process in which the emissions depend directly on the conditions of the process for which the measurement is performed. Releases and transfers to effluents from industrial processes are usually a function of process characteristics, such as temperature, pressure or acidity; and therefore constitute a candidate for calculating the quantity using indirect monitoring data. In any case in which indirect monitoring is used to verify the connection between the monitored parameter and the emission.

7.4 Calculations

Calculations are divided into a number of types:

- **Mass balances** – in a mass balance, the emissions are calculated based on the quantities of materials entering and exiting the process. This approach is based on the law of conservation of mass that determines that the quantity of material entering a system must exit as a product or as an emission or transfer, or change in a chemical reaction with another substance. Equation 5 shows in general terms the manner of application of the calculation of emissions using a mass balance.

Equation 5. Mass balance

$$VOL_{in} + VOL_{generated} = VOL_{out} + VOL_{destroyed}$$

- **Models** – based on extensive, detailed information concerning the aggregate of relations within the system. This knowledge originates from the combination of physicochemical equations and empiric data. The user of the model is also required to have extensive knowledge of the system and the processes within it. An example of such a model is the EPA's TANKS software for calculating emissions from storage tanks.

- **Physicochemical laws** – laws that are derived from chemistry and physics and are based on the specific properties of the substance in question. Examples of known laws are Henry's law, the ideal gases law, Antonie's equation and others.
- **Engineering calculations** – based on empiric equations that are attributed to a series of observed or measured parameters.

7.5 Emission factors

Emission factors are numbers that may be multiplied by a rate of activity or rate of production of any facility (such as energy generation, water consumption, fuel consumption). The method works under the assumption that the work rate is in a range that maintains a linear relationship between it and emissions. The factors are usually expressed as a weight of emitted material divided by a measurement unit (weight, volume, distance or time) of the activity that causes the emission.

Emission factors may be used when the connection between the process characteristics and emissions is relatively direct and simple. Emission factors are usually developed by calculating the average of many measurements over time, from similar facilities and under defined operation conditions. After the factor has been developed, it may be used for calculating emissions from similar sources.

The disadvantage in this calculation method is that different facilities are planned and operated in different ways, meaning that an emission factor that is suitable for one may fail to be suitable for another facility that has the same purpose and the same type of activity. In view of this, the factor that is used is to be examined well and a check must be made to see that it is suitable and whether there is no better factor. To the extent that the factor is intended for a narrower range (with regard to facility type, fuel, geographic area), the more precise it tends to be.

Emission factors for evaluation of emissions into the air will be the factors that have been defined by the EPA: Compilation of Air Pollutant Emission Factors, in the current version on the EPA website (hereinafter: "AP-42"). The additional instructions for determining an optimum calculation method that have been prescribed for different activity types or fields specify emission factors that are relevant to each range or type of activity, out of the AP-42 or other sources.

The AP-42 rates the reliability of the factor from A (the most precise) to E (the least precise). An A rated factor is a reliable factor that has been developed based on a reliable methodology, using many samples from a number of facilities, which have been sampled using a uniform, accepted method. An E rating is given to a less reliable factor, which has been developed based on a small database, rendering it suitable for approximations of order of magnitude only.

A plant owner is allowed to use emission factors other than the factors appearing in AP-42 if he considers them to be more suitable or reliable, concerning a certain emission, than the emission factors appearing in AP-42.

Reduction measures – the factors in calculators do not include reduction of emissions using reduction measures. Therefore if there is a reduction measure, the plant owner must reduce the calculated quantity in accordance with the efficiency of the reduction measure. Some calculators have a dedicated field for inputting the efficiency of the reduction measure. In these cases there is no need to change the calculated quantity.

In cases in which the plant owner uses emission factors outside the scope of the calculator, it must be ensured that the emission factor includes reduction measures. If the emission factor does not include the efficiency of the reduction measure, the calculated quantity must be reduced in accordance with the efficiency of the reduction measure.

7.5.1 Calculation of emissions into the air using emission factors

The calculation of emissions into the air using emission factors will be carried out using equation 6 below.

Equation 6: calculation of emissions into the air using emission factors

$$E_i = [A * OpHrs] * EF_i * \left[1 - \left(\frac{CE_i}{100}\right)\right]$$

Where:

E_i = Annual emission of pollutant i (kg/ year)

A= The production activity (tons/ hour)

OpHrs= Production activity hours (hours / year)

E_{Fi} = Uncontrolled emission factor of pollutant i (kg/ ton)

CE_i = The total reduction efficiency of the treatment facility for pollutant i (%)

7.5.2 Calculation of emissions into the air from equipment elements using emission factors

Calculation of diffuse emissions of volatile organic compounds into the air (partial vapor pressure higher than 0.3 kPa under standard conditions), from equipment elements in the production facility, including: couplings and flanges, valves and taps, compressors, pumps, mixing equipment, sampling points, pressure reduction devices (PRDs).

A plant that is not required to have a plan for detecting and dealing with emissions from equipment elements as set forth in the “procedure for executing a plan for leak detection and review (LDAR)” is to calculate the emission quantity of NMVOC or volatile pollutant as required in the EPA protocol for evaluating emissions from equipment elements (Protocol for Equipment Leak Emissions Estimates), in the current version that is published at the address: www.epa.gov/ttn/chief/efdocs/equiplks.pdf

Out of the methods for calculating emissions that appear in the protocol set forth, the calculation is to be made according to the Average emission factors method (Chapter 2.3.1), which is the only method that does not rely on measurement results.

The method calculates emissions into the air of equipment elements according to emission factors for all volatile organic compounds (total volatile organic compounds, TVOC). The report will be made for NMVOC assuming that there is no potential for emissions of methane from the equipment elements or after subtracting it if there is such an emission.

If it is known that a single pollutant runs through the equipment elements at any given moment and this pollutant appears in the list of pollutants to be reported in the first addendum to the Law, the results of the calculation are to be used to report an emission of that pollutant rather than for NMVOC emission. In addition, it must be noted that according to the calculation in Chapter 2.3.1 of the protocol, pollutant emission is received in kg/ hour

units, and to receive the annual emission, this result must be multiplied by the number of annual work hours in which the equipment elements have been used.

The first stage of the use of the average emission factors method is counting and classification of the equipment elements in the facility in accordance with the directions set forth in Chapter 3.3 of the protocol.

7.5.3 Calculation of emissions / transfers of effluents using emission factors

The calculation of emissions / transfers for effluents using emission factors is made by multiplying the emission factor by the quantity of the product or quantity of the material used in the process, while considering the efficiency of the effluent pretreatment facility if there is one at the plant, as set forth in Equation 7 below.

Equation 7: calculation of emissions / transfers of effluents using emission factors

$$E_i = EFi * A * \left(1 - \frac{CE_i}{100}\right)$$

Where:

E_i = annual emission/ transfer of pollutant i (kg / year).

EF_i = the emission / transfer factor of pollutant i out of the emission factor tables, kg/ ton

A = Quantity of product of quantity of material for use in the prices per year, ton / year

CE_i = Total reduction efficiency rate in percent of the effluent pretreatment facility for pollutant i .

7.6 Engineering judgments

An engineering judgment is an optimum calculation method that relies on the experience and professional knowledge of the plant owner, concerning a certain facility or process. These calculation methods are of lowest priority and will be used only in cases in which it is not possible to use any of the other calculation methods.

7.7 Quantity of exceptional emissions

There is a distinction between expected exceptional emissions, such as cleaning of tanks or maintenance activity of a facility, and unexpected, uncontrolled exceptional emissions such as overflowing from a collection tank, a leak from an underground pipeline or other malfunction.

A characteristic of exceptional emissions is that they create non-linear peak points in the annual emission graph. In addition, emission abatement technologies may fail to function or may be bypassed during the event. For example, emissions from emergency depressurization that are vented directly into the atmosphere (to avoid cases of blocking of the emission pathway as a result of clogging or corrosion and for reducing the danger of an explosion).

When continuous monitoring data can be used, if the emission rate does not exceed the measurement range of the equipment, these figures must be used. If there is no monitoring data or it cannot be used, data from the control system is to be used. For this purpose, a relationship between the process characteristics (such as temperature) and emissions must be established.

If emissions from these events cannot be quantified in measurements or emission factors, they may be quantified using mass balances and engineering judgments.

When the character of the emission is solid waste or another stable state, the exceptional emissions must be estimated by weighing.

7.8 Calculations of waste transfer quantities

The calculation of waste quantities will be carried out according to weighing data. If the plant does not have weighing data of the waste, the quantity of waste is to be calculated using a mass balance. If one of these calculation methods cannot be used, the waste quantity must be calculated according to Chapter 7.8.1.

Waste (hazardous or non-hazardous) will be classified according to the Hebrew translation of the European waste classification catalog as published on the website of the Ministry. In

addition, hazardous waste will be classified according to the Hebrew translation of the waste classification of the Basel Convention that is published on the website of the Ministry.

Effluents that are transferred for treatment in tanks will be reported as waste transfer.

The calculation of waste quantities transferred from the plant will be made for all waste that is created within the boundaries of the plant, whether originating from industrial or non-industrial processes, such as office or dining room activity.

For all waste, the plant owner is to report the type of treatment and type of disposal at the destination to which it is transferred.

7.8.1 Calculation using waste retention and removal data

Using this method, the annual waste quantity calculation is made according to the data for waste retention and frequency of removal for a plant, combined with density data of different waste components. For this purpose, the calculator “annual waste quantity calculation” based on Equation 8 and European waste catalog data are to be used.

Equation 8. Calculation of annual waste quantity from waste retention and removal data

$$Q_w = 12 * F * X_i * V_i * D_i * C * 1,000$$

Where:

Q_w = the annual quantity of waste of type w (kg/ year)

F= monthly removal frequency

X_i = number of containers of type i

V_i = volume of container of type i (m^3)

D_i = density of waste of type i (tons/ m^3) (an existing figure in the annual waste quantity calculator)

C = average percent of filling bin i during filling (general estimate based on observation (default value 75%))

1,000 = conversion factor from tons to kg

7.9 Calculation of greenhouse gas emissions

Clarification – this chapter deals with the duty to report greenhouse gas emissions pursuant to the Law, and does not deal with a ‘greenhouse gas emission recording and reporting mechanism’.

Greenhouse gases that must be reported according to the Law are: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), polyfluorocarbons (PFCs) and sulfur hexafluorides (SF₆).

A plant owner is to report emissions of greenhouse gases from the activity of the plant according to the provisions of this document and additional instructions, according to type of activity and relevant calculators. However, in the case of the activities reported in Table 6, the “greenhouse gas emission reporting calculator” is to be used. The calculator will be used if the activity at the plant matches the emission type in the calculator.

Table 6. Use of a calculator for reporting greenhouse gas emissions

Activity	Number of spreadsheet in calculator for reporting greenhouse gas emissions
<p>Production: lime, semiconductors, adipic acid, ammonia, clinker, hydrogen (from natural gas), iron, steel, methane, nitric acid, soda ash, magnesium, black carbon, ethylene, ethylene dichloride, styrene.</p> <p>Use: gypsum, soda ash</p>	4
<ul style="list-style-type: none"> • Distillation of gas and fuels • Extraction of fuels in gas, liquid or solid state • Carbon or other fuel liquefaction of gasification facilities 	5
<ul style="list-style-type: none"> • Industrial air conditioning (chillers and heat pumps of 201kW-1MW) • Industrial cooling (cooling rooms, storage centers, etc.) 	7

The quantity of emissions of the six greenhouse gases will appear in Section 5 in the “reporting form sheet” of the “greenhouse gas emissions reporting calculator”. The emissions are calculated based on the data that was entered into the input sheets. Note that the calculated quantity is shown in tons per year.

7.10 Calculation of energy and water consumption data

In accordance with the provisions of Chapter 6 in this document, the energy and water consumption must be calculated by direct measurement, such as readings of an electricity / water meter or fuel weight data.

Energy consumption must be reported in units of ton oil equivalent (TOE). Conversion factors of energy consumption from the quantity of fuel / electricity unto TOE are provided in Table 7. The calculation will be made by multiplying the quantity of fuel / electricity consumed by the appropriate conversion factor.

Table 7. Conversion factors of units into TOE

Electricity fuel type	Conversion factor to energy consumption in TOE (ton)
electricity (kWh)	0.00021
Coal (tons)	0.63
Diesel (tons)	1.02
Light fuel oil (tons)	0.98
Heavy fuel oil (tons)	0.96
Superheavy fuel oil (tons)	0.95
Natural gas (tons)	0.91
Crude oil (tons)	1

gasoline (tons)	1.05
Kerosene (tons)	1.03
Naphtha (tons)	1.06
LPG (tons)	1.08
Jet fuel (tons)	1.04
Petroleum coke (tons)	0.79
Steam	The conversion factors appearing on the IPSS website at http://www.ipcc.ch/ipccreports/tar/wg3/index.php?idp=477 may be used

About the document

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