

2-2 Basic procedure of calculating released/transferred quantity

2-2-1 Type of data to be notified under the PRTR system

Under the PRTR system, data must be calculated according to the classification of released/transferred quantity calculation, and the result must be notified according to the classification of released/transferred quantity notification.

The annual quantity of specified substances handled and the quantity released as completed products need not be notified.

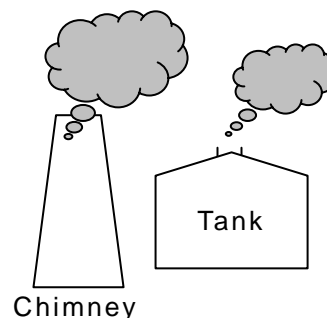
Classification for released/transferred quantity calculation	Classification for released/transferred quantity notification
A. Air emission	(Releases) → a Air emission
B. Release to water	→ b Surface water discharge
C. Land emission	→ c Land emission in the business establishment
D. Quantity in waste	→ d Landfills in the business establishment
	(Transfers) → e Transfer to sewage
	→ f Off-site transfer in waste

The following section outlines release/transfer by type.

A. "Air emission" (Classification for notification: a. "Air emission")

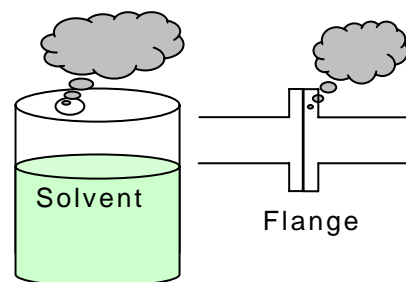
"Air emission" includes all the possible points where the specified substance is released to the air, such as exhaust ports, chimneys, and joints of pipes through which the substance leaks.

- Release from exhaust ports and chimneys
- Release from reactors and other process vessels
 - Release from storage tanks (release at the time of acceptance or delivery, and release resulting from temperature change)
 - Release from pollution controllers and incinerators, etc.



Release from those other than exhaust ports or chimneys

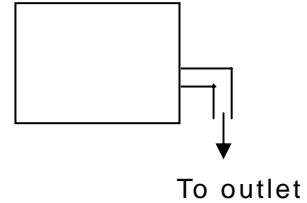
- Evaporation from open tanks or vessels, overflows, or transportation containers
- Leakage from pumps, valves, flanges, etc.
- Ventilation system of the building
- Volatilization of solvent component in paint in open spaces, etc.



B. "Release to water" (Classification for notification: b. "Surface water discharge", or, e. "Transfer to sewage")

"Release to water" includes all the possible release points to water areas, such as the case where washing water is released to a public water area from a reactor.

- Effluent from the process
- Release from effluent treatment facilities and equipment
- Release of cleaning water from vessels and containers, work space, etc.

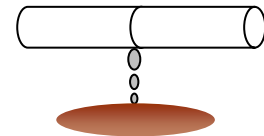


Notification must be made according to the following classification.
When released to rivers, lakes, or seas → "Surface water discharge"
When released to sewage → "Transfer to sewage"

C. "Land emission" (Classification for notification: c. "Land emission in the business establishment")

Land emission includes not only leakage from nonelevated tanks and leakage at the time of transfer/conveyance, but also all possible emissions including leakage from pipes to land. This includes penetration into land resulting from the discharge performed by businesses themselves.

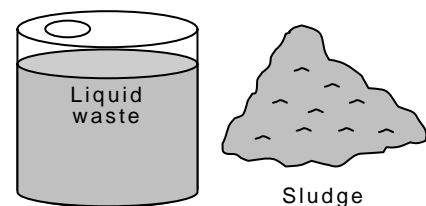
- Penetration to the ground due to leak from vessels or equipment (tanks, pipes, etc.)
- Intended penetration to the ground of effluent and cleaning water of each process, etc.



D. "Quantity in waste" (Classification for notification: d. "Landfills in the business establishment", or, f. "Off-site transfer in waste")

"Quantity in waste" includes the cases where the waste containing specified substance is generated at the establishments of the pertinent business.

- Waste and liquid waste generated from each process
- Dewatered cake and filter media
- Collected dust, spent carbon, waste generated from pollution control devices such as water treatment sludge
- Distillation residue, residue in vessels or tanks, etc.



- Submit a notification according to the following classification.
When waste is disposed to a landfill site within the premises of the business → Landfills in the business establishment
- When disposal is commissioned to an industrial waste management contractor → Off-site transfer in waste

When the waste is sold to an external recycling service, businesses do not have to make notification.

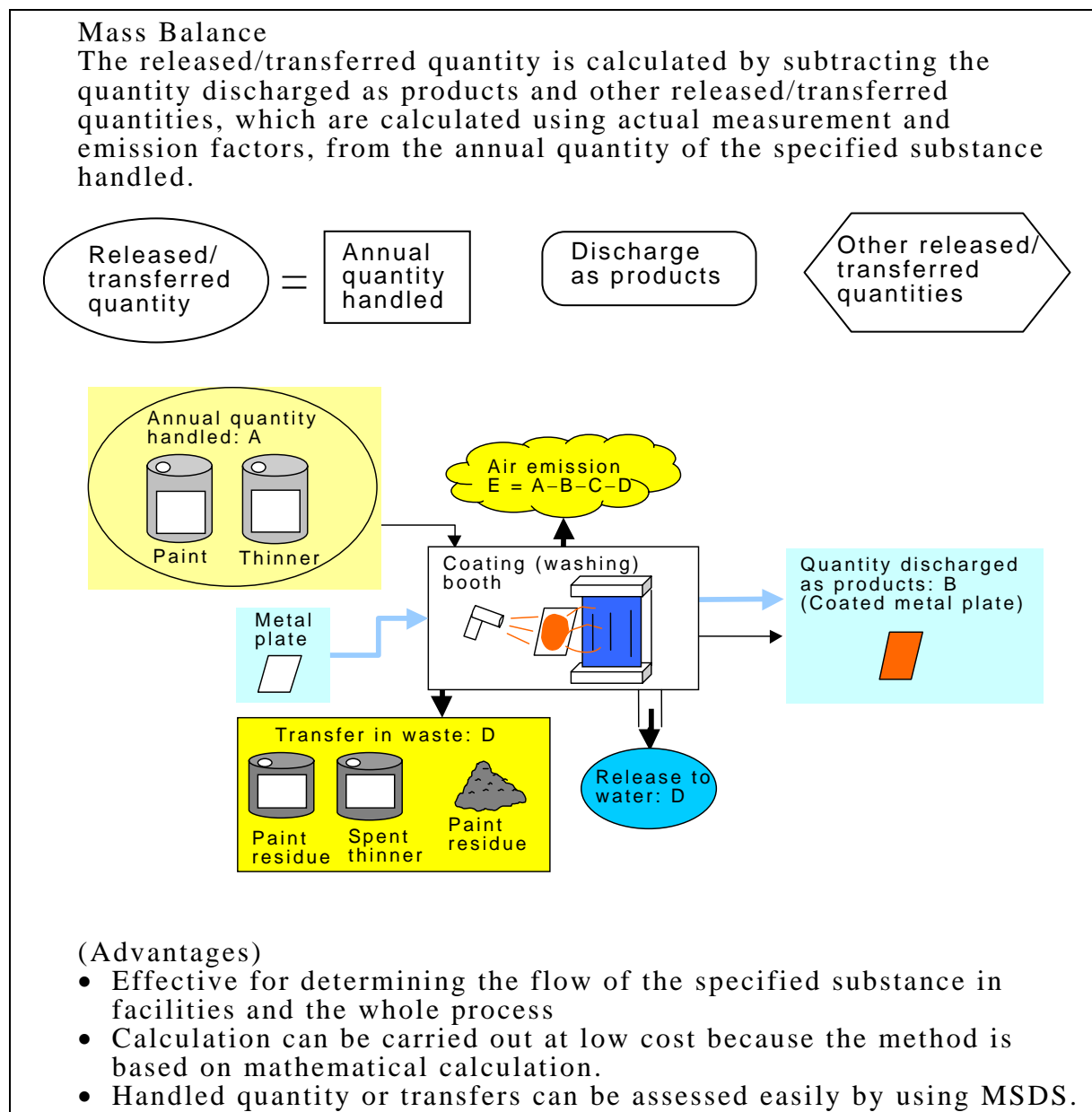
2-2-2 Concept of calculating released/transferred quantities

There are four main methods of calculating released/transferred quantities.

Mass Balance
Direct Measurement
Emission Factors
Engineering Calculations

The advantages and considerations of each method are shown below. Study available data and select an appropriate method for your business establishment or discharge point.

In addition to the methods shown above, you can also use values based on experience that you consider yield a more accurate calculation.



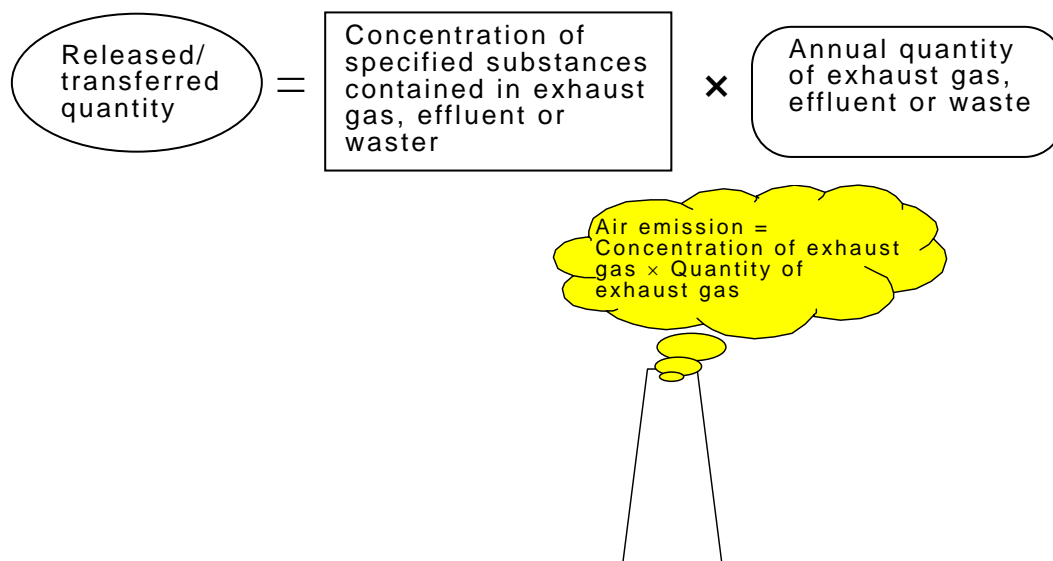
(Considerations)

- A more accurate result can be obtained if the method is used to calculate the quantity released to the medium to which a larger quantity is released.
- Since the result depends on the accuracy of the annual quantity handled, quantity taken out, and other discharges, errors must be kept as small as possible.
- When processing equipment (such as combustion equipment) is mounted on the outlet (chimney or other outlets) to the medium, calculate the discharge after the processing by multiplying the calculation result by the removal rate of the processing equipment or by subtracting the quantity removed by the equipment from the annual quantity handled.
- Specified substances generated as by-product of drying/baking processes must be included in the annual quantity handled when making the calculation.

After calculating all the discharges, you should compare the handled quantity and the sum of released/transferred quantities, and check for incorrect estimation.

Direct Measurement

The concentration of specified substances in exhaust gas, effluent or waste at major outlets of the business establishment is measured, then multiplied by the quantity of exhaust gas, effluent, or waste.

**(Advantage)**

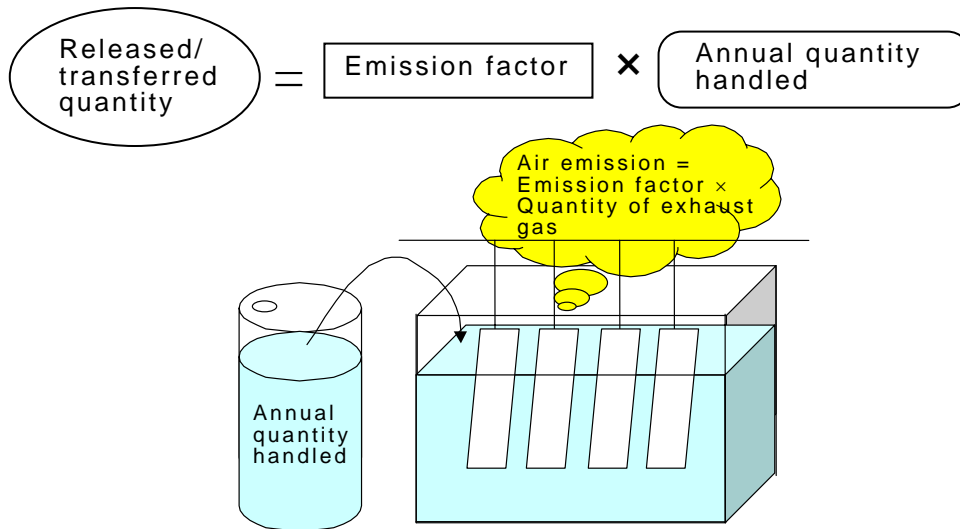
- If the concentration in exhaust gas or effluent is calculated according to the Law Concerning Special Measures against Dioxins, the values can be used.

(Considerations)

- Since the concentration may vary greatly depending on the working conditions, average concentration must be used.
- Ensure the accuracy of the measurements.

Emission Factors

The released/transferred quantity is calculated by multiplying the annual quantity of the specified substance handled by the ratio of the quantity handled, which is calculated separately via model experiments, to the quantity released (emission factor).



(Advantage)

- The release can be calculated only by studying the quantity handled.
- The mathematical calculation can be made at low cost, if only the emission factors are available.

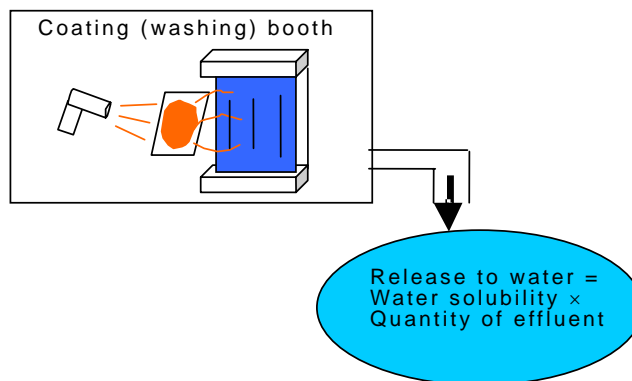
(Considerations)

- The emission factors listed in this manual are not absolute values. If you have emission factors of your own evaluated from measurement results in the past, use those values.
- When using an emission factor listed in manuals created by industry associations, carefully examine whether it is applicable for your calculation.
- Since the release depends on the quantity handled, efforts to limit emissions may not be reflected in the result of calculation.

Engineering calculations

The concentration of the specified substance in exhaust gas or effluent is estimated based on the saturated vapor pressure, water solubility, etc., which is multiplied by the quantity of exhaust gas or effluent.

$$\text{Released/transferred quantity} = \text{Concentration of specified substance in exhaust gas, effluent or waste obtained by engineering calculation} \times \text{Annual quantity of exhaust gas, effluent or waste}$$



(Advantages)

- Data for calculation can be obtained from various manuals, etc.
- Cost is low compared with Direct Measurement.

(Considerations)

- Knowledge of chemical engineering is required to set the conditions such as temperature to suit the actual situation.
- Since the values for virtual conditions and the maximum value are calculated using a theoretical formula, the result may differ from the actual status of the business establishment.

2-2-3 Basic procedure of calculating released/transferred quantity

The procedure of calculating the released/transferred quantity is described for the following two cases.

- (1) Procedure of calculating the quantity released/transferred from those other than specific requirement facilities (→pI-39)
- (2) Procedure of calculating the quantity released/transferred from specific requirement facilities (→pI-54)

- (1) Procedure of calculating the quantity discharged/transferred from those other than specific requirement facilities

Fig. 2-5 below shows examples of calculation for ABC Industry Co., Ltd. both for the solvent component (toluene, xylene) and pigment component (hexavalent chromium compound).

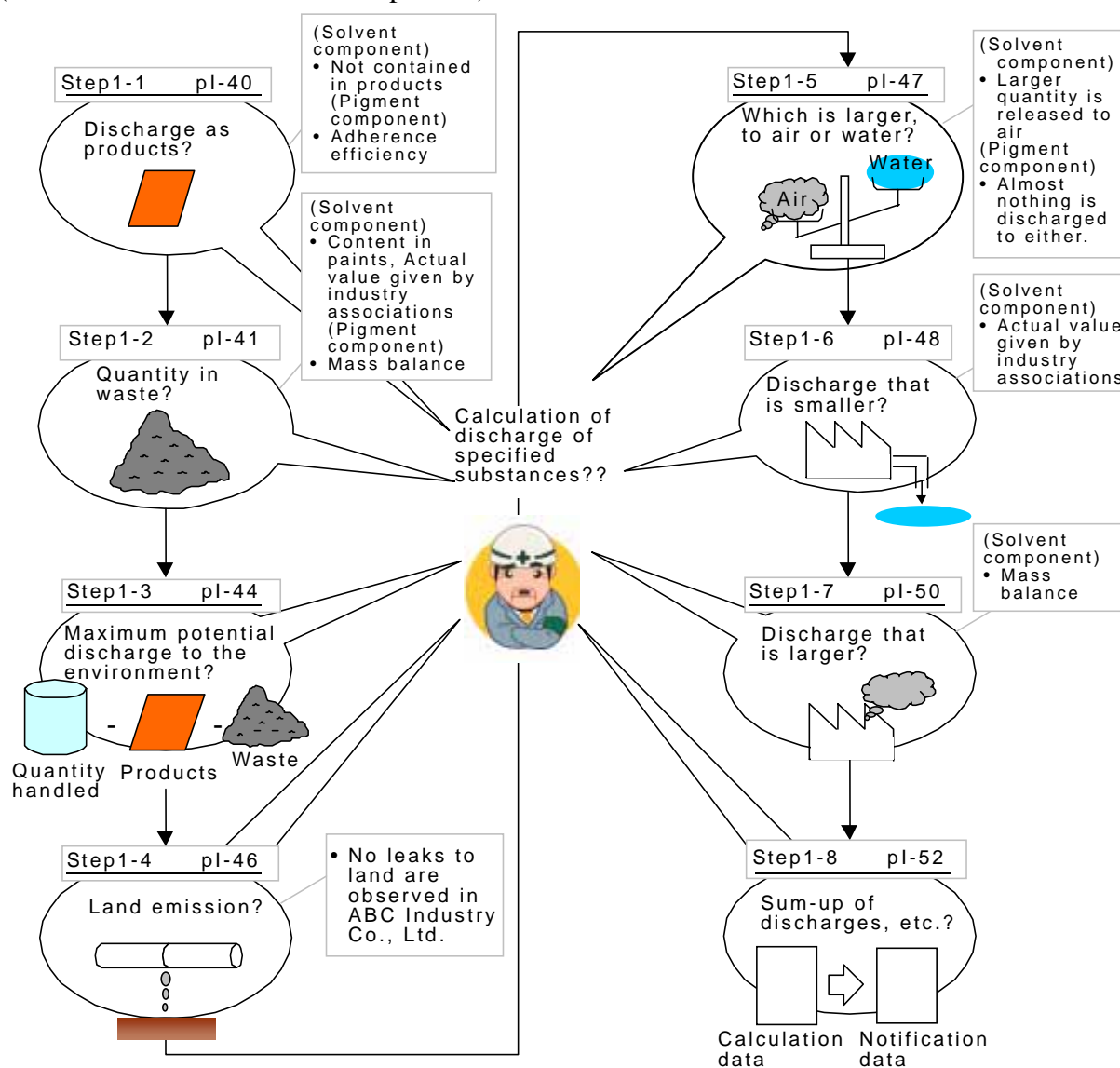


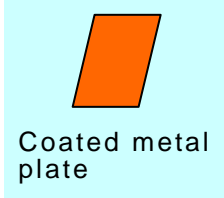
Fig. 2-5 Procedure of calculating the quantity released/transferred from specific requirement facilities

Reference page

- Part II 2-1 Procedure of calculating the quantity released/transferred from those other than specific requirement facilities (→ pII-41)

Step 1-1 Calculate the quantity of specified substance released as manufactured goods.

The quantity of specified substances discharged as products (hereafter referred to as “manufactured goods”), which are manufactured in a process where specified substances are handled, is calculated using the following formula.

$$\text{Quantity of specified substance released as manufactured goods} = \text{Annual quantity of manufactured goods} \times \text{Content of specified substance in manufactured goods, or other values obtained through experience} \div 100$$


Coated metal plate

* Specify 0 if no specified substances are contained in manufactured goods.

Case of ABC Industry Co., Ltd.

Solvent component

Solvent component is not contained in manufactured goods (coated metal plates).

$$\text{Quantity of toluene released as manufactured goods kg/year} = \text{Quantity of xylene as manufactured goods kg/year} = 0 \text{ kg/year}$$

Pigment component

The release is calculated by multiplying the annual quantity of specified substance handled by adherence efficiency.

- Adherence efficiency of air spray to metal plate
40 to 50% (use 40% to be conservative)
- * Coating process (2001.1), Chemical substance discharge calculation manual [Chemical Industry], Japan Small and Medium Enterprise Corporation

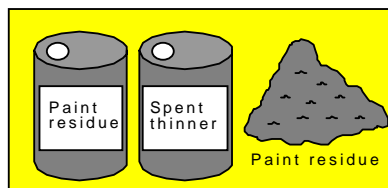
$$\begin{aligned} \text{Quantity of hexavalent chromium released as manufactured goods kg/year} &= \text{Annual quantity of hexavalent chromium handled 0.663t/year} \times 1000 \text{ kg/t} \times \text{Adherence efficiency of air spray to metal plate 40\%} \div 100 \\ &= 265 \text{ kg/year} \end{aligned}$$

Reference page

- Part II 2-1-1 Calculate the discharge as products (→ pII-43)
- Part III 2. Q&A Q91 (→ pIII-148),
4-3-3 Emission factors listed in manuals of each industry (→ pIII-249),
4-3-4 Painting method and painting adhesion efficiency (→ pIII-281),
4-3-5 Current efficiency and electrochemical equivalent of metal precipitated in plating process (→ pIII-282)

Step1-2 Calculate the quantity of the specified substance in waste.

Calculate the quantity of specified substance in waste by using the following formula.



$$\begin{array}{c} \text{Quantity of} \\ \text{specified} \\ \text{substance} \\ \text{in waste} \\ \text{kg/year} \end{array} = \begin{array}{c} \text{Quantity of} \\ \text{waste} \\ \text{generated} \\ \text{kg/year} \end{array} \times \begin{array}{c} \text{Content of specified} \\ \text{substance in waste or} \\ \text{other values obtained} \\ \text{through experience} \\ \% \end{array} \div 100$$

If no other discharge is observed, you can use the following formula to calculate the quantity.

$$\begin{array}{c} \text{Quantity of} \\ \text{specified} \\ \text{substance in} \\ \text{waste} \\ \text{kg/year} \end{array} = \begin{array}{c} \text{Annual} \\ \text{quantity of} \\ \text{specified} \\ \text{substance} \\ \text{handled} \\ \text{t/year} \end{array} \times 1000 \text{ kg/t} \times \begin{array}{c} \text{Quantity of specified} \\ \text{substance discharged} \\ \text{as manufactured} \\ \text{goods} \\ \text{kg/year} \end{array}$$

* Waste such as collected dust and sludge generated as a result of exhaust gas/effluent treatment is ignored here. They are calculated in Step 1-6 (→ pI-48) and Step 1-7 (→ pI-50).

Case of ABC Industry Co., Ltd.

Solvent component

The quantity is calculated by multiplying the quantity of waste generated by the following values.

Spent paint, spent thinner : Content in paint or thinner handled
Paint residue : 0.2%*

* Coating process (2001.1), Chemical substance discharge calculation manual [Chemical Industry], Japan Small and Medium Enterprise Corporation

(Toluene)

$$\begin{aligned} \text{Quantity of toluene in waste (kg/year)} &= \text{Quantity of spent paint generated (140 kg/year)} \times \text{Content of toluene in paint A (10\%)} \div 100 \quad (= \text{Quantity in spent paint (14 kg/year)}) \\ &= \text{Quantity of spent thinner generated (70 kg/year)} \times \text{Content of toluene in thinner B (10\%)} \div 100 \quad (= \text{Quantity in spent thinner (7 kg/year)}) \\ &= \text{Quantity of paint residue generated (5500 kg/year)} \times \text{Content of toluene in paint residue (0.2\%)} \div 100 \quad (= \text{Quantity in paint residue (11 kg/year)}) \\ &= \text{32 kg/year} \end{aligned}$$

(Xylene)

$$\begin{aligned} \text{Quantity of xylene in waste (kg/year)} &= \text{Quantity of spent paint generated (140 kg/year)} \times \text{Content of xylene in waste (20\%)} \div 100 \quad (= \text{Quantity in spent paint (28 kg/year)}) \\ &= \text{Quantity of spent thinner generated (70 kg/year)} \times \text{Content of xylene in thinner B (40\%)} \div 100 \quad (= \text{Quantity in spent thinner (28 kg/year)}) \\ &= \text{Quantity of paint residue generated (5500 kg/year)} \times \text{Content of xylene in paint residue (0.2\%)} \div 100 \quad (= \text{Quantity in paint residue (11 kg/year)}) \\ &= \text{67 kg/year} \end{aligned}$$

Pigment component

Since almost no quantity is discharged to the environment (air, water, land), the quantity is calculated using Mass Balance.

$$\begin{array}{l}
 \text{Quantity of hexavalent chromium compound in waste} \\
 \text{kg/year} \\
 \text{=} \\
 \text{Annual quantity of hexavalent chromium compound handled} \\
 \text{0.663 t/year} \\
 \times 1000 \text{ kg/t} \\
 \text{Quantity of hexavalent chromium compound discharged as manufactured goods} \\
 \text{265 kg/year} \\
 \text{=} \\
 \text{398 kg/year}
 \end{array}$$

Calculations by type of waste (spent paint, paint residue) are shown below.

$$\begin{array}{l}
 \text{Quantity in spent paint} \\
 \text{kg/year} \\
 \text{=} \\
 \text{Quantity of spent paint generated} \\
 \text{140 kg/year} \\
 \times \\
 \text{Content of hexavalent chromium in paint A} \\
 \text{3.0\%} \\
 \div 100 \\
 \text{=} \\
 \text{4.2 kg/year}
 \end{array}$$

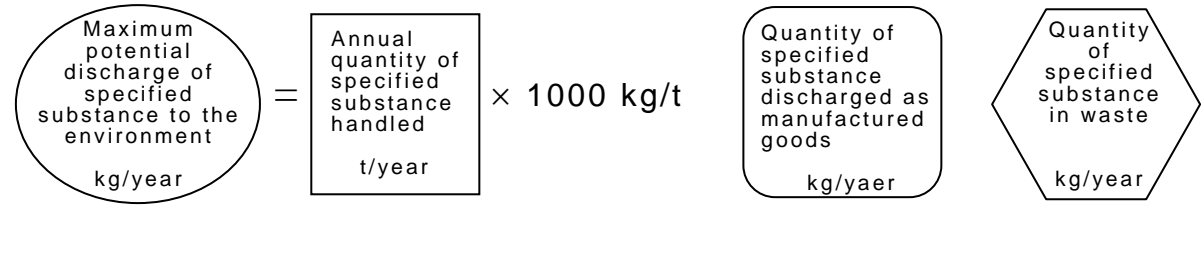
$$\begin{array}{l}
 \text{Quantity in paint residue} \\
 \text{kg/year} \\
 \text{=} \\
 \text{Quantity in waste} \\
 \text{398 kg/year} \\
 \text{Quantity in spent paint} \\
 \text{4.2 kg/year} \\
 \text{=} \\
 \text{394 kg/year}
 \end{array}$$

Reference page

- Part II 2-1-2 Calculate the quantity of the specified substance in waste (→ [pII-48](#))
- Part III 2. Q&A Q63 (→ [pIII-138](#)), Q78–Q82 (→ [pIII-144–145](#)), Q86–Q87 (→ [pIII-146–147](#)), Q93 (→ [pIII-149](#)), 4-3-3 Emission factors listed in manuals of each industry (→ [pIII-249](#))

Step1-3 Calculate the maximum potential discharge to the environment.

Calculate the maximum potential discharge to the environment by using the following formula.

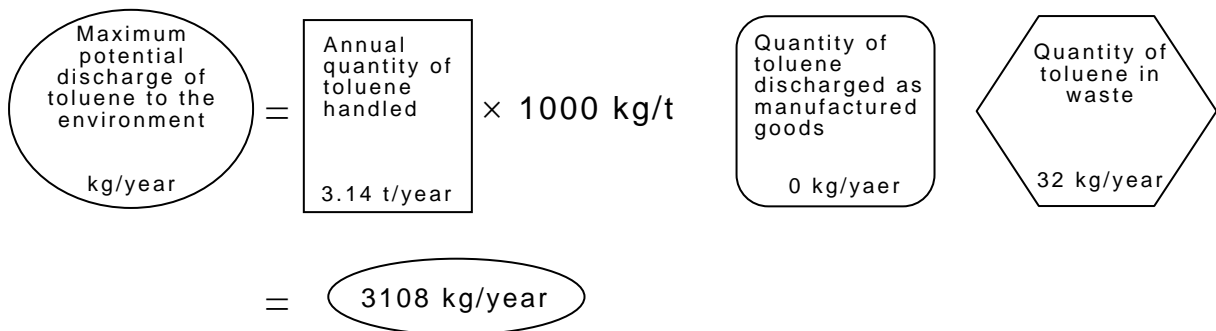


* “The maximum potential discharge to the environment,” which is calculated using the above formula, is the maximum quantity that could be discharged to the environment.

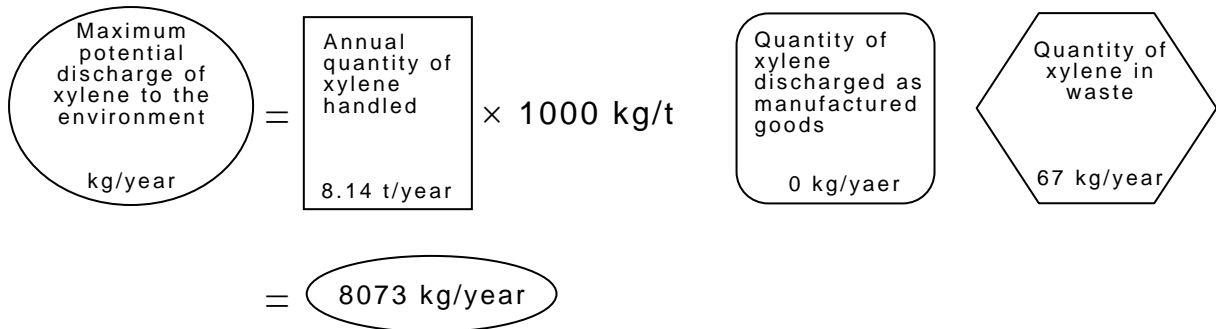
Case of ABC Industry Co., Ltd.

Solvent component

(Toluene)



(Xylene)



Pigment component

Almost no quantity is discharged to the environment (air, water, land).

$$\begin{array}{c} \text{Maximum potential} \\ \text{discharge of} \\ \text{hexavalent chromium} \\ \text{compound to the} \\ \text{environment} \\ \text{kg/year} \end{array} = \begin{array}{c} \text{0 kg/year} \end{array}$$

Reference page

- Part II 2-1-3 Calculate the maximum potential discharge to the environment (→ pII-52)

Step1-4 Calculate the land emission of the specified substance.

Calculate the land emission of specified substance by using the following formula.

$$\begin{array}{c} \text{Land emission} \\ \text{of specified} \\ \text{substance} \\ \text{kg/year} \end{array} = \begin{array}{c} \text{Quantity of raw} \\ \text{materials or} \\ \text{materials} \\ \text{discharged to} \\ \text{land} \\ \text{kg/year} \end{array} \times \begin{array}{c} \text{Content of} \\ \text{specified} \\ \text{substance in} \\ \text{raw materials} \\ \text{or materials} \\ \% \end{array} \div 100$$

* If there is no leakage to land, land emission can be regarded as 0.

Case of ABC Industry Co., Ltd.

ABC Industry Co., Ltd. does not have any land emissions.

Solvent component

$$\begin{array}{c} \text{Land emission} \\ \text{of toluene} \\ \text{kg/year} \end{array} = \begin{array}{c} \text{Land emission} \\ \text{of xylene} \\ \text{kg/year} \end{array} = \begin{array}{c} 0 \text{ kg/year} \end{array}$$

Pigment component

$$\begin{array}{c} \text{Land emission} \\ \text{of hexavalent} \\ \text{chromium} \\ \text{compound} \\ \text{kg/year} \end{array} = \begin{array}{c} 0 \text{ kg/year} \end{array}$$

Reference page

- Part II 2-1-4 Calculate the land emission of the specified substance (→ [pII-54](#))
- Part III 2.Q&A Q84–Q85 (→ [pIII-146](#))

Step1-5 Judge the medium, air or water, to which larger or smaller quantity is released.

Study the following and determine which is larger, the quantity released to air or to water.

- a) Material properties of the specified substance (gaseous, liquid, solid) and handling method^{*1}
- b) Henry's constant of the specified substance^{*2}

- *1 When it is assumed that either of the quantities released to air or to water is zero depending on the condition where raw materials or materials containing the specified substance are handled, you can enter 0 as the released quantity.
- *2 Substance that has a larger Henry constant is more likely to be released to air.

Case of ABC Industry Co., Ltd.

Solvent component

Since the solvent component is highly volatile, the quantity released to air is likely to be larger than that to water.

Pigment component

Almost no quantity is released either to air or water. (Perform the calculation with either of the discharges set as 0. Skip Steps 1-6 and 1-7.)

Reference page

- Part II 2-1-5 Judge the medium, air or water, to which larger or smaller quantity is released (→ [pII-56](#))
- Part III 4-2-6 Table of physical properties of specified substances (→ [pIII-227](#))
- 4-3-7 Guideline to judge to which medium, air or water, larger quantity is released (→ [pIII-288](#))

Step1-6 Calculate the quantity released to the medium to which the smaller quantity is released.

Calculate the quantity released to the medium to which the smaller quantity is discharged using either of the following methods or other appropriate methods such as values obtained through experience.

- a) Direct Measurement (→pl-36)
- b) Emission Factors (→pl-37)
- c) Engineering Calculations (→pl-38)

When exhaust gas or effluent treatment is performed, calculate the following values using removal rate and decomposition rate*.

- Discharge after treatment
- Quantity decomposed by treatment
- Quantity in waste generated by treatment

* Removal rate : The rate of removing specified substance in exhaust gas or effluent using a dust remover, purification device, activated carbon adsorption device, etc.

Decomposition rate : The rate of decomposing specified substance in exhaust gas or effluent into another simpler substance (such as carbon dioxide and water) using a combustion device or microbial decomposition device

Case of ABC Industry Co., Ltd.

Solvent component

The discharge is calculated by multiplying the quantity released by the following value.

- Content of solvent component in effluent: 0.01%

* Coating process (2001.1), Chemical substance discharge calculation manual [Chemical Industry], Japan Small and Medium Enterprise Corporation

$$\begin{aligned}
 & \text{Release of toluene to water} &= & \text{Release of xylene to water} \\
 & \text{kg/year} & & \text{kg/year} \\
 & &= & \text{Annual effluent discharge} \times 1000 \text{ kg/m}^3 \times \text{Quantity of xylene discharged as manufactured goods} \div 100 \\
 & & & \text{2500m}^3/\text{year} \\
 & &= & \text{250 kg/year}
 \end{aligned}$$

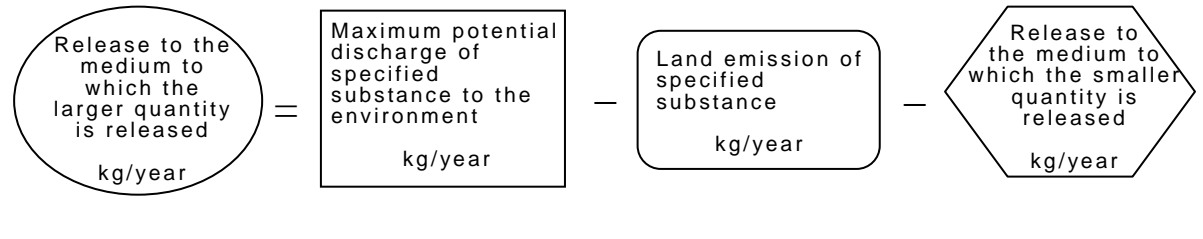
Reference page

- Part II 2-1-6 Calculate the quantity released to the medium to which the smaller quantity is released (→ pII-58)
- Part III 2. Q&A Q88–Q90 (→ pIII-147–148), Q94 (→ pIII-149), Q104–Q105 (→ pIII-152),
4-2-6 Table of physical properties of specified substances (→ pIII-227),
4-3-1 Examples of emission factors of specified substances into the atmosphere (→ pIII-246),
4-3-2 Examples of emission factors of the gasoline in a storage tank into the atmosphere (→ pIII-247),

4-3-3 Emission factors listed in manuals of each industry
(→ pIII-249),
4-3-6 Rejection rate and decomposition rate in representative
exhaust gas device and wastewater treatment device
(→ pIII-283)

Step1-7 Calculate the quantity released to the medium to which the larger quantity is released.

Calculate the quantity released to the medium to which the larger quantity is released using the following formula.



* When exhaust gas or effluent treatment is performed, calculate the following values using the removal/decomposition rate.

- Discharge after treatment
- Quantity in waste generated by treatment

Case of ABC Industry Co., Ltd.

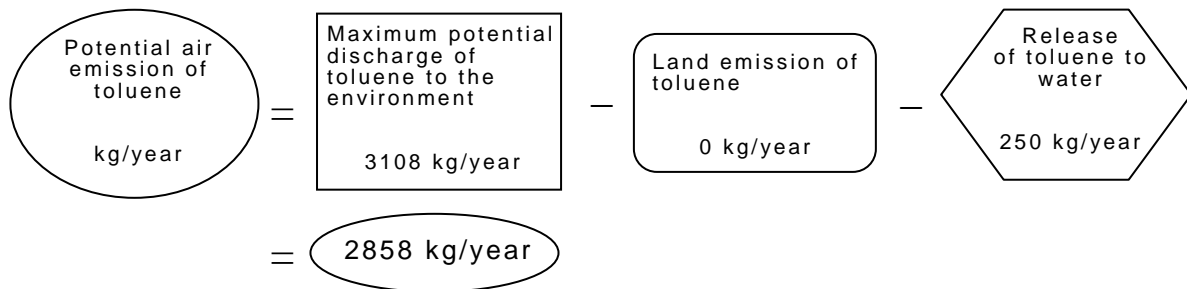
Solvent component

Calculate the potential air emission using Mass Balance. The potential air emission is the quantity that may be discharged to air in the event that exhaust gas treatment is not performed.

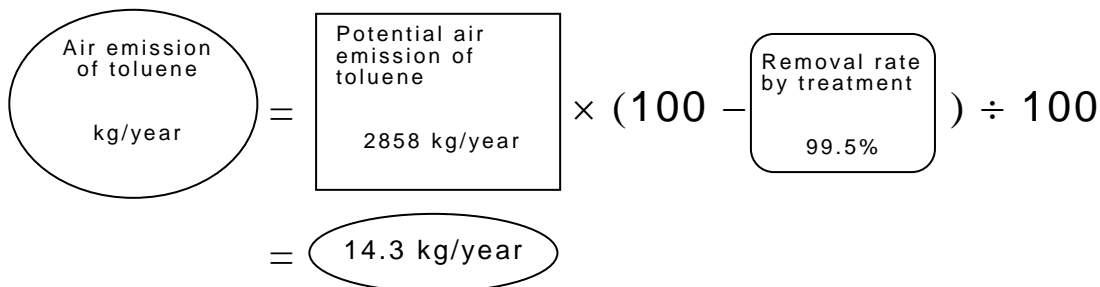
Then calculate the air emission after combustion treatment using the removal rate (since the removal rate and decomposition rate are the same, the quantity in waste generated by treatment is regarded as 0).

(Toluene)

- Potential air emission

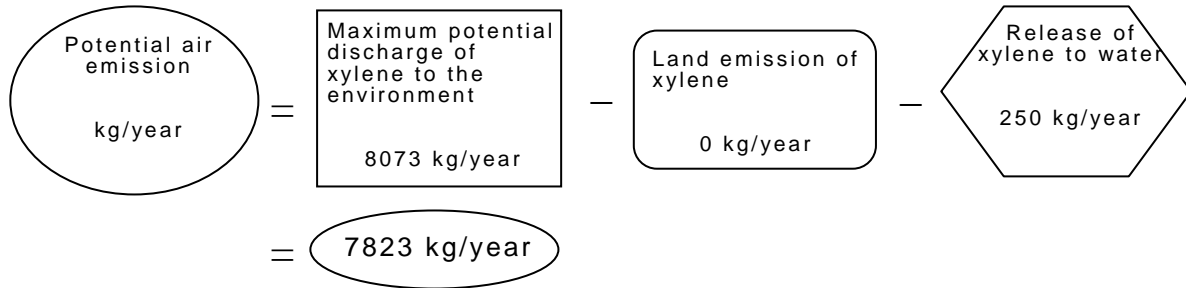


- Air emission after combustion treatment

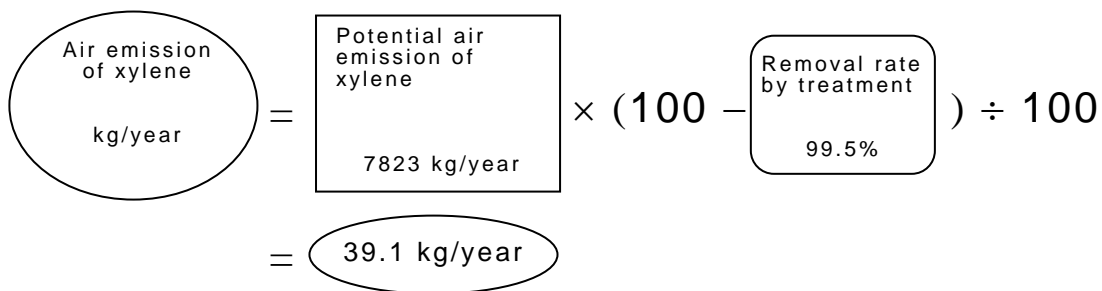


(Xylene)

• Potential air emission



• Air emission after combustion treatment



Reference page

- Part II 2-1-7 Calculate the quantity released to the medium to which the larger quantity is released (→ [pII-75](#))
- Part III 2.Q&A Q88 (→ [pIII-147](#)), Q94 (→ [pIII-149](#)), 4-3-6 Rejection rate and decomposition rate in representative exhaust gas device and wastewater treatment device (→ [pIII-283](#))

Step1-8. Sum-up the released/transferred quantities.

Add up the released/transferred quantities calculated by classification.

Case of ABC Industry Co., Ltd.

The results of calculation are classified as follows for the sake of notification.

Toluene (unit; kg/year)

Classification for Calculation	Classification for Notification
	(Releases)
A Air emission; <u>14.3</u>	→ a. Air emission; <u>14</u>
B Release to water ^{*1} ; <u>250</u>	→ b. Surface water discharge; <u>250</u>
C Land emission; <u>0</u>	→ c. Land emission in the business establishment; <u>0.0</u>
D Quantity in waste ^{*2} ;	→ d. Landfills in the business establishment; <u>11</u>
Spent paint..... <u>14</u>	(Transfers)
Spent thinner.... <u>7</u>	→ e. Transfer to sewage; <u>0.0</u>
Paint residue <u>11</u>	→ f. Off-site transfer in waste; <u>21</u>

Xylene (unit; kg/year)

Classification for Calculation	Classification for Notification
	(Releases)
A Air emission; <u>39.1</u>	→ a. Air emission; <u>39</u>
B Release to water ^{*1} ; <u>250</u>	→ b. Surface water discharge; <u>250</u>
C Land emission; <u>0</u>	→ c. Land emission in the business establishment; <u>0.0</u>
D Quantity in waste ^{*2}	→ d. Landfills in the business establishment; <u>11</u>
Spent paint..... <u>28</u>	(Transfers)
Spent thinner.... <u>28</u>	→ e. Transfer to sewage; <u>0.0</u>
Paint residue <u>11</u>	→ f. Off-site transfer in waste; <u>56</u>

Chromium (IV) compounds (unit; kg/year)

Classification for Calculation	Classification for Notification
	(Releases)
A Air emission; <u>0</u>	a. Air emission; <u>0.0</u>
B Release to water ^{*1} ; <u>0</u>	b. Surface water discharge; <u>0.0</u>
C Land emission; <u>0</u>	c. Land emission in the business establishment; <u>0.0</u>
D Quantity in waste ^{*2} ;	d. Landfills in the business establishment;
Spent paint..... <u>4.2</u>	<u>390</u>
Spent thinner.... <u>0</u>	(Transfers)
Paint residue <u>394</u>	e. Transfer to sewage; <u>0.0</u>
	f. Off-site transfer in waste; <u>4.2</u>

*1 : Effluent; Discharge to surface water → “Surface water discharge”

*2 : Spent paint, spent thinner; Delivery to industrial waste management contractor → “Off-site transfer in waste”

Paint residue; Disposal in landfills within the business establishment → “Landfills in the business establishment”

Reference page

- Part II 2-1-8 Compilation of quantities released/transferred (→ pII-80)

(2) Procedure of calculating the quantity released/transferred from specific requirement facilities

Use the Direct Measurement* method with regard to the materials and medium for which actual measurement is required by the Law. Use the unit mg-TEQ/year for dioxins, and kg/year for other specified substances.

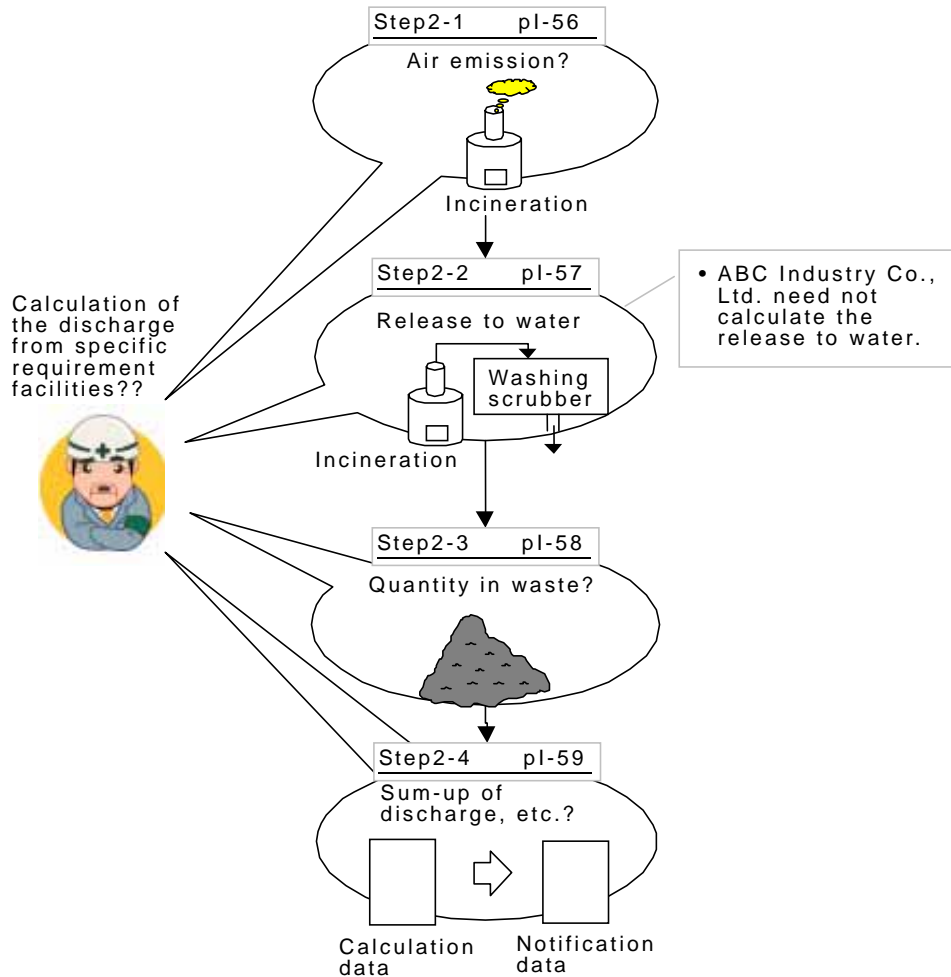


Fig. 2-5 Procedure of calculating the quantity released/transferred from specific requirement facilities

* Handling of the data when the concentration obtained by actual measurement is below the minimum limit of determination
 Dioxins (The same as that designated by the Law Concerning Special Measures against Dioxins)

Sum up the following by substance to obtain the concentration.

- When the measurement is the same as or larger than the minimum limit of determination
 → The measurement converted to TEQ will be used as the concentration.
- When the measurement is smaller than the minimum limit of determination
 → The measurement, which is regarded as "0," converted to TEQ will be used as the concentration.

Specified substances other than dioxins

- When the measurement is smaller than the minimum limit of detection
→ Regard the value as 0 (zero).
- When the measurement is the same as or larger than the minimum limit of detection and smaller than the minimum limit of determination
→ Regard the value as 1/2 of the minimum limit of determination.

Reference page

- Part II 2-2 Procedure of calculating the quantity released/transferred from specific requirement facilities (→ pII-82)

Step2-1. Calculate the air emission from specific requirement facilities.

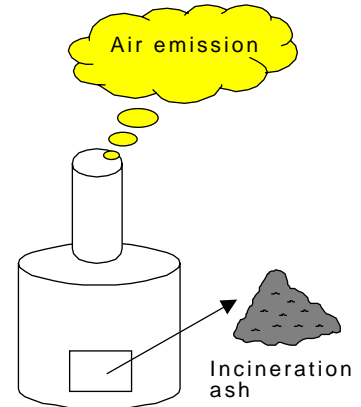
Calculate the air emission from specific requirement facilities by using the following formula.

$$\text{Air emission from specific requirement facilities} = \text{Concentration of specified substance in exhaust gas} \times \text{Annual quantity of exhaust gas}$$

Case of ABC Industry Co., Ltd.

Use the following values for calculation.

- Number of days of operation per year : 200 days
- Average hours of use per day : 4 hours
- Quantity of exhaust gas : 340 Nm³/h
- Dioxin concentration in exhaust gas : 2.2 ng-TEQ/Nm³



$$\begin{aligned} \text{Air emission of dioxins (mg-TEQ/year)} &= \frac{\text{Dioxin concentration in exhaust gas (2.2 ng-TEQ/Nm}^3)}{1,000,000 \text{ (ng/mg)}} \\ &\times \left[\text{Quantity of exhaust gas released per hour (340 Nm}^3\text{/h)} \times \text{Incineration hour per day (4h/day)} \times \text{Number of days of use of incinerator per year (200 days/year)} \right] \\ &= \text{0.5984 mg-TEQ/year} \end{aligned}$$

Reference page

- Part II 2-2-1 Calculate the air emission from specific requirement facilities (→ pII-84)
- Part III 2.Q&A Q123 (→ pIII-159)

Step2-2. Calculate the release to water from specific requirement facilities.

Calculate the release to water from specific requirement facilities by using the following formula.

$$\text{Release to water from specific requirement facilities} = \text{Concentration of specified substance in effluent} \times \text{Annual quantity of effluent}$$

Case of ABC Industry Co., Ltd.

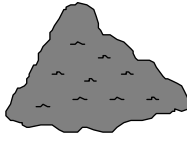
No effluent is generated. → Calculation of release to water is not required.

Reference page

- Part II 2-2-2 Calculate the release to water from specific requirement facilities (→ p -88)
- Part III 2.Q&A Q115-Q117 (→ pIII-155-156)

Step2-3 Calculate the quantity in waste released from specific requirement facilities.

Calculate the quantity in waste released from specific requirement facilities by using the following formula.

$$\text{Quantity in waste from specific requirement facilities} = \text{Concentration of specified substance in waste} \times \text{Waste generated per year}$$


Case of ABC Industry Co., Ltd.

Use the following values for calculation.

- Incineration ash generated per year : 0.46 t/year
- Dioxin concentration in incineration ash : 3.1 ng-TEQ/g

$$\begin{aligned} \text{Quantity of dioxins in waste (mg-TEQ/year)} &= \text{Dioxin concentration in waste (3.1 ng-TEQ/g)} \times \text{Quantity of waste generated (0.46 t/year)} \times 1 \text{ (mg/ng)(g/t)} \\ &= 1.426 \text{ mg-TEQ/year} \end{aligned}$$

Reference page

- Part II 2-2-3 Calculate the quantity in waste released from specific requirement facilities (→ pII-90)

Step2-4 Sum-up the quantities released/transferred from specific requirement facilities.

Sum up the quantities calculated according to the classification of notification.

Case of ABC Industry Co., Ltd.

The results of calculation are classified as follows for notification.

Dioxins (unit; mg-TEQ/year)

Classification for Calculation	Classification for Notification
	(Releases)
A. Air emission; <u>0.5984</u>	→ a. Air emission; <u>0.60</u>
B. Release to water; <u>0</u>	→ b. Surface water discharge; <u>0.0</u>
C. Land emission; <u>0</u>	→ c. Land emission in the business establishment; <u>0.0</u>
D. Quantity in waste ; <u>1.426</u>	d. Landfills in the business establishment; <u>0.0</u>
	(Transfers)
	→ e. Transfer to sewage; <u>0.0</u>
	→ f. Off-site transfer in waste; <u>1.4</u>

* Incineration ash: Handed over to industrial waste management contractor
→ “Off-site transfer in waste”

Reference page

- Part II 2-2-4 Sum-up the quantities released/transferred from specific requirement facilities (→ pII-92)