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Title :	**TECHNICAL GUIDE FOR SUPPLIERS OF WATER INTENDED FOR HUMAN CONSUMPTION: METHODS FOR SELECTING POINTS WHERE THE PARAMETER VALUES MUST BE MET (POINTS OF COMPLIANCE) AND DRAWING UP THE AUTO-CONTROL PROGRAMME.**

Summary :	This text is a practical guide to the method for selecting points of compliance and drawing up an auto-control programme proposal that has to be submitted to the Agency for evaluation.

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Document approval

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Document history log

Revision	Revision date	Description of changes	Author
#0	2020-04-20	Initial version EN	Claes Jurgen
#1	2022-06-01	Complements, corrections, additional explanations and simplification	Claes Jurgen

1. Purpose

The Royal Decree of 31 May 2016 and the additional FANC Decision of 24 November 2016 require the "supplier" to guarantee the radiological quality of the water. The supplier is hereby responsible for preparing an annual auto-control programme for water quality and submit or present it to the Agency.

This raises some questions:

- How can or should the supplier prepare its auto-control programme?
- What basic information must I gather together in advance?
- What are the different issues to be taken into account as a supplier?
- How can I prepare a simplified scheme and what does it mean?
- How can I determine the corresponding frequencies of the selected PDC points?
- How do I have to submit this auto-control programme to the Agency?

2. Scope

Application of the Royal Decree of 31 May 2016 on protection from radioactive substances in water intended for human consumption.

3. Development of an auto-control programme

3.1. Gathering the necessary basic information

Before drawing up a proposal for an auto-control programme, you must gather the following basic information:

- An inventory of the sources employed (surface waters, groundwater wells):
- Characterisation of those sources. In the case of the groundwater wells, this concerns the groundwater permit stating in which aquifer and groundwater body the wells are located, the depth of the borehole, the maximum permitted flow, etc.
- Which treatments, if any, the water undergoes (sand filter, deferrisation, softening, etc.).
- The average daily water consumption: if the daily volumes are unsuitable, the annual volume may be used and then divided by the number of production days.

In the case of food-production companies, there is also the following:

- general description of the process treatments (washing, transportation, boiling, blanching, centrifuging, evaporation, etc.) and their associated (sub-) volumes. Later on in the document, you can find examples of such processes and sub-volumes applied in such simplified schemes..
- The various food products being manufactured, sub-divided into categories or families, such as yoghurt, dairy products, deep-frozen products, sauces, drinks, biscuits, etc.).
- For each category or family of foods, the average quantities produced per day, in tonnes, for example.

3.2. Draw up a simplified scheme[1]:

Draw up a simplified scheme of the process(es). Indicate the sources and partial flows with their respective volumes and mark whether it concerns contact water or incorporation water. Examples of such simplified schemes can be found further in this document and the method for determining whether it concerns contact water or incorporation water.

If it concerns a drinking water distribution network (drinking water supplier of tap water), give a simple representation of the network diagram (example 4).

3.3. Adding control points (PDC-points):

Indicate in your scheme the control points (points where parameter values have to be met) and take into account the indicated volumes and water type (contact or incorporation water). The whole of selected PDC points must always cover all possible risks of exposure by ingestion. The PDC points shall preferably be located:

- After the water treatment;
- After a mixture of water, except if the added water has already been checked (by the supplier in question via another PDC point or by another supplier);
- At the tap;
- After the integration of the water in the production chains of food product companies (unless the water is distributed by a water supplier that has already been checked).

During the analysis, take into account the corresponding frequencies (see §3.4). In practice, this can result in a "trial-error" exercise in which the locations of the PDC-points and their volume and frequency are repeatedly re-evaluated and adjusted to determine "your" optimum. This "optimum" can differ from supplier to supplier and depends on the (sub) volumes in function of the type of water (contact or incorporation) and personal preference.

3.4. Determine the volumes (m^3/day) and corresponding frequencies (samples/year):

The volumes of each source or partial flow are expressed in average day volumes which are calculated on the basis of a calendar year. The corresponding frequencies can be determined by means of table 1, annex 1. The first part of the table concerns incorporation or drinking water; the second part concerns contact water. Table 2 of annex 1 shows some examples of frequency calculations for different volumes.[2]

For points with a volume ≤ 100 m^3 the number of samples is determined on a case-by-case basis by the Agency depending on the risk level of the point where the parameter values have to be met. This risk depends, among other things, on:

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[1] **NOTE:** A (complete) simplified scheme contains, as a minimum, information regarding 1) the type of source(s), specifying the depth, aquifer and groundwater body in the case of groundwater source(s); 2) whether the water is treated in any way and if so, the treatment that is applied; 3) the PDC point(s); 4) the average daily volume and sub-volumes used by each sub-process**; for food producing companies this is supplemented by:** 5) a general description of the process (e.g. washing, transportation, boiling, blanching, etc.); 6) the type of water (incorporation/contact); 7) the average quantity of the food product produced each day (family/category); 8) the WFR per food family.

[2] **NOTE:** You are advised to consult the frequency table and the examples of frequency calculations for different volumes (table 1 and 2, annex 1) so that you understand the calculated frequencies that will follow in the document.

- The type of water;
- The closeness of nuclear activities;
- Groundwater collected from geological areas which are known to contain more natural radionuclides.

Annex 1, tables 3 and 4, contains guidelines which allow you - the supplier - to determine the risk profile and corresponding frequency. The frequency varies between 0.25 (1 sample every 4 years, which must be taken during the first year) and 1 (one sample each year).

3.5. Determine the Water Food Ratio (WFR[3]):

For each family of food products or family, a WFR needs to be determined. The WFR is the radio of the (daily) volume of water added (kg) to the production quantity produced each day (kg).

On a practical level, this involves counting up all of the volumes that are added during the entire production process or that come into contact with the food product. Volumes that "disappear" as a result of evaporation or centrifuging, for example, may not be deducted!

Example: A WFR of 14% means that during the entire production process, 14kg of water was added in order to manufacture 100 kg of the food product. Example 3 shows a practical example that has been worked out in full.

A WFR also needs to be calculated if contact water[4] is involved; this typically amounts to a few percent.

3.6. Draw up an auto-control programme (fill in the template):

Fill in the chosen PDC points (= proposal auto-control programme) in the template[5] provided and complement the other columns which contain a further characterisation of the point (water origin in %, water use in %...); a description of the template is available in Annex 2 and can be downloaded via the EDWD help-section on the web-platform (https://dxp.fanc.be).

The worked-out examples in this document (§4) have also been entered in the auto-control programme template. This result is also available in tables 5 and 6, Annex 1.

3.7. Submitting an automatic verification programme:

The proposal of the auto-control programme is submitted via the data-exchange web-platform of the Agency (https://dxp.fanc.be).

[3] **NOTE**: The Water Food Ratio (WFR) does not apply in the case of drinking water (tap water) producers.

[4] **NOTE**: Water can be regarded as contact water if a maximum of 5% of the water used during the process is left behind as a result of incorporation or absorption by the food, etc. Once that amount exceeds 5%, the water must be regarded as incorporation water. The methodology to determine the water type is elaborated in Example 2.

[5] **NOTE**: The template only serves to structurally record the necessary data for yourself and cannot be uploaded; all PDC points must be entered manually one by one.

Logging in takes place via the CSAM platform[6] and the applicant representing the company or supplier must possess the necessary eGov role[7] "FANC Drinking Water Directive – Data Management". If the applicant does not possess that role, it will not be possible to access the EDWD module (European Drinking Water Directive) module.

The role can be assigned by the Chief Access Manager or by an Access Manager[8] belonging to the organisation. You can download an access guide[9] concerning the use of CSAM and about eGov Role Management for the FANC Data-Exchange Platform (DXP) on the DXP itself.

After successfully logging in and opening the EDWD module, you can register the company as a Supplier and submit the ACP proposal. More information with regard to the use of this web-platform and more specifically with regard to submitting the auto-control programme is available in the EDWD web-platform manual.

In the "Auto Control program Declaration" feature, the necessary details can be entered in all sections:

- "PDC List" section: The PDC points must be entered manually one by one, accompanied by their full characterisation[10]. In a final step, the supplier is still able to enter text to provide arguments for his choices or to justify the submitted programme.
- "Water Food ratio" section: the WFRs calculated must be recorded in this section.
- "Attachments" section: The simplified scheme(s) and other required information files can also be uploaded and attached here.
- "Lab" section: Declaration of the laboratories[11] with which the supplier works[12].

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[6] **NOTE:** Users on behalf of professional partners who need to have access to the FANC DXP platform are managed via the CSAM platform. CSAM provides companies with an interface with which to organise and manage the roles they wish to assign to their employees who make use of Belgian government applications, including FANC DXP. The users themselves can log in to CSAM by means of the frequently used and reliable identification technologies, such as e-ID or ItsMe.

[7] **NOTE:** By means of eGov Role Management (RMA, https://iamapps.belgium.be/rma/generalinfo), the chief access manager or an access manager from the company will designate one or more persons who have been tasked with the role of "FANC Drinking Water Directive – Data Management". The FANC DXP application also belongs to the Home Affairs domain. Whenever you designate Access Managers, make sure that they are definitely connected to that domain, so that they can manage the roles for the FANC DXP application!

[8] **NOTE**: For a more detailed explanation of CSAM, we recommend contacting the HR department or the Accountancy department of your organisation. As the CSAM platform is used for many other government applications (such as for submitting returns to the social security and tax authorities), it is likely that they will already be familiar with it. They ought to be able to tell you who the access managers are within your organisation.

[9] https://dxp.fanc.be/Help/AccessGuide

[10] **NOTE**: The full characterisation for each PDC point encompass the geographical coordinates (longitude/latitude), the Locality (municipality), the NUTS code (geographic code), the Catchment (origin of the water), the Characterisation (physical location of the PDC point, according to the process), the Water Origin (% of groundwater/surface water), the Water destination (% of drinking water/ingestion water/contact water), the volume, the Sample Rate (sampling frequency) and a Comment.

[11] **NOTE:** An ACP proposal can only be submitted if all of the required sections have been completed. One of the required sections is the identification of the laboratory that the Supplier is working with in order to carry out the radioactivity analyses. Most laboratories that take samples for the mandatory biochemical analyses often also offer these radioactivity analyses through subcontracting. In the majority of cases, you can seek advice from the biochemical laboratory already working with you. Every analysis of radioactivity or in other words for every measurement type, the measurement method and the lab must be accredited.

[12] **NOTE:** The laboratory (or laboratories) that must ultimately be entered will be the laboratory (or laboratories) that invoices you for the radioactivity analyses performed, in view of the fact that they are

Remark: as long as the proposal of programme and/or the uploaded files are not officially submitted (via the "submit" button), the supplier can still make changes. After "submit" this is no longer possible until the Agency has evaluated the proposal (accepted or rejected).Acceptance or rejection of the auto-control programme:

After submission the Agency will receive a notification and it will approve or reject the auto-control programme. In both cases the supplier will receive a notification by e-mail. In case of rejection this will always be accompanied by the arguments for rejection and the request to adjust the submitted proposal.

The auto-control programme (ACP) will only be implemented as confirmation of approval is received from the Agency.

4. Examples development of an auto-control programme

The following examples show, step-by-step, the development of an auto-control programme. In the beginning, attention is paid to the simple basic principles, with additional principles gradually being introduced during the study of these examples. Towards the end, all aspects will have been discussed, which should enable the supplier to develop its auto-control programme and submit it to the Agency. Each example includes:

- Drawing up a simplified scheme;
- Determining the volumes and corresponding frequencies;
- Possible choices of PDC points;
- Completing the auto-control programme template.

The first three examples are suitable to suppliers of the food industry and the fourth is aimed at drinking water producers (tap water)

Suppliers from the food industry must also provide the following additional information when submitting their auto-control programme:

- The maximum percentage of "added water" to the finished end product (on a weight basis): e.g. 4% water = 4 kg added water/100 kg food product. This clearly refers to the amount of "added water". Water which is originally present in the food product or ingredient is not taken into account.
- Generic name of the type of food product e.g. crisps, (fruit) yoghurt …
- The validation date.

The weight percentage of added water per end product is necessary for the Agency to determine the actual risk if a parameter value is exceeded and the indicative dose (ID) is calculated. The ID calculation assumes an annual intake of 730 litres per person (consumption of 2 litres of water per day).

On the web-platform, identification of food products (end products) can be given for each PDC-point (in the section Water Food Ratio). After selection of the PDC-point, the following can be added: « name/type end product », « Water Food Ratio », « Valid From » and « Valid Until ».

the ones that bear the responsibility and, on the one hand, guarantee that the analyses were carried out in a manner that complied with the regulations (even if the activity itself was outsourced to third parties) and, on the other hand, are required to deliver the results of the analyses to the FANC according the prescribed template.

4.1. Example 1

Example 1.1: Supplier A

Supplier A has an own source (groundwater) and produces the necessary water (300 m³) which is partially used as contact water (200 m³) to clean machines, and partially as incorporation water (100 m³) for the production of a food product.

a) Simplified scheme and possible PDC points:

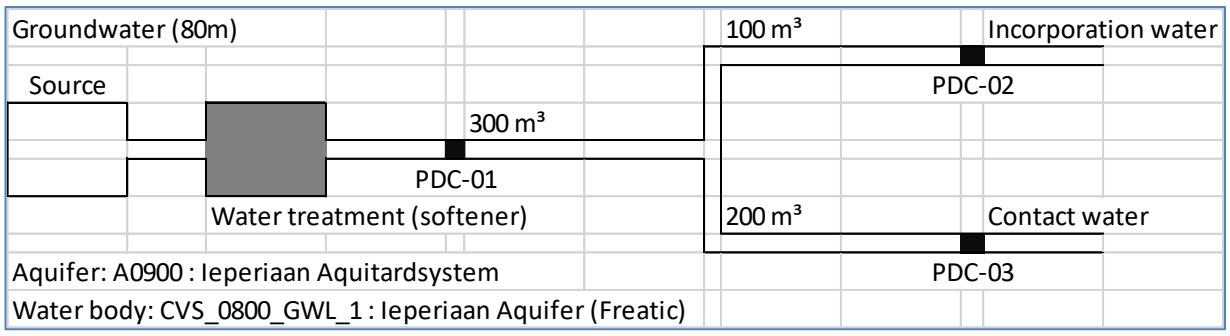

Figure 1: Production process Supplier A with given volumes (average m³ per day).

PDC-01, 02 and 03 are possible points where the parameter values have to be met.

PDC-01 is a possible choice because this point covers all possible risks of exposure by ingestion. However, this is only possible if the radiological quality of the water after this point is uniform and cannot change as such. If, however, after this point a second source of water is added to the circuit or process, there is a risk that the radioactivity concentration changes with regard to the water in PDC-01. In that case the choice for one single PDC-01 is no longer possible.

Also points PDC-02 and PDC-03 are an option. Together they cover all possible risks and guarantee the inspection of every volume of water that comes into contact with the food products.

b) Volumes and corresponding frequencies

Calculated frequencies (see tables 1 to 4, annex 1):

- PDC-01: 1/year PDC-02: 0.5/year PDC-03: 1/year

At PDC-01 the total volume must be treated as incorporation. According to the frequency table for drinking water/incorporation this gives a frequency of 1 sample per year for a volume of 300 m³/day.

At PDC-02 (incorporation, volume smaller or equal to 100 m³) the frequency is determined by the Agency according to the risk (type of water, vicinity of nuclear activities, aquifers with higher content of natural radionuclides …). Depending on the risk profile the Agency will impose a frequency of 0.25 – 0.5 – 0.75 or 1/year. In this example we assume that the profile for PDC-02 leads to a frequency of 0.5 samples per year.

Remark: Tables 3 and 4 allow to determine the risk profile and corresponding frequency. The Agency asks every supplier to determine this himself and to provide arguments for the proposed frequency when submitting the auto-control programme on the web-platform. The minimum frequency is 0.25/year (in other words, 1 sample per 4 years) and whereby the sample should be taken in the first monitoring year.

For PDC-03 the table gives a frequency of 1 sample a year for contact water and volumes larger than 100 m³.

c) Choice of the auto-control programme (PDC points)

The optimal auto-control programme can differ from supplier to supplier and is mainly dependent on the (sub) volumes in function of the water type (contact or incorporation). In this case two choices are possible (Choice A1 and A2). The examples presented will explain both choices in a neutral manner. The above analyses show that the following programmes are adequate:

- Choice A1: PDC-01 for a total of 1 sample/year;
- Choice A2: PDC-02 with PDC-03 for a total of 1.5 samples/year.

d) Drafting an auto-control programme / filling in the template

The fully completed template is available in table 5, Appendix 1. The fields « Locality », « NUTS code », « Catchment », « Aquifer name(s) », « Groundwater Body name(s) » and « PDC Characterisation » contain predefined option lists.

- Longitude/Latitude: geographical coordinates expressed in decimal degrees (DD,dddddd°). These must be as accurate as possible and are easy to determine via Google Maps or Google Earth.
- Locality[13]: the municipality will be entered automatically based on your geographical coordinates.
- NUTS Code: the geographic code will be entered automatically, based on the coordinates.
- Catchment: the origin of the water source (drop-down list)
    - River: the surface water of a river
    - Lake-Basin: the surface water of a lake/basin
    - Aquifer: groundwater
    - Mixed-Surface: a mix of different surface waters
    - Mixed-Aquifer: a mix of different groundwaters
    - Mixed-Mixed: a mix of (different) surface and groundwaters
    - Other: Other or Unknown (specify in the Comment field)
- Aquifer name(s): an extensive drop-down list naming possible aquifers; multiple selections are possible (consult your groundwater well permit(s))
- Groundwater Body name(s): an extensive drop-down list naming possible ground water body(s); multiple selections are possible (consult your groundwater well permit(s))
- Characterisation: a description of where the water samples were taken (drop-down list)
    - Untreated: samples taken directly from the source or prior to treatment
    - Treatment facility: samples taken immediately after treatment and before distribution
    - Pump station: samples taken at a pump station before repressurisation and before further distribution.
    - Reservoir: samples taken at water reservoirs, etc. (e.g. water tower, tank, etc.)
    - Local tap: samples taken at an end-point of a distribution zone such as a household tap, etc.

[13] **NOTE:** Locality: in borderline cases, the correct municipality may not be displayed. In such cases, a drop-down list can be used in order to select the neighbouring municipality manually (see DXP Manual).

    - Nutrition production: samples taken at a food production facility where the water is incorporated and/or used as contact water

- Water treatment filters in place (Y/N): are water filters being used? Yes/No
- Water Origin[14] (%): composition of the water in the PDC point in %GW (ground water) and %SW (surface water)
- Water destination[15] (%): destination or use of the water in the PDC point in %DW (as drinking water), %IW (as incorporation water) and %CW (as contact water)
- Volume: the daily volume passing through the PDC point in m^3/day.
- Sample Rate: (aT/bR, H3, Rn222[16]): the frequency or number of samples per year calculated for this PDC point. Initially, the frequency for the various parameters H3 (tritium), Rn222 (Radon) and TID (total indicative dose, determined by means of total alpha (aT) and residual beta[17] (bR)) will always be the same.
- Comment: a free field for explanations and/or justification.

The sum of the percentage of the fields "destination" and "Origin" must be 100:

- A1-PDC-01[18]: 0 %DW 66 %CW 34 %IW and 0 %SW 100 %GW
- A2-PDC-02[19]: 0 %DW 0 %CW 100 %IW and 0 %SW 100 %GW
- A2-PDC-03[20]: 0 %DW 100 %CW 0 %IW and 0 %SW 100 %GW

e) Catchment and Characterisation of the PDC-point

The corresponding "Catchment[21]" en "Characterisation[22]" of the different PDC points are:

- Choice X1-PDC-01: « Aquifer » & « Treatment facility »
- Choice X2-PDC-02: « Aquifer » & « Nutrition Production »
- Choice X2-PDC-03: « Aquifer » & « Nutrition Production »

f) Aquifer name(s) and Groundwater Body name(s) of the PDC-point[23]

Identification of the corresponding aquifer(s) and groundwater body name(s) for the various PDC points is done via a dropdown list on the DXP (DataExchange Platform). It is therefore sufficient to select the codes of the relevant aquifers from the list as is stated in the groundwater permit. In our example, this gives for each PDC point:

- Aquifer name (s): « A0900 : Ieperiaan Aquitardsystem »
- Groundwater Body name(s): « CVS_0800_GWL_1: Ieperiaan Aquifer (Freatic) »

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[14] **NOTE:** Water Origin: the sum of the origin/composition in % must always equal 100.

[15] **NOTE:** Water destination: the sum of the destination in % must always equal 100.

[16] **NOTE:** After a minimum of 4 consecutive years of sampling and measurement, a reduction of the minimum frequency per parameter can be requested if a number of conditions are fulfilled. Consult the practical guide entitled "Reduction request of the minimum frequency".

[17] **NOTE:** Beta residual = total beta – K40

[18] **NOTE:** &CW = 200 m^3/300 m^3 = 66% (rounded off) and %IW = 100/300 m^3 = 34% (rounded off)

[19] **NOTE:** %IW = 100 m^3/100 m^3 = 100%

[20] **NOTE:** %CW = 200 m^3/200 m^3 = 100%

[21] **NOTA**: See §1.1, example 1.1, section d) for the options and description

[22] **NOTA**: See §1.1, example 1.1, section d) for the options and description

[23] **NOTA**: This only applies when groundwater – completely or partly – is used. For surface water only these fields remain empty (and are not visible).

Example 1.2: Suppliers B and C

Analogous to example 1.1 suppliers B and C have a similar process but with different volumes.

a) Simplified scheme and possible PDC points:

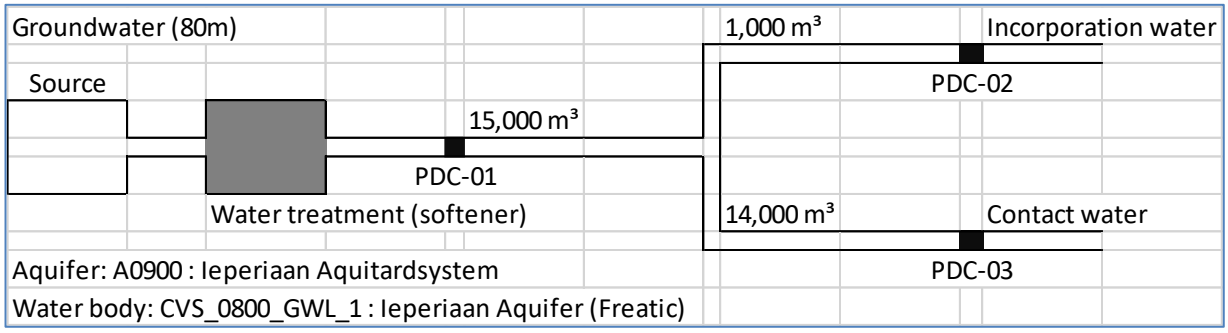


Figure 2: Production process Supplier B with given volumes (average m³ per day).

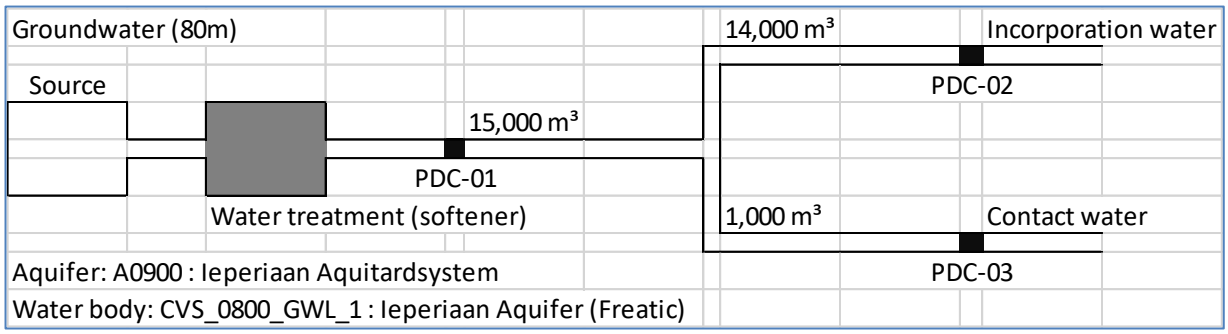


Figure 3: Production process Supplier C with given volumes (average m³ per day).

b) Calculated frequencies & choices of the auto-control programme

The calculated frequencies according to table 1, annex 1 are, in this case, as follows:

- Supplier B: PDC-01: 4/year PDC-02: 1/year PDC-03: 1/year
- Supplier C: PDC-01: 4/year PDC-02: 4/year PDC-03: 1/year

Analogous to example 1.1 both suppliers have the following choices:

- Supplier B
  - Choice B1: PDC-01 for a total of 4 samples/year;
  - Choice B2: PDC-02 with PDC-03 for a total of 2 samples/year.
- Supplier C:
  - Choice C1: PDC-01 for a total of 4 samples/year;
  - Choice C2: PDC-02 with PDC-03 for a total of 5 samples/year.

c) Auto-control programme

The fully completed programme in the template for both suppliers is available in table 5, annex 1.

For Supplier B the calculated percentages are:

- B1-PDC-01[24]: 0 %DW 93 %CW 7 %IW and 0 %SW 100 %GW
- B2-PDC-02: 0 %DW 0 %CW 100 %IW and 0 %SW 100 %GW
- B2-PDC-03: 0 %DW 100 %CW 0 %IW and 0 %SW 100 %GW

[24] **NOTE:** %CW = 14,000/15,000 = 93% (rounded off) and %IW = 1,000/15,000 = 7% (rounded off)

For Supplier C the calculated percentages are:

- C1-PDC-01[25]: 0 %DW 7 %CW 93 %IW and 0 %SW 100 %GW
- C2-PDC-02: 0 %DW 0 %CW 100 %IW and 0 %SW 100 %GW
- C2-PDC-03: 0 %DW 100 %CW 0%IW and 0 %SW 100 %GW

Remarks: pay attention when calculating percentages DW-CW-IW and SW-GW.

d) Catchment, Characterisation and identification of the Aquifer(s)

See example 1.1, section e) and f).

Conclusion Example 1

Although Suppliers A, B and C have a similar production process, this does not mean that they have the same auto-control programme. The examples show that the volumes and/or type of water (contact or incorporation water) which belong to these volumes affect the choice of auto-control programme (PDC points).

4.2. Contact water or incorporation water[26]?

Previous examples showed how a production process can be translated to a simplified scheme and that the auto-control verification programme depends on the location of the selected PDC points, the volume flows which are present and, also important, whether the water is contact water or incorporation water.

The following question must thereby be asked: "*When can water be considered as contact water"?* Answer: *"If maximum 5% of the used water is left behind during the process as a result of evaporation, incorporation in food products by absorption etc., it can be considered as contact water. As soon as the volume is more than 5%, it must be considered as incorporation water*."

Before illustrating this with an example, we will first explain the method used to determine the type of water.

Methodology to determine the "type of water"

We illustrate the methodology by means of the following considerations: Supplier D has its own source (groundwater) and produces the required water which is partially used (directly or indirectly) in the production of a food product. In our case the water is used, among other things, for washing, transport and further preparation of the food product.

[25] **NOTE:** %CW = 1,000/15,000 = 7% (rounded off) and %IW = 14,000/15,000 = 93% (rounded off)

[26] **NOTE** : Drinking water producers (tap water) never have contact water but always incorporation water as water type.

Simplified scheme and possible PDC points:

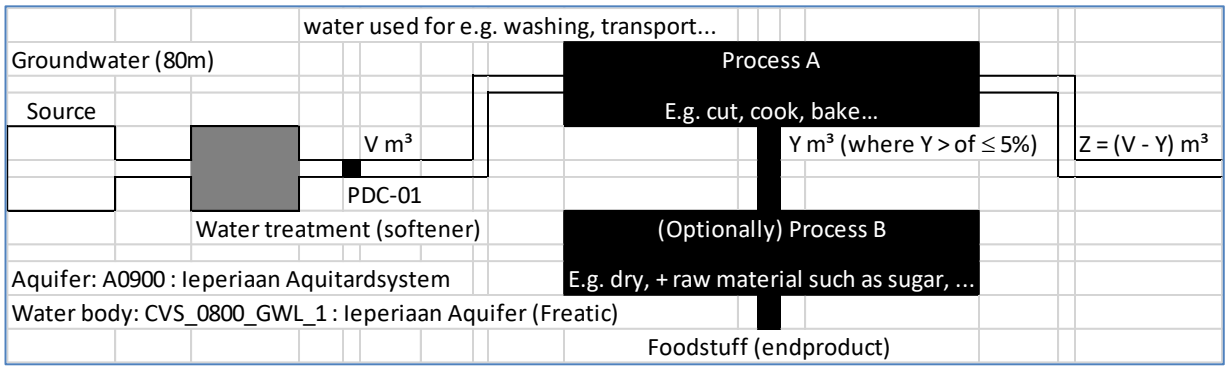


Figure 4: Production process Supplier D

Contact water: Y[27] ≤ 5% of the volume V

If during the production process 5% or less of the water is left behind, the water in PDC-01 can be considered as contact water; parameter Y is therefore ≤ 5% of the volume V at PDC-01.

a) Simplified scheme

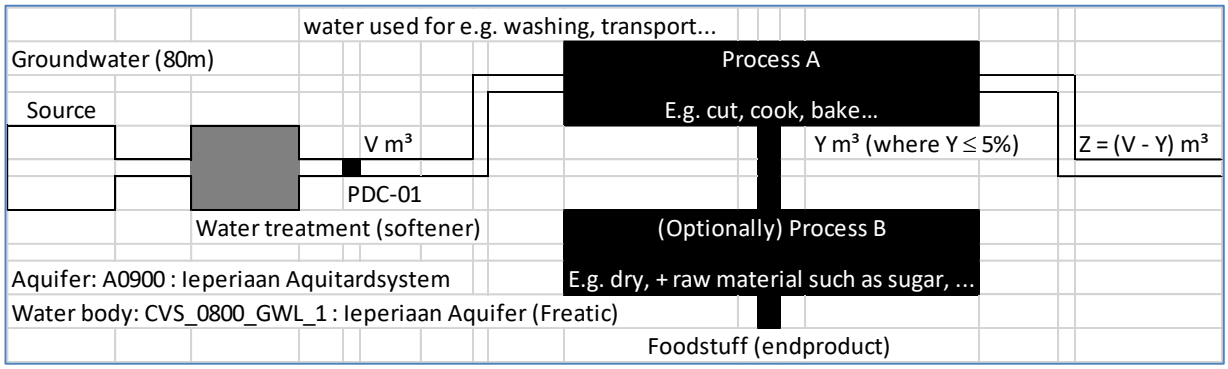


Figure 5: Production process Supplier D (contact water)

b) Volumes and corresponding frequencies

The number of samples per year according to the frequency table of contact water[28] amounts to:

- For a volume V larger than 100 m³/day the frequency is 1;
- For a volume V smaller or equal to 100 m³/day the frequency is 0.25 to 1 depending on the risk profile (see tables 3 and 4, annex 1).

Incorporation water: Y > 5% of the volume V

If during the production process more than 5% of the water is left behind, the water in PDC-01 must be considered incorporation water; parameter Y is therefore > 5% of the volume V at PDC-01.

[27] **NOTE:** Y = V – Z (m^3) or Y% = (Y / V) x 100

[28] **NOTE:** Table 1, Annex 1

a) Simplified scheme

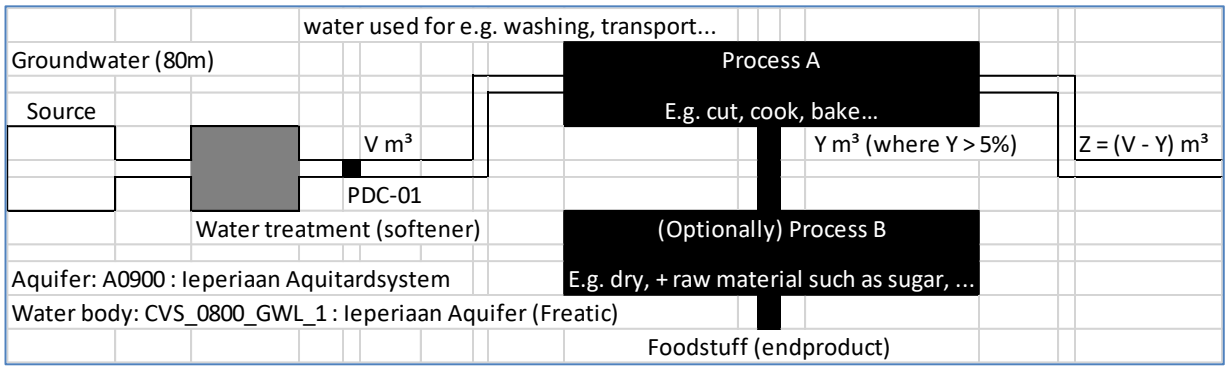


Figure 6: Production process Supplier D (incorporation water).

b) Volumes and corresponding frequencies

The number of samples per year according to the frequency table for incorporation or ingestion water[29] for volume V is:

- For a volume V larger than 100 m^3/day: see frequency table;
- For a volume V smaller than or equal to 100 m^3/day, the frequency will be 0.25 to 1, according to the risk profile (see tables 3 and 4, annex 1).

4.3. Example 2

Example 2.1 (contact water)

Analogous to supplier D, suppliers E and F have a similar process but with the following volumes.

- Supplier E: V = 100,000 m³/day Z = 96,000 m³/day (figure 7)
- Supplier F: V = 90 m³/day Z = 87 m³/day (figure 8)

The calculated Y parameter is therefore:

- Supplier E : Y = 100,000 – 96,000 = 4,000 m³ or Y = 4,000/100,000 = 4 %
- Supplier F : Y = 90 – 87 = 3 m³ or Y = 3/90 = 3.3%

a) Simplified scheme:

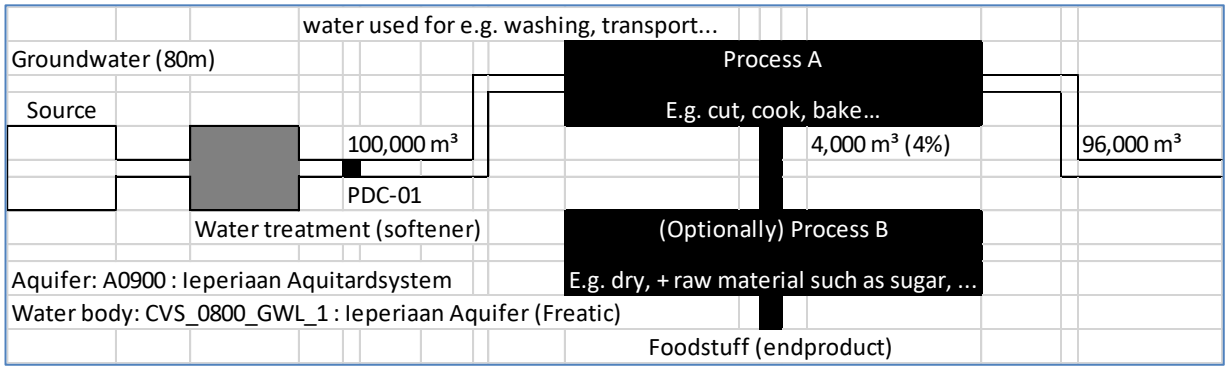


Figure 7: Production process Supplier E with given volumes (average m³ per day).

[29] **NOTE**: Table 1, Annex 1

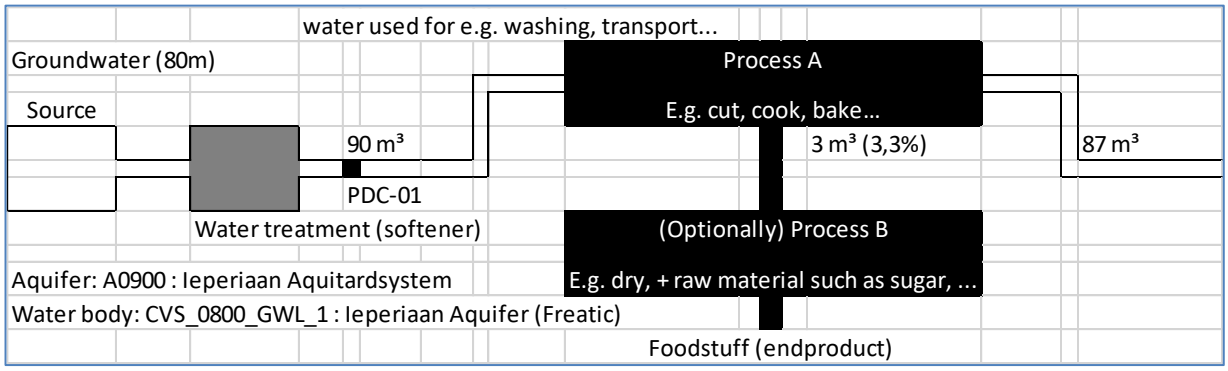


Figure 8: Production process Supplier F with given volumes (average m³ per day).

b) Calculated frequencies and automatic verification programme

The calculated frequency at PDC-01 according to table 1 (contact water), annex 1 is, in this case:

- Supplier E: for a volume of 100,000 m³ = 1/year (> 100 m³);
- Supplier F: for a volume of 90 m³ = 0.25 to 1/year (≤ 100 m³) according to the risk profile. In this example we assume that the profile will lead to a frequency of 0.75 samples per year.

The fully completed programme in the template for both suppliers is available in table 5, annex 1.

For Supplier E and F the calculated percentages for PDC-01 are:

- Supplier E[30]: 0 %DW 96 %CW 4 %IW and 0 %SW 100 %GW
- Supplier F[31]: 0 %DW 97 %CW 3 %IW and 0 %SW 100 %GW

Remarks: pay attention when calculating percentages DW-CW-IW and SW-GW.

c) Catchment, Characterisation and identification of the Aquifer(s)

See example 1.1, sections e) and f).

Example 2.2 (incorporation water)

Analogous to supplier D, suppliers G and H have a similar process but with the following volumes.

- Supplier G: V = 80,000 m³/day Z = 68,000 m³/day
- Supplier H: V = 1,000 m³/day Z = 920 m³/day

The calculated Y parameter is therefore:

- Supplier G : Y = 80,000 – 68,000 = 12.000 m³ or Y = 12,000/80,000 = 15 %
- Supplier H : Y = 1,000 – 920 = 80 m³ or Y = 80/1,000 = 8%

[30] **NOTE:** %CW = 96,000/100,000 = 96% and %IW = 4,000/100,000 = 4%

[31] **NOTE:** %CW = 87/90 = 97% (rounded off) and %IW = 3/90 = 3% (rounded off)

a) Simplified scheme:

This gives for supplier G (Figure 9) and supplier H (Figure 10) the following schemes.

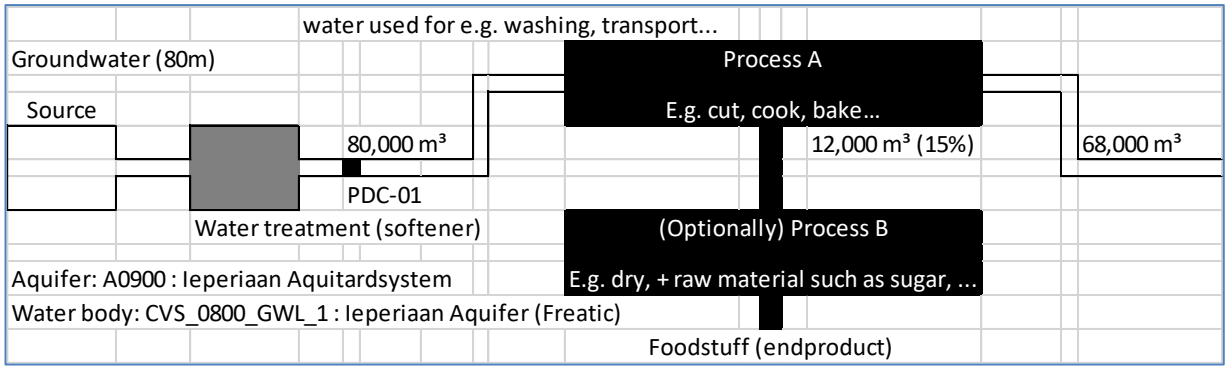


Figure 9: Production process Supplier G with given volumes (average m³ per day).

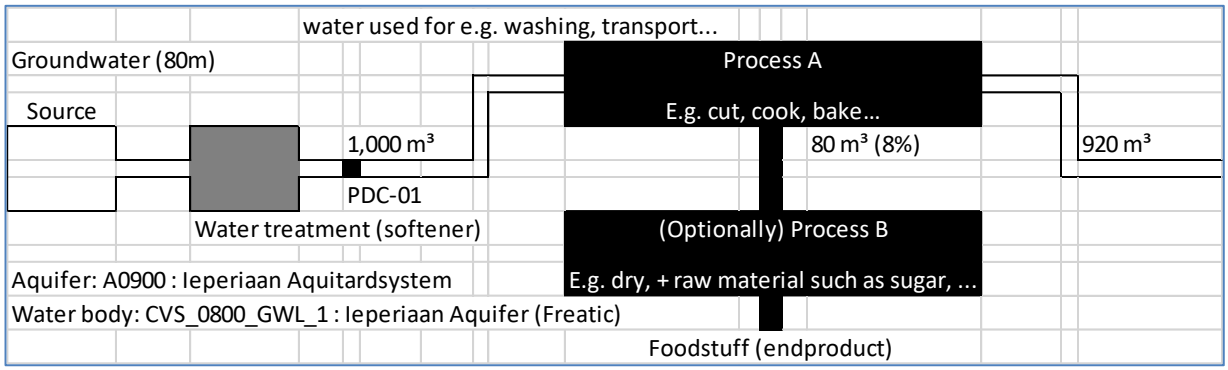


Figure 10: Production process Supplier H with given volumes (average m³ per day).

b) Calculated frequencies and auto-control programme

The calculated frequency at PDC-01 according to table 1 (incorporation water), annex 1 is, in this case:

- Supplier G1: for a volume of 80,000 m³ = 10/year;
- Supplier H1: for a volume of 1,000 m³ = 1/year;

The fully completed programme in the template for both suppliers is available in table 5, annex 1.

For Supplier G and H the calculated percentages for PDC-01 are:

- Suppl. G1[32]: 0 %DW 85 %CW 15 %IW and 0 %SW 100 %GW
- Suppl. H1[33]: 0 %DW 92 %CW 8 %IW and 0 %SW 100 %GW

Remarks: pay attention when calculating percentages DW-CW-IW and SW-GW.

c) Catchment, Characterisation and identification of the Aquifer(s)

See example 1.1, sections e) and f).

[32] **NOTE:** %CW = 68,000/80,000 = 85% and %IW = 12,000/80,0000 = 15%

[33] **NOTE:** %CW = 920/1,000 = 92% and %IW = 80/1,000 = 8%

4.4. Example 3

In the foregoing, with help of some simple examples, the basic principles and methods to set up an auto-control programme were explained gradually and in different steps.

The following practical example or case study handles all aspects together, including the calculation of the water-food ratio (WFR), which is the ratio of the "added" water (kg/day) compared to the finished end product (kg/day).

Supplier X is a food producer of crisps and jam. The daily production of the source (groundwater from the aquifer "Aq16: Cambro-Silurian basement of Brabant and water body "E160: basement of Brabant") is 1,290 m³. The water flows through a sand filter and is then de-ironed and softened. Of this amount, 1,200 m³ flows to the production line for crisps each day, where it is used to wash and transport cut potatoes until they reach the frying pan. After frying and adding the spices (for example salt or paprika …) the crisps still contain 3% of fluid. At the end of the production line Supplier X recovers 1,150 m³ water each day and 125 tons of crisps were produced.

The other 90 m³ flows to the production line for jam where this water is used to transport the fruit to the mills; 60 m³ is mixed with the fruit and 30 m³ is separated. In a next process sugars are added and the fruit mixture is heated. During this process 50 m³ is evaporated and the jam still contains 30% fluid. Every day, Supplier X produces about 200 tons of jam.

a) Simplified scheme (1)

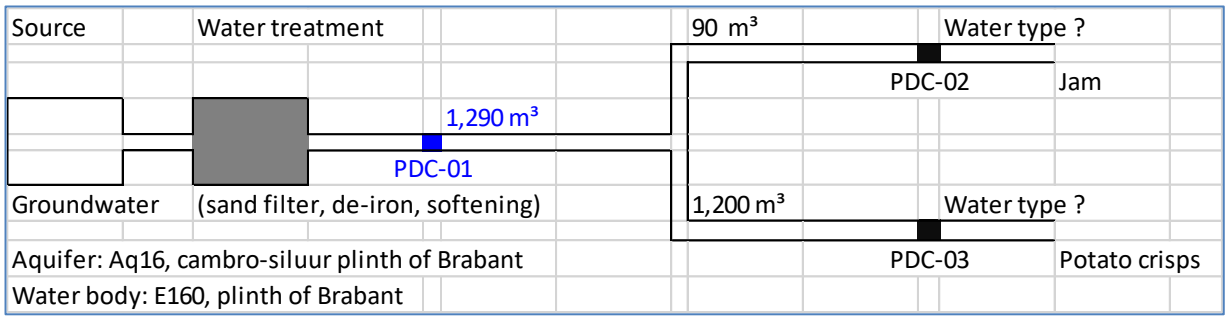


Figure 11: Production process Supplier X (average m³ per day).

The previous exercises showed that a valid auto-control programme is possible by monitoring PDC-01 alone or PDC-02 with PDC-03.

If not investigated whether PDC-02 or PDC-03 can either or not be considered as contact or incorporation water, the corresponding frequencies must be determined according to the table for incorporation (most conservative assumption).

The calculated frequencies (see table 1, annex 1):

- Choice X1-PDC-01: incorporation, 1290 m³ = 2/year;
- Choice X2-PDC-02: incorporation, 90 m³ = 0.25 to 1/year;
- Choice X2-PDC-03: incorporation, 1,200 m³ = 2/year.

The corresponding percentages:

- X1-PDC-01: 0 %DW 0 %CW 100 %IW and 0 %SW 100 %GW
- X2-PDC-02: 0 %DW 0 %CW 100 %IW and 0 %SW 100 %GW
- X2-PDC-03: 0 %DW 0 %CW 100 %IW and 0 %SW 100 %GW

Remarks: pay attention when calculating percentages DW-CW-IW and SW-GW.

Contact or incorporation water

Figures 12 and 13 represent the individual jam and crisps production lines. By means of the methodology described in example 2 the water type of both process lines is determined.

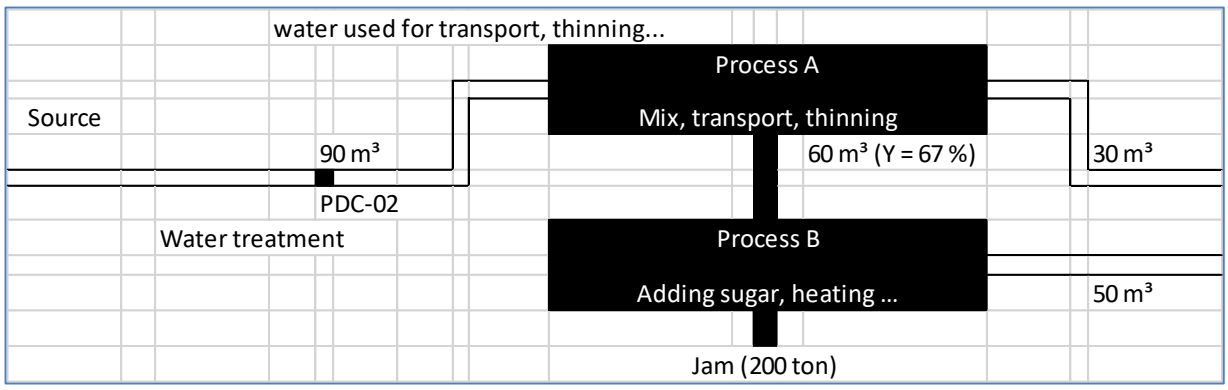


Figure 12: Production process jam (averages per day).

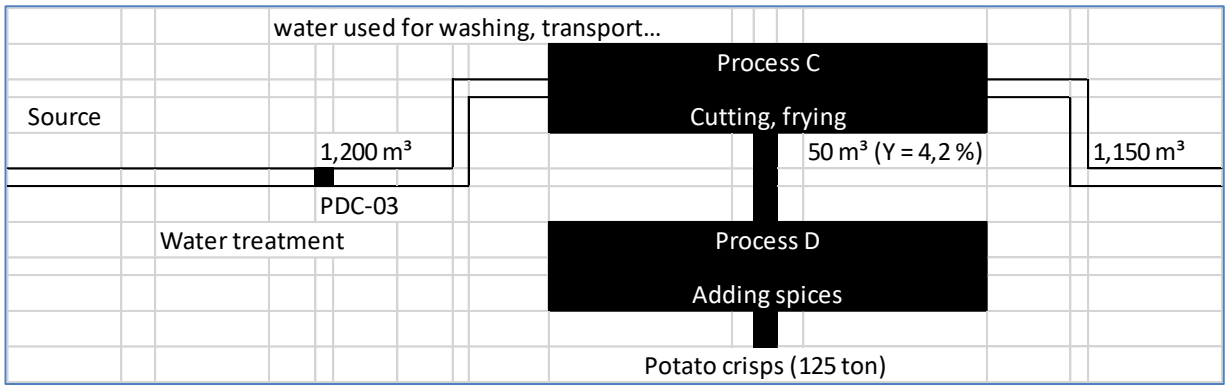


Figure 13: Production process crisps (averages per day).

The calculated Y parameter is therefore:

- Jam: Y = 90 – 30 = 60 m³ or Y = (60/90) = 67%
- Crisps : Y = 1,200 – 1,150 = 50 m³ or Y = (50/1,200) = 4.2 %

This analysis shows that the water of the jam process line is incorporation water and that of the crisps process line can be considered contact water.

Now that the type of water was determined for each process line, a new general simplified scheme[34] can be prepared as illustrated in figure 14.

[34] **NOTE:** The WFR stated in the scheme is calculated and explained in further in section c).

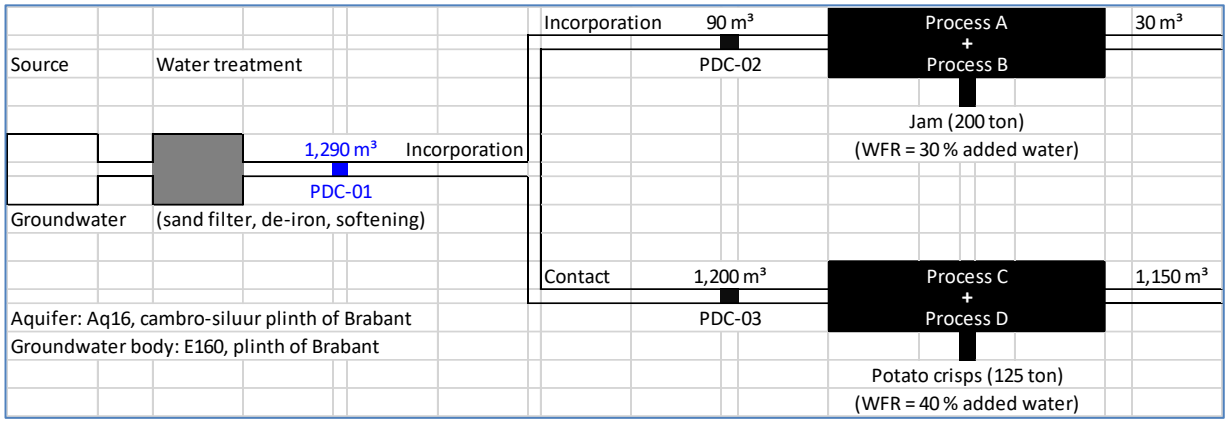


Figure 14: Production process Supplier X (averages per day).

b) Calculated frequencies and automatic verification programme

The calculated frequencies of these 3 PDC points (see table 1, annex 1):

- Choice X1-PDC-01: incorporation, 1,290 m³ = 2/year;
- Choice X2-PDC-02: incorporation, 90 m³ = 0.25 to 1/year (≤ 100 m³) depending on the risk profile. In this example we assume that the profile will lead to a frequency of 0.25 samples per year;
- Choice X2-PDC-03: contact, 1,200 m³ = 1/year.

The corresponding percentages:

- X1-PDC-01[35]: 0 %DW 93 %CW 7%IW and 0 %SW 100 %GW
- X2-PDC-02: 0 %DW 0 %CW 100 %IW and 0 %SW 100 %GW
- X2-PDC-03: 0 %DW 100 %CW 0 %IW and 0 %SW 100 %GW

Remarks: pay attention when calculating percentages DW-CW-IW and SW-GW.

The fully completed programme in the template for both choices is available in table 5, annex 1.

c) Weight percentage of "added water" (WFR)

As set out in §4 the Suppliers from the food sector must, besides the generic name of the type of food product, also indicate the maximum percentage that the finished end product contains in added water (on a weight basis). Water which is originally present in the food product or ingredient is not taken into account.

- Name "jam": 60 m³ per 200 tons of product = 60,000 kg / 200,000 kg = 30 %
- Name "crisps":50 m³ per 125 tons of product = 50,000 kg / 125,000 kg = 40 %

That crisps or jam as finished products contain respectively 3 and 30% of fluid, is irrelevant. The given that during the heating process of the jam 50 m³ evaporates is not important either. Evaporating or drying does not remove potential radionuclides; they form deposits or are left behind in the concentrate. Only the proportion of the amount of water that is used or added in relation to the amount of end product is relevant.

[35] **NOTE:** %CW = 1,200/1,290 = 93% and 90/1,290 = 7%

This can also be cumulative: every step in the production process in which water is added must be cumulatively taken into account.

- +60m³ (incorp.) –50m³ (evaporation) + 5m³ (contact) – 10m³ (baking) ≠ 5 m³
- +60m³ (incorp.) –50m³ (evaporation) + 5m³ (contact) – 10m³ (baking) = 65 m³
- The volumes which disappeared due to the drying or baking do not count.

If a parameter value is exceeded and the indicative dose (ID) is calculated, the Agency can determine the actual risk by means of the percentage of "added value". After all, the ID calculation assumes an annual intake of 730 litres per person (consumption of 2 litres of water per day).

Supposing a parameter value is exceeded and this gives an indicative dose of 0.15 mSv/year, this implies the following for the food products:

- Jam: 30% = 30 kg water / 100 kg jam = 30 L / 100 kg = 2 L / 6.7 kg
- Crisps: 40% = 40 kg water / 100 kg crisps = 40 L / 100 kg = 2 L / 5.0 kg

In order to reach an ID of 0.15 mSv/year a reference person must eat the equivalent of 6.7 kg of jam or 5.0 kg of crisps every day. So a reference person must eat 4.5 kg of jam or 3.3 kg of crisps per day to reach an ID of 0.1 mSv/year.

d) Catchment, Characterisation and identification of the Aquifer of the PDC point

The associated "Catchment[36]" and "Characterisation[37]" of the various PDC points are:

- Choice X1-PDC-01: « Aquifer » & « Treatment facility »
- Choice X2-PDC-02: « Aquifer » & « Nutrition Production »
- Choice X2-PDC-03: « Aquifer » & « Nutrition Production »

With the identification of the aquifers for the Aquifer:

- Aquifer name (s): « Aq16 : Cambro-Silurian basement of Brabant »
- Groundwater Body name(s): « E160: basement of Brabant »

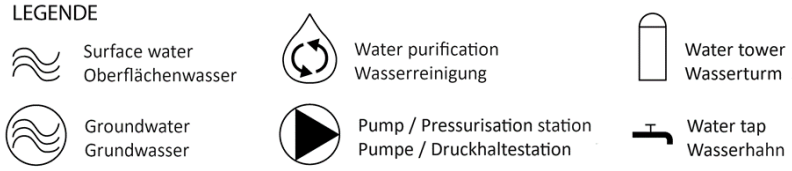
[36] **NOTE:** See §4.1, example 1.1, section d) for the possible options and description

[37] **NOTE:** See §4.1, example 1.1, section d) for the possible options and description

4.5. Example 4 (producer of drinking water)

Supplier Z is a drinking water producer and has several sources (groundwater and surface water from a river). The treated water is distributed over the delivery area using various booster / pump stations and water reservoirs. Figure 15 presents the simplified scheme. The production and partial volumes are as follows (averages in m³ per day):

- 1 = 2 = 100,000 m³
- 7 = 11 = 20,000 m³
- 3 = 50,000 m³
- 4 = 30,000 m³
- 5 = 20,000 m³
- 6 = 30,000 m³
- 8 = 30,000 m³
- 9 = 40,000 m³
- 10 = 60,000 m³



a) Simplified scheme

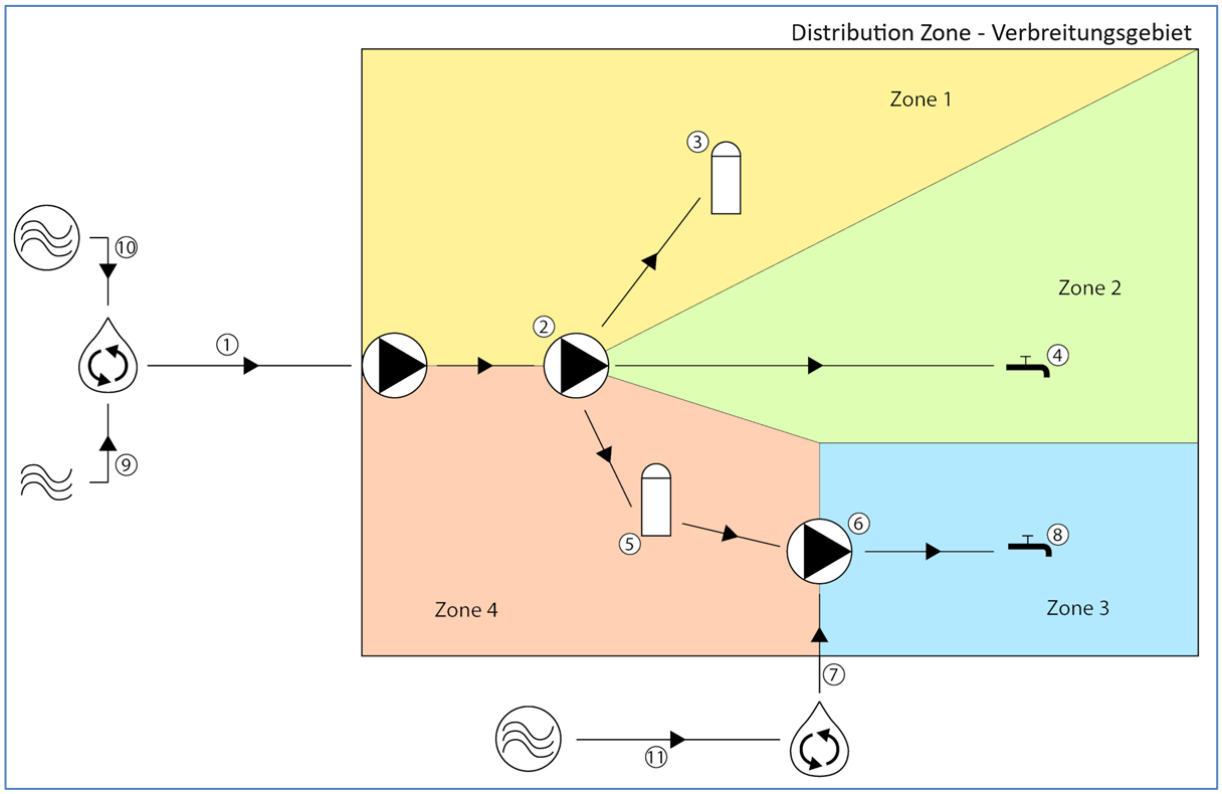


Figure 15: Presentation of the production and distribution of drinking water by the Supplier Z.

From the regional groundwater well permit it appears that well (10) is located in the aquifer "A1100: Cretaceous Aquifer System" and groundwater body "BLKS_1100_GWL_2m : Cretaceous Aquifer System (Strung)" and that well (11) is located in the "A0200: Campine Aquifer System" (Aquifer name) and "CKS_0220_GWL_1 : Complex of the Campine (Freatic)" (Groundwater body name).

In our example also the following applies:

- Zone 1 receives water from reservoir 3;
- Zone 2 receives water from booster / pump station 2;
- Zone 3 receives water from by booster / pump station 6;
- Zone 4 receives water from reservoir 5.

b) Possible PDC-points

As stated in §3.3, a proposal for an auto-control programme is valid if the entire set of selected PDC points (points where the parameter values must be met) cover all possible risks of exposure by ingestion. In other words, the supplier must guarantee that the proposed monitoring programme covers the entire delivery area.

Furthermore, the PDC points are preferably located:

- After the water treatment;
- After a mixture of water, unless the added water has already been checked before (by itself via another PDC point or by another supplier);
- At the tap;
- After the integration of the water into the production chains of food companies, except if the water is distributed by a water supplier that was previously checked

The combinations below are examples of a valid program that always cover the entire delivery area (not exhaustive):

- Choice Z1 = 1 + 7 being PDC-01 and PDC-07;
- Choice Z2 = 9 + 10 + 7 being PDC-09, PDC-10 and PDC-07;
- Choice Z3 = 2 + 6 being PDC-02 and PDC-06;
- Choice Z4 = 2 + 7 being PDC-02 and PDC-07;
- Choice Z5 = 3 + 4 + 5 + 8 being PDC-03, PDC-04, PDC-05 and PDC-08;
- …

The previous choices always include the volume as given in the assignment. However, the combination PDC-04 + PDC-08 is also a possible selection. The water quality in Zone 2 is the same as that in Zone 1 or Zone 4. After all, the distributed water in these zones all originate from Point 2, whereby the composition of the water or the radiological quality after this point in principle does not change. Though, in this case you should apply the volume of point 2 to point 4

However, as indicated above, the PDC point is preferably as close as possible after the water treatment. Selecting point 2 as a PDC point is therefore much more logical than point 4.

By the way, Art.2, 11 ° of the Royal Decree of 31.05.2016, "point of sampling" states: *point that is chosen freely by the supplier in a delivery area, provided that there is no negative change in the value of the radioactivity concentration between this point and the point where the parameter values must be met (PDC point).*

This means that the supplier can choose point 2 as PDC point and take samples in points 3, 4 or 5. **Remark**: in that case, in addition to the obligatory unique identification code of PDC-02, the actual GPS coordinates must also be stated on the sampling sheet. These coordinates are reported in the measurements reporting sheet in the "Comment" column.

c) Calculated frequencies & auto-control programme

The calculated frequencies of the above PDC points, according to table 1 (drinking water), annex 1 are in this case:

- PDC-01: 100,000 m³ = 12/year
- PDC-02: 100,000 m³ = 12/year
- PDC-03: 50,000 m³ = 7/year
- PDC-04: 30,000 m³ = 5/year;
- PDC-05: 20,000 m³ = 4/year
- PDC-06: 30,000 m³ = 5/year
- PDC-08: 30,000 m³ = 5/year
- PDC-07: 20,000 m³ = 4/year
- PDC-09: 40,000 m³ = 6/year
- PDC-10: 60,000 m³ = 8/year
- PDC-11: 20,000 m³ = 4/year

For Supplier Z the calculated percentages for each PDC-point are:

- PDC-01[38]: 100 %DW 0 %CW 100 %IW and 40 %SW 60 %GW
- PDC-02: 100 %DW 0 %CW 100 %IW and 40 %SW 60 %GW
- PDC-03: 100 %DW 0 %CW 100 %IW and 40 %SW 60 %GW
- PDC-04: 100 %DW 0 %CW 100 %IW and 40 %SW 60 %GW
- PDC-05: 100 %DW 0 %CW 100 %IW and 40 %SW 60 %GW
- PDC-06[39]: 100 %DW 0 %CW 100 %IW and 13 %SW 87 %GW
- PDC-07: 100 %DW 0 %CW 100 %IW and 0 %SW 100 %GW
- PDC-08: 100 %DW 0 %CW 100 %IW and 13 %SW 87 %GW
- PDC-09: 100 %DW 0 %CW 100 %IW and 100 %SW 0 %GW
- PDC-10: 100 %DW 0 %CW 100 %IW and 0 %SW 100 %GW
- PDC-11: 100 %DW 0 %CW 100 %IW and 0 %SW 100 %GW

The fully completed programme for both choices is available in table 6, annex 1.

d) Catchment and Characterisation of each PDC point

The associated "Catchment[40]" and "Characterisation[41]" of the various PDC points are:

- PDC-01: « Mixed-Mixed » & « Treatment facility »
- PDC-02: « Mixed-Mixed » & « Pump station »
- PDC-03: « Mixed-Mixed » & « Reservoir »
- PDC-04: « Mixed-Mixed » & « Local tap »
- PDC-05: « Mixed-Mixed » & « Reservoir »
- PDC-06: « Mixed-Mixed & « Pump station »
- PDC-07: « Aquifer » & « Treatment facility »
- PDC-08: « Mixed-Mixed » & « Local tap »
- PDC-09: « River » & « Untreated »
- PDC-10: « Aquifer » & « Untreated »
- PDC-11: « Aquifer » & « Untreated »

[38] **NOTE:** %SW = 40,000/100,000 = 40% and %GW = 60,000/100,000 = 60%. The water in PDC-02, 03, 04 and 05 is the same as in PDC-01; the calculation for this %SW and %GW is identical.

[39] **NOTE:** PDC-06 = 30,000 m³ (20,000 m³ from PDC-07 + 10,000 m³ from PDC-05); PDC-07 = 100%GW and PDC-05 = 40%SW and 60%GW; for PDC-06, the %SW therefore = 40% x 10,000/30,000 = 13% and %GW = [60% x 10,000 + 100% x 20,000]/30,000 = 87%. The water in PDC-08 is the same as PDC-06, as a result of which the calculation is identical.

[40] **NOTE:** See §4.1, example 1.1, section d) for the possible options and description

[41] **NOTE:** See §4.1, example 1.1, section d) for the possible options and description

e) Aquifer name(s) and Groundwater Body name(s) of the PDC-points

As stated in the groundwater well permit, the associated aquifer(s) and groundwater body name(s) for the various PDC-points in our example are as followed:

For PDC-10, PDC-01, PDC-02, PDC-03, PDC-04, PDC-05:

- Aquifer name (s): « A1100 : Cretaceous Aquifer system »
- Groundwater Body name(s): « BLK_1100_GWL_2m : Cretaceous Aquifer system »

For PDC-11, PDC-07:

- Aquifer name (s): « A0200 : Campine Aquifer system »
- Groundwater Body name(s): « CKS_0220_GWL_1 : Complex of the Campine »

For PDC-06, PDC-08[42]:

- Aquifer name (s): « A1100 : Cretaceous Aquifer system »
- Groundwater Body name(s): « BLKS_1100_GWL_2m : Cretaceous Aquifer system »
- Aquifer name (s): « A0200 : Campine Aquifer system »
- Groundwater Body name(s): « CKS_0220_GWL_1 : Complex of the Campine »

[42] **NOTE**: Multiple selections from the aquifer and groundwater body option lists are possible. In this case, points PDC-06 and PDC-08 are fed by potentially 2 different groundwater wells.

5. Appendices

ANNEX 01

Table 01: Frequency table (Table 1, Annex 1, Royal Decree of 31.05.2016)

Daily amount of water distributed, produced or incorporated within a delivery area (m³) (see remark 1)	**Number of samples per year (see remark 2)**
volume ≤ 100	(see remark 3)
100 < volume ≤ 1 000	1
1 000 < volume ≤ 10 000	1 + 1 for each 3 300 m³/d and fraction thereof of the total amount
10 000 < volume ≤ 100 000	3 + 1 for each 10 000 m³/d and fraction thereof of the total amount
volume > 100 000	10 + 1 for each 25 000 m³/d and fraction thereof of the total amount
Daily amount of contact water used within a delivery area (m³) (see remark 1)	**Number of samples per year**
Volume > 100	1
Volume ≤ 100	(see remark 3)

Remark 1: The volumes are average volumes calculated across a calendar year.

Remark 2: The number of samples taken must be as evenly distributed as possible in terms of time and place.

Remark 3: The number of samples taken is determined by the Agency, according to the origin of the sampled water in relation to the point at which the parameter values must be fulfilled and the accompanying risk, in accordance with Article 9, § 2 of the Royal Decree of 31/05/2016.

Table 02: Examples of frequency calculations for different volumes.

		Number of sampling per year for		
Volume	Number of samples	Samples first part	Samples second part (of complete fractions)	samples third part (of partial fraction)
540 m³	1			
8,500 m³	4	1 for 1,000 m³	2 for 2x 3,300 m³	1 for 900 m³
95,000 m³	12	3 for 10,000 m³	8 for 8x 10,000 m³	1 for 5,000 m³
260,000 m³	17	10 for 100,000 m³	6 for 6x 25,000 m³	1 for 10,000 m³

More precisely:

V = 8,500 m³, number of samples = 1 for 1,000 m³ + 1 for 3,300 m³ + 1 for 3,300 m³ + 1 for 900 m³ = 4

Calculation based on Note 3 of Directive (EU) 2015/1787 of the Commission of 6 October 2015 amending Annexes II and III to Council Directive 98/83/EC on the quality of water intended for human consumption.

Table 03: Decision criteria for determining the risk profile and associated frequency for small volumes (≤100 m³ / day) of contact or incorporation water

Increased risk criteria	No. of samples per year	Comments
None	**0.25**	1 every 4 years (which is the minimum)
Water type: surface water extracted downstream of a nuclear site and/or located within a ray of 10 km around a nuclear site	+0.25 or **0.5** in total	1 every 2 years
Water type: groundwater located in a risk zone (Table 4) (increased presence of natural radioactivity)	+0.25 or **0.5** in total	1 every 2 years
Both risks mentioned above coexist	+0.25 +0.25 or **0.75** in total	1 every 16 months
Use of the water: incorporated or for ingestion	Potentially **+0.25** to be added to the given values above	1 every 2 years when 0,50 1 every 16 months when 0,75 1 every year when 1,00

REMARK:

Note: in all cases, a sample must be taken during the first year.

The criteria, for whether the groundwater is located in a risk zone, can be found in table 04 of this appendix. The table does not include all aquifers; it is a tool for initial assessment and should be confirmed or contested when the first actual radioactivity measurements are done. If the source is located in one of the red bolded aquifers, the groundwater is labelled as a (risk) water that may contain an increased presence of natural radioactivity.

Table 04: Values of the screening parameters in the Belgian groundwater[1]

Parameter	^{40}K	Total Beta	Total Alpha	Rn-222
Screening value (Bq/L)	-	1	0,1	100
Basement of the Brabant Formation	0,44 ± 0,28	***0,6 ± 0,5***	**0,27 ± 0,17**	68 ± 29
Tournaisian carboniferous limestone	0,38 ± 0,09	0,54 ± 0,12	**0,27 ± 0,14**	17 ± 9
Namur Basin carboniferous limestone	0,06 ± 0,03	0,14 ± 0,04	**0,24 ± 0,15**	29 ± 30
Chalk of the Mons Basin	0,14 ± 0,10	0,22 ± 0,14	**0,13 ± 0,09**	12 ± 4
Devonian limestone of Dinant	0,08 ± 0,06	0,11 ± 0,07	***0,083 ± 0,023***	11 ± 2
Landenian	0,23 ± 0,17	0,18 ± 0,10	***0,06 ± 0,04***	23 ± 9
Chalk	0,26 ± 0,06	0,25 ± 0,15	***0,06 ± 0,04***	
Carboniferous limestone of Dinant	0,057 ± 0,020	0,090 ± 0,009	0,06 ± 0,01	19 ± 15
Virtonian	0,032 ± 0,016	0,078 ± 0,017	0,053 ± 0,023	13 ± 3
Brusselian	0,044 ± 0,013	0,12 ± 0,09	0,0447 ± 0,027	
Shale Formation of the Ardennes	0,03 ± 0,04	0,06 ± 0,04	0,029 ± 0,015	**128 ± 101**

[1] Values in Bq/L. Every value is a mean ± standard deviation of at least 3 analyses. Means exceeding the screening values are marked **bold and underlined**. Values where mean ± standard deviation exceed the screening value are marked ***bold italic***.

Table 05: Filled in "Auto-control programme" for examples 1.1, 1.2, 2.1, 2.2 and 3.

PDC	Decimal Latitude	Decimal Longitude	Locality	NUTS	Average Volume (m^3/day)	Annual sampling Frequency	%DW	%CW	%IW	%SW	%GW	Catchment	PDC Characterisation	Justification change	Comment
Vb 1.1 - A1 - PDC-01	X1	Y1	Leuven	BE24	300	1	0	66	34	0	100	AQUIFER	TREATMENT FACILITY		
Vb 1.1 - A2 - PDC-02	X2	Y2	Leuven	BE24	100	0,50	0	0	100	0	100	AQUIFER	NUTRITION PRODUCTION		
Vb 1.1 - A2 - PDC-03	X3	Y3	Leuven	BE24	200	1	0	100	0	0	100	AQUIFER	NUTRITION PRODUCTION		
Vb 1.2 - B1 - PDC-01	X1	Y1	Gent	BE23	15000	4	0	93	7	0	100	AQUIFER	TREATMENT FACILITY		
Vb 1.2 - B2 - PDC-02	X2	Y2	Gent	BE23	1000	1	0	0	100	0	100	AQUIFER	NUTRITION PRODUCTION		
Vb 1.2 - B2 - PDC-03	X3	Y3	Gent	BE23	14000	1	0	100	0	0	100	AQUIFER	NUTRITION PRODUCTION		
Vb 1.2 - C1 - PDC-01	X1	Y1	Mons	BE32	15000	4	0	7	93	0	100	AQUIFER	TREATMENT FACILITY		
Vb 1.2 - C2 - PDC-02	X2	Y2	Mons	BE32	14000	4	0	0	100	0	100	AQUIFER	NUTRITION PRODUCTION		
Vb 1.2 - C2 - PDC-03	X3	Y3	Mons	BE32	1000	1	0	100	0	0	100	AQUIFER	NUTRITION PRODUCTION		
Vb 2.1 - E1 - PDC-01	X1	Y1	Liege	BE33	100000	1	0	96	4	0	100	AQUIFER	TREATMENT FACILITY		
Vb 2.1 - F1 - PDC-01	X1	Y1	Hasselt	BE22	90	0,75	0	97	3	0	100	AQUIFER	TREATMENT FACILITY		
Vb 2.2 - G1 - PDC-01	X1	Y1	Brussel	BE10	80000	10	0	85	15	0	100	AQUIFER	TREATMENT FACILITY		
Vb 2.2 - H1 - PDC-01	X1	Y1	Wavre	BE31	1000	1	0	92	8	0	100	AQUIFER	TREATMENT FACILITY		
Vb 3 - X1 - PDC-01	X1	Y1	Ieper	BE25	1290	2	0	93	7	0	100	AQUIFER	TREATMENT FACILITY		
Vb 3 - X2 - PDC-02	X2	Y2	Ieper	BE25	90	0,25	0	0	100	0	100	AQUIFER	NUTRITION PRODUCTION		
Vb 3 - X2 - PDC-03	X3	Y3	Ieper	BE25	1200	1	0	100	0	0	100	AQUIFER	NUTRITION PRODUCTION		

Remark: The unique codes for the PDC points are automatically created by the system when the auto-control programme is submitted on the web-platform; they are in the form of: 01BE1234567890-A01 (i.e. counter + registered CBE number + counter).

The fields « Locality » and « NUTS Code » will be proposed by the DXP system itself based on the given coordinates (longitude/latitude).

Table 06: Filled in "Auto-control programme" for example 4.

PDC	Decimal Latitude	Decimal Longitude	Locality	NUTS	Average Volume (m^3/day)	Annual sampling Frequency	%DW	%CW	%IW	%SW	%GW	Catchment	PDC Characterisation	Justification change	Comment
Vb 4 - Z1 - PDC-01	X1	Y1	Leuven	BE24	100000	12	100	0	0	40	60	MIXED-MIXED	TREATMENT FACILITY		
Vb 4 - Z1 - PDC-07	X7	Y7	Rotselaar	BE24	20000	4	100	0	0	0	100	AQUIFER	TREATMENT FACILITY		
Vb 4 - Z2 - PDC-09	X9	Y9	L9	N9	40000	6	100	0	0	100	0	RIVER	UNTREATED		
Vb 4 - Z2 - PDC-10	X10	Y10	L10	N10	60000	8	100	0	0	0	100	AQUIFER	UNTREATED		
Vb 4 - Z2 - PDC-07	X7	Y7	L7	N7	20000	4	100	0	0	0	100	AQUIFER	TREATMENT FACILITY		
Vb 4 - Z3 - PDC-02	X2	Y2	L2	N2	100000	12	100	0	0	40	60	MIXED-MIXED	PUMP STATION		
Vb 4 - Z3 - PDC-06	X6	Y6	L6	N6	30000	5	100	0	0	13	87	MIXED-MIXED	PUMP STATION		
Vb 4 - Z4 - PDC-02	X2	Y2	L2	N2	100000	12	100	0	0	40	60	MIXED-MIXED	PUMP STATION		
Vb 4 - Z4 - PDC-07	X7	Y7	Rotselaar	BE24	20000	4	100	0	0	0	100	AQUIFER	TREATMENT FACILITY		
Vb 4 - Z5 - PDC-03	X3	Y3	L3	N3	50000	7	100	0	0	40	60	MIXED-MIXED	RESERVOIR		
Vb 4 - Z5 - PDC-04	X4	Y4	L4	N4	30000	5	100	0	0	40	60	MIXED-MIXED	LOACL TAP		
Vb 4 - Z5 - PDC-05	X5	Y5	L5	N5	20000	4	100	0	0	40	60	MIXED-MIXED	RESERVOIR		
Vb 4 - Z5 - PDC-08	X8	Y8	L8	N8	30000	5	100	0	0	13	87	MIXED-MIXED	LOACL TAP		

Remark: The unique codes for the PDC points are automatically created by the system when the auto-control programme is submitted on the web-platform; they are in the form of: 01BE1234567890-A01 (i.e. counter + registered CBE number + counter).

ANNEX 02

The "auto-control programme" template[43] can be downloaded from the FANC website (https://dxp.fanc.be). The template contains the following information (excluding the Aquifer name(s) and Groundwater body name(s)):

- PDC Sample ID = unique ID (identification) of the PDC-point (points where parameter values have to be met). These unique identification codes are automatically generated by the data-exchange web-platform.
- Latitude / Longitude = geographic coordinates of the PDC-point in decimal degrees (DD.dddddd)
- Locality = town / city where the PDC-point is located (drop-down list)
- NUTS code = geographic (area) code where the PDC-point is located (drop-down list)
- Volume = average volume per day in m³ calculated on the basis of a calendar year
- Frequency = number of samples per year
- DW = part of the water intended as **d**rinking **w**ater (in %)
- CW = part of the water intended as **c**ontact **w**ater (in %)
- IW = part of the water intended as **i**ncorporation **w**ater (in %)
- SW = part of the water originating from **s**urface **w**ater (in %)
- GW = part of the water originating from **g**round **w**ater (in %)
- Catchment = description of the type of water source catchment area (drop-down list)
- PDC characterisation = description of the type of sampling point (drop-down list)
- Justification demand for change = reason for request to change the parameterisation of the PDC point (only for future adjustments and not applicable for an initial PDC point)
- Comment = empty field for adding comments or specifications such as the geographic coordinates of the sampling if not executed on the location of the actual PDC-point; data/information are separated by a semicolon

Clarifications regarding the data to be delivered:

- PDC Sample ID: These unique identification codes are generated automatically by the data-exchange platform and can then be exported with the full auto-control programme
- Locality, NUTS Code: fields must not be empty; default values will be generated when creating the PDC point on the web-platform (by its geographical coordinates). If the given "default" value is not correct, another value can be selected via a "drop-down" list
- Volume and Frequency: fields must not be empty
- DW, CW and IW: fields must not be empty and contain values between 0 and 100 of which the sum equals 100
- SW and GW: fields must not be empty and contain values between 0 and 100 of which the sum equals 100
- Catchment and PDC Characterisation: fields must not be empty and must contain one single value of the "drop-down" list

On the spreadsheet, additional tabs for different fields are provided and clarify how these should be completed.

[43] **NOTE:** The template only serves to structurally note down the necessary data for yourself and cannot be uploaded; the PDC points must be entered manually one by one.

ANNEX 03

The template[44] for the registration and reporting of the radioactive measurements can be downloaded from the data-exchange web platform of the Agency (https://dxp.fanc.be) .

The spreadsheet for the measurements contains the following:

- PDC Sample ID = unique ID (identification) for the Point of Compliance (point where the parameter values have to be met)
- LIMS ID = supplier column where measurements can be linked to their ID within the laboratory information management system of the laboratory carrying out the measurement
- Locality Name = town/city where the PDC is located (drop-down list)
- NUTS Code = Geographic (area) code where the PDC is located (drop-down list)
- Catchment = type of water source catchment area (drop-down list)
- Latitude / Longitude = geographic coordinates of the PDC in decimal degrees (DD.dddddd)
- Accuracy Type = precise sampling point (= B) (drop-down list)
- Sample Type = type of sample / sample description (water) (drop-down list)
- Sample treatment = method used to treat / prepare the sample (drop-down list)
- Nuclides = nuclide or calculated TID (drop-down list)
- Apparatus Type = type of measuring equipment used to determine radioactivity (drop-down list)
- Begin Date = date on which sampling commenced (YYYY/MM/DD)
- Begin Time = time sampling commenced (HH:MM)
- End Date = date on which sampling ended (YYYY/MM/DD)
- End Time = time sampling ended (HH:MM)
- Less Than = if the measurement is less than the DL (detection limit), the "<" symbol is used and the DL is mentioned in the Activity Value column and the Uncertainty Value column stays empty
- Activity Value = measured value
- Value Type = mathematical description of the measured value (drop-down list)
- Measuring Unit = measured value unit (drop-down list)
- Uncertainty Value = error associated with the measured value
- Uncertainty Type = mathematical method by which the measurement errors were determined (drop-down list)
- Uncertainty Unit = measurement error unit (drop-down list)
- Laboratory = abbreviation of the laboratory carrying out the measurement(s)
- Supplier = abbreviation of the supplier from whom the sample was taken
- Comment = empty field for adding comments or specifications such as e.g. the geographic coordinates of the sampling if not executed on the location of the actual PDC-point, etc.; data and/or information are separated by a semicolon

[44] **NOTE:** In principle, the template for the radioactivity measurements is solely intended for the laboratories, unless the company wishes to encode and upload measurements itself.

Further details on the data to be entered:

- Locality Name, NUTS Code, Catchment: cells may not be empty and may only contain one value from the drop-down list
  REMARK: Fields may be empty if measurements are uploaded in the Agency's EDWD web platform. The fields are automatically filled in with the information linked to the PDC point of the submitted auto-control programme
- Latitude, Longitude: degrees expressed as decimal figures – these cells may not be empty
  REMARK: Fields may be empty if measurements are uploaded in the Agency's EDWD web platform. The fields are automatically filled in with the information linked to the PDC point of the submitted auto-control programme
- Accuracy Type, Sample type, Sample treatment, Nuclides, Apparatus Type: these cells may not be empty and must contain a value from the drop-down list
- Begin Date and End Date: may not be empty, format: YYYY/MM/DD. The end date is always later than or the same as the begin date (in general for a scoop sample, both dates are equal)
- Begin Time and End Time: may not be empty, format: HH:MM. The end time is always later than or the same as the begin time if the begin and end times are identical (in general for a scoop sample, both times are equal)
- Less Than: if < appears in this column, the Uncertainty Value column must remain empty and the Activity value column must contain the detection limit (DL)
- Value Type and Uncertainty Type: these cells may not be empty and must contain a value from the drop-down list
- Measuring Unit and Uncertainty Unit: these cells may not empty and must contain a value from the drop-down list
- Activity Value and Uncertainty Value: decimal numbers
- Laboratory, Supplier: these cells may not be empty and must contain their respective abbreviation/name
- Comment: if this cell contains different or multiple items, the values or text parts must be separated by a semicolon.

On the spreadsheet, additional tabs for different fields are provided and clarify how these should be completed.

When registering the auto-control programme proposal, and more precisely at the "Analysis Labo" section where laboratories that will carry out the radioactivity analyses on the water should be identified, the supplier can authorise the laboratories to upload the measurement data directly into the data exchange web platform. In this case, both the supplier and FANC will receive a notification of the platform system when new results are available/uploaded and which can be consulted and exported after login.