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Submission number: ZE831357-27

Subject: Request for additional information – answer (Communication number: AFA-C-2114568060-56-01/F)

General questions on the Application for Authorisation (AfA)

1. Given that the Sunset Date of sodium dichromate has already passed, under which existing AfA (and use number) is the ongoing use of sodium dichromate currently covered?

The company refers to AfA with number *REACH/20/5/5 - Use for surface treatment of metals (such as aluminium, steel, zinc, magnesium, titanium, alloys), composites and sealings of anodic films for the aerospace sector in surface treatment processes in which any of the key functionalities listed in the Annex is required*.

Questions on the CSR

2. Could you please clarify the training frequency of the workers involved in operations with exposure to sodium dichromate on working procedures and behaviour in order to minimise personal exposure and environmental release of chromium? Is it only at the incorporation at work or are they periodically retrained?

The training of the workers is performed at the incorporation at work, when the worker is associated with a new task or on the occasion of operational changes that may require new or different risk management measures. A meeting is held annually between the workers, the workers' safety manager, the head of the prevention and protection service, as well as the production manager (with responsibility for the environment, health and safety in the workplace). This meeting discusses topics related to health and safety in the workplace, with particular reference to exposure to sodium dichromate. The main critical issues related to the use of the substance and the related management measures to be followed in order to reduce exposure to the substance and the consequent risk are also recalled. Moreover, workers have the possibility to contact at any time the competent doctor for any information or doubt related to the task.

3. For most of the WCS you specify that as maximum 1-2 workers are trained and perform the task. Who is performing the tasks within a particular scenario if e.g. a person trained is sick and tasks need to be done? Would someone who was not trained be performing the tasks?

A total of #2 workers in the company are involved in the use applied for of sodium dichromate (CSR pg.26). These #2 workers are assigned to the various tasks in the numbers indicated in the CSR, however, precisely to cope with the scenario suggested in the question, they are trained for more than a task. In addition, only WCS2 and WCS3 are directly related to production, while the activities described by the remaining WCS are ancillary and can possibly be postponed if there is no availability of trained workers. It is also specified that the ancillary activities to the production are carried out with much less frequency than those related to production that are instead performed daily. In case of multiple absence of workers, a temporary stop in the production is evaluated.
Tasks that involve sodium dichromate can be performed only by trained workers.

4. Please specify how many shifts the company has in 24 hours.

In the 24h the company has only one shift of 8h.

5. Why is there such a great difference (3 orders of magnitude) in inhalation exposure as 8 h TWA in WCS 4 (ES1) Maintenance and repair: 3.97 E-03 µg Cr(VI)/m3 and WCS 1 (ES 3) Maintenance and repair: 3.18 E-06 µg Cr(VI)/m3, in spite of the fact that the working procedures are very comparable? What difference was in the input parameters in ART 1.5 modelling to result in such a great difference?

WCS4 (ES1) refers to the industrial use of the substance and is the task performed by Robur workers on malfunctioning GAHP (i.e. those not passing QC). This activity is an R&D activity to study and possibly eliminate any issue in the manufacture of the product. The activity can be performed in a closed cell or outdoor (the last has been considered as the worst case). For this reason, priority has been given to this aspect in the modelling, even if the same recovery solution device used in CS1 (ES3) is used. It is acknowledged that this represents a worst-case approach.

CS1 (ES3) is an activity performed at the consumer's site when GAHP are malfunctioning. This operation is only performed indoor and also uses Robur's recovery solution device

As summarized below, both activities have the same duration, use the same devices, deal with the same concentration of the substance and apply the same PPE. Nevertheless, the conditions are different regarding the general control measures, also linked to the site where the task is performed (indoor vs outdoor)
Details of the input of the models, summarized below, can be also seen in the modelling reports, attached to the CSR in Annex II. Differences are in **bold.**

ES 1- CS 4	ES 3 – CS 1
Product (article) characteristics	
▪ Concentration of substance in mixture: 1.05 % w/w sodium dichromate *Concentration of substance in the refrigerant solution (max) = 1.048% w/w (corresponding to 0.42 % w/w Cr (VI). This is a worst case, since Cr (VI) is progressively passivated to Cr (III) during use of the unit.*	▪ Concentration of substance in mixture: 1.05 % w/w sodium dichromate *Concentration of substance in the refrigerant solution (max) = 1.048% w/w (corresponding to 0.42 % w/w Cr (VI). This is a worst case, since Cr (VI) is progressively passivated to Cr (III) during use of the unit.*
▪ Substance product type: Liquid	▪ Substance product type: Liquid
▪ 0.000001 Pa at 20 °C (Set to minimum because not relevant for inorganic substances, also in line with RAC 2005)	▪ 0.000001 Pa at 20 °C (Set to minimum because not relevant for inorganic substances, also in line with RAC 2005)
▪ Fraction in the liquid mixture (to evaluate exposure to mist): 0.0105	▪ Fraction in the liquid mixture (to evaluate exposure to mist): 0.0105
▪ Viscosity of the substance/preparation: Liquids with low viscosity (like water)	▪ Viscosity of the substance/preparation: Liquids with low viscosity (like water)
Amount used (or contained in articles), frequency and duration of use/exposure	
▪ Non exposure-period: 420 min	▪ Non exposure-period: 420 min
▪ Duration of activity: 60 min *This represents the total time needed to perform the task. The operation takes place* [redacted] *and is*	▪ Duration of activity: 60 min *This represents the total time needed to perform the task. The operation takes place <=40 days/year*

ES 1- CS 4	ES 3 – CS 1
repeated very limited times a year.	
Technical and organisational conditions and measures	
▪ Process temperature: Room temperature (15 – 25 °C)	▪ Process temperature: Room temperature (15 – 25 °C)
▪ Primary emission source located in the breathing zone of the worker: Yes	▪ Primary emission source located in the breathing zone of the worker: Yes
Conditions and measures related to personal protection, hygiene and health evaluation	
▪ General control measures in close proximity of the near-field emission source: **no LEV (operation is performed outdoor)** ▪ **Note: This parameter could have been set to: "*Containment – no extraction – high level of containment*", as the extraction of the refrigerant liquid is performed by the same recovery solution device applied in CS1 (ES3). Nevertheless, to highlight the difference in indoor vs outdoor activity, the current settings (no LEV, outdoor) have been used.**	▪ General control measures in close proximity of the near-field emission source: Containment – no extraction – **high level of containment** *The extraction of the refrigerant liquid is performed by a recovery solution device* secondary control measures: none
▪ Is the process fully enclosed and is the integrity of that enclosure regularly monitored? Yes. [redacted] Blank #1 [redacted].	▪ Is the process fully enclosed and is the integrity of that enclosure regularly monitored? Yes. *The extraction of the refrigerant liquid is performed a recovery solution device,* [redacted] Blank #1 [redacted]
▪ Site: **outdoors** (close to buildings) *The task can be performed also indoors, inside a closed cell with forced ventilation. This is a better case compared to the outdoor scenario, as detailed in the model in Annex 2: Modelling results – ART.*	▪ Work area: **Indoors** ▪ Room size: **Any size room**
▪	▪ Ventilation rate of the general ventilation system in the work area? Only good general ventilation
▪	▪ Are general housekeeping practices in place?Yes
▪ Are secondary sources present in the workroom in addition to the source in the breathing zone of the worker? No	▪ Are secondary sources present in the workroom in addition to the source in the breathing zone of the worker? No
▪ Respiratory protection: Yes [APF 4] *Note: RPE is a required PPE for this task due to exposure to ammonia solution and is therefore applied to this scenario, using the lowest APF for the mask already in use*	▪ Respiratory protection: Yes [APF 4] *Note: RPE is a required PPE for this task due to potential exposure to ammonia solution and is therefore applied to this scenario, using the lowest APF for the mask already in use*
Other conditions affecting workers exposure	
▪ Activity class: Handling of contaminated objects *(i.e., coupling and decoupling of hoses, maintenance of pumps, evaporation from object, handling of contaminated tools)*	▪ Activity class: Handling of contaminated objects *(i.e., coupling and decoupling of hoses, maintenance of pumps, evaporation from object, handling of contaminated tools)*
▪ Activities with treated/contaminated objects	▪ Activities with treated/contaminated objects

ES 1- CS 4	ES 3 – CS 1
(surface 1 – 3 m^2)	(surface 1 – 3 m^2)
▪ Level of containment of the surface of the object: contamination < 10% of surface	▪ Level of containment of the surface of the object: contamination < 10% of surface

Despite the difference in exposure, the same PPE have been applied to both scenarios (using the lowest APF for the mask already in use), as RPE is a required PPE for this task due to potential exposure to ammonia solution.

6. What procedures and organizational risk management measures are included in the General good occupational hygiene practices, which are listed in the Succinct summary of representative risk management measures (RMMs) and operational conditions (OCs)?

These are the main general good occupational hygiene practices:

- Workers can Smoke, eat, and drink only in designated areas away from areas where hazardous materials are used or stored. Lunch can only be made in the company canteen;
- Workers are sensitized to keep their clothes clean and in good condition;
- Workers are sensitized to maintain order and cleanliness in their workstation;
- Working clothes are substituted twice a year at least and upon workers request (when broken/damaged);
- Workers have at their disposal changing rooms where they can change and keep their civilian clothes separate from their work clothes
- Workers have adequate toilets including sinks and showers;
- Workers are sensitized to wash their hands before eat, drink and smoke as well as at the end of the shift;
- The working areas, including production areas, are equipped with heating and cooling system;

The company is currently implementing a UNI EN ISO 45001 occupational health and safety managing system with the aim to obtain the certification in Q1 2022.

In addition, it is specified that the Company is engaged in different health-related projects for the workers.

Indeed, the Company launched a project to help workers quit smoking. Workers willing to quit can call an anonymous number to get in touch with subject experts. The company participates in the cost of the operation.

Also, to increase the consumption of heathy food, the Company canteen serves only fresh food and vending machines indicate for each product its content in terms of cholesterol and sugars.

Finally, the Company encourages a healthy lifestyle by promoting the use of stairs and bicycles with the use of opportune signs, by the creation of an internal bicycle parking and by allowing flexible entry times.

7. The LoQ of the method used for measuring the concentration of Cr(VI) in air for monitoring stack emission is 0.002-0.003 mg/m3 (Table 3, page 11). However, the LoQ of the method used for measuring the concentration of Cr(VI) in the working environment is 0.00002 mg/m3 (page 17). Could you explain why there is a difference of 100 times between the two?

The difference between the two LoQs is to be searched in the different volume of air sampled. The LoQ indicated in the CSR is referred to a concentration, so the duration of the sampling and

the flow rate of the pump, that influence the volume of air drawn in by the pump, are variables that influence the LoQ. The stack emission sampling was performed for an overall duration of about 1,5 hours (as provided by Italian law) while personal and static sampling in the workplace was performed for a longer duration in order to achieve LOQ values below 10% of the ACGIH TLV—TWA for CrVI (for occupational health and safety purposes).

8. The results of biological monitoring measuring total chromium in urine were provided in the CSR (page 21) for one worker working in WCS1, WCS2, WCS 3, WCS 4 and WCS 6, in total for 5 workers exposed to sodium dichromate. In addition, concentration of chromium was also measured in 6 non-exposed workers. The samples of urine from each exposed and non-exposed worker were taken at the beginning of the shift and at the end of the shift. The sampling of urine was repeated 3 times for each worker. Please provide contextual information for these data. In particular, when the samples of urine were taken for all tested workers, if the samples were taken on three consecutive days, and what was the method used for determination of chromium in urine? On page 22, biomonitoring data from exposed workers in different WCS were aggregated. Nevertheless, since each of those workers are only performing one task, data should have been analysed separately. Could you elaborate in this issue?

Urine sampling was taken at the beginning and at the end of the working shift in three not consecutive different days: 2020/12/01, 2020/12/03, 2020/12/16. Chromium in urine was detected using ICP-MS analytical technique.

In the following table, as requested, the results of the biomonitoring are summarized and analysed separately for each task, including “not exposed” workers.

WCS/NE	1st repetition (µg/l)			2nd repetition (µg/l)			3rd repetition (µg/l)			increasing during shift (mg/l)			BEI	Beginning of Shift			End of Shift			BEI
	BoS	EoS	increasing	BoS	EoS	increasing	BoS	EoS	increasing	MAX	min	mean		MAX	min	mean	MAX	min	mean	
WCS 1	#2	#2	#2	#2	#2	#2	#2	#2	#2	#2	#2	#2		#2	#2	#2	#2	#2	#2	
WCS 2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
WCS 3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	10	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	25
WCS 6	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
WCS 4	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
NE #1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
NE #2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
NE #3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
NE #4	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	10	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	25
NE #5	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
NE #6	#2	#2	#2	#2	#2	#2	#2	#2	#2	#2	#2	#2		#2	#2	#2	#2	#2	#2	

Where:

- WCS 1: Loading and mixing of the aqueous 17.5% w/w sodium dichromate solution into a closed equipment with demineralised water (PROC 3)
- WCS 2: Filling of the solutions (sodium dichromate and ammonia solutions) in the circuits of the gas absorption appliances (PROC 8b)
- WCS 3: Testing of the gas absorption (GA) appliances (PROC 3)
- WCS 4: Maintenance and repair: emptying of the refrigerant solution by recovery solution device from the sealed circuits in the gas absorption appliances not passing quality control (PROC 8b) (covering also PWS1 – ES3)
- WCS 6: Cleaning of malfunctioning GA appliances elements before analysis (PROC 20)
- NE: Not exposed

As for the data presented in an aggregated way, the above data show that all measured values are below the limits defined by the ACGIH, both as regards the absolute end-of-shift value and the increase in chromium in the urine during the shift. It is also observed that the values measured in exposed workers are equivalent to those of workers not exposed to chromium

9. It is stated in the CSR (page 11) that "in order to quantify the possible presence of chromium VI in emissions into the atmosphere, samples were carried out at stacks equipped with a sampling line" during "filling the GA appliances circuit with the Cr(VI) solution in the dedicated cab" (WCS 2) and "Cleaning of malfunctioning parts in the dedicated cab" (WCS 6). The samples were carried out in December 2020 in three repetitions as required by current legislation. Please provide more information on the pathways of exhaust air from the room/cabins where the operations with sodium dichromate at your production site are performed and local or general ventilation of these rooms. Please, also provide justification why the measurement done at the stacks/chimneys during two working contributing scenario (WCS 2 and WCS 6) cover all emissions of chromium to air at your production site?

Sampling of the emissions was performed in the only two locations in which the stacks are equipped with a sampling line as required by the environmental authorisation issued to the Company. These correspond to the WCS2 and WCS6, where the air is let through an exhaust chimney to the outside of the building, where workers have no access. Other tasks described by the other WCSs are performed in closed cabin with air extraction (WCS3), in areas with natural ventilation (WCS1), outdoor (WCS4) or a combination of these situation (WCS5 can be performed in all areas where other WCSs are performed).
As described above, WCS2 and WCS6 are the only measurable emissions. In order to estimate the potential emission of other tasks, samplings of the working air in the very proximity of the source were performed. All of these samplings showed values < LOQ. All activities are performed in a closed system, only WCS6 is performed while the circuit is open (water flowing in the GAHP element) and so it is expected to cause the higher emission of the substance. To verify this, three series of sampling on the emission stack, on the worker and in the cabin where the operation is carried out were performed. All of these samplings showed values < LOQ indeed it was impossible to prove the estimation of the higher value potentially emitted in WCS6.
Hereafter are presented all the conditions in which the tasks are carried out:

WCS name	***Details on the task and conditions***	***Comments***
WCS 1 - Loading and mixing of the aqueous 17.5% w/w sodium dichromate solution into a closed equipment with demineralised water (PROC 3)	Handling of the sealed container Manual connection of a valve to the original tank and overpowering of the automatic mixing process	This task is performed in an essentially closed system (system is open only when twice a year, the operator connects the pump to the original tank, but the valve is designed to minimize leakage). No stacks or aspiration systems going to the external environment are present, only natural ventilation
WCS 2 - Filling of the solutions (sodium dichromate and ammonia solutions) in the circuits of the gas absorption appliances (PROC 8b)	Manual connection of the hoses to the GA appliances circuit, supervision of the filling process. The filling process is performed in a closed cabin (worker supervises from outside the cabin) with LEV and emission with stack	Stack emissions, that led the air outside the building, have been measured and are <LOQ
	Manual connection of the hoses to the GA appliances circuit, supervision of the testing process. The testing	This task closely resembles WCS 2 and emissions to the environment are therefore comparable and

WCS name	*Details on the task and conditions*	*Comments*
WCS 3 - Testing of the gas absorption (GA) appliances (PROC 3)	process is performed in a closed cabin (worker supervises from outside the cabin) with LEV and emission without measurable stack	<LOQ. Environmental static sampling performed into the cabin shows values < LOQ.
WCS 4 - Maintenance and repair: emptying of the refrigerant solution by recovery solution device from the sealed circuits in the gas absorption appliances not passing quality control (PROC 8b)	Removing the solution from the GA appliances by recovery solution device, cutting the circuit, removing of the malfunctioning part and substituting it, sealing of the circuit and refilling of the solution by the recovery solution device. The operation was performed outdoor	The operation is performed outdoor but using a recovery solution device, which minimizes the emission to the environment making them negligible as demonstrated by the personal and static sampling (< LOQ)
WCS5: - Maintenance and cleaning of the equipment in contact with sodium dichromate (PROC28)	Cleaning of potentially contaminated equipment and inside the cells used for filling and testing. Max 5 days/year	This operation is performed a maximum of 5 days/years and does not involve the direct use of sodium dichromate. Only residues of the substance might be present (given that spills are immediately removed). A negligible air concentration of sodium dichromate is expected in air indoor and an even lower emission to the environment
WCS 6 - Cleaning of malfunctioning GA appliances elements before analysis (PROC 20)	Cutting the malfunctioning element to allow the flowing of water, connecting the water hose to the element and washing of it (water flowing in the element)	Stack emissions, that led the air outside the building, have been measured and are <LOQ

Analysing the operating conditions and risk management measures reported above, it appears that WCS6 can be considered the scenario with the highest predictable emission of substance. This is mainly due to the use of an open system for cleaning malfunctioning elements. Considering instead that in the remaining WCSs the activities are carried out in closed systems or for extremely limited durations and frequencies, it is considered that their contribution to the total emissions is irrelevant compared to that made by WCS6. The sum of the measured contributions (WCS2 and WCS6) was therefore considered as representative of the entire emissions into the atmosphere.

In conclusion, it is also noted that there is no threshold value (PNEC) for hexavalent chromium in air (moreover, the environmental risk assessment is not relevant for the AfA of this substance) and that the contribution to the assessment of exposure "man via environment" is negligible (systemic RCR<0.01 and ELR 10-9).

10. It is stated in the CSR that a combined emission in the air coming out at stack is Cr(VI) < 0,003 mg/m3, but since a daily volume of this air is not provided it is not possible to calculate emission to air during a day or year. In addition, this concentration is higher than in the working

environment – 0.02 µg/m3. Could you please provide a reasonable estimate of the amount of Cr(VI) released daily to air?

Considering that the company works on one shift/day, the total daily amount of Cr(V)I emitted in air by the two stacks can be calculated by multiplying the measured mass flow for the duration of the daily shift:
0.022 g/h*8h=0.176 g/day=0.000176 kg/day=1.76 E-04 Kg/day
This value is calculated considering the worst case of the stack related the emission of WCS6 (the LOQ of WCS2 is one order lower than LOQ of WCS6).

A comparison between the value in the working environment and that in the air coming from stacks cannot be made since both values are (as a worst case) set to the LOQ and the LOQ is different in the 2 cases (see reply to point 7 for more details).

11. Please note that an emission factor to air for substances with vapour pressure below 1Pa equal 0.00005 (1 E-5) is only foreseen in EU Technical Guidance Document on Risk assessment in IC = 8: METAL EXTRACTION, REFINING AND PROCESSING INDUSTRY so your reference in Table 10 of the CSR "the release factor to air was defined according to the TGD Part II, Appendix I. For Corrosion inhibitors the TGD, by default, allocates a release factor to air of 1E-05. (EUSES Industry Category (IC) = 15/0, others EUSES Use Category (UC) = 14, corrosion inhibitors EUSES Main Category (MC) industrial use = III, non-dispersive use)" could not be found. Please provide a clear reference.
The guidance Technical Guidance Document on Risk Assessment, Part II, section 3, reports in Annex I, the following table (table A3.16) which allocates as a default release factor of 0.00001 for "other" (IC 0), "industrial uses", MC3 (non-dispersive uses), in the case of a concentration >=1000 mg/L (i.e. 0.1%) and a Vapour pressure <10 Pa. Please see the screenshots below. This has been used for the assessment, as also emission data support a very low release to air of the substance (<LOQ).

IC = 0: OTHERS

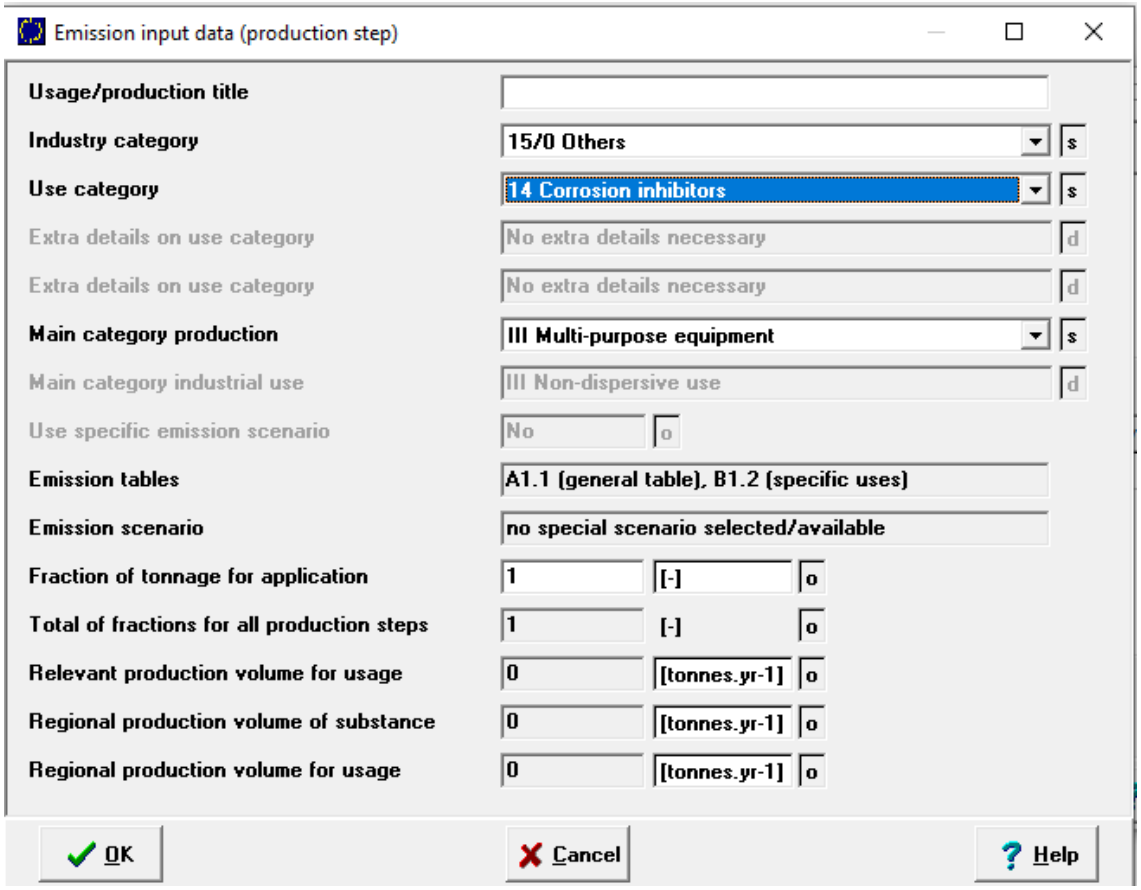
PRODUCTION	Table A1.1
FORMULATION	Table A2.1
INDUSTRIAL USE	Table A3.16

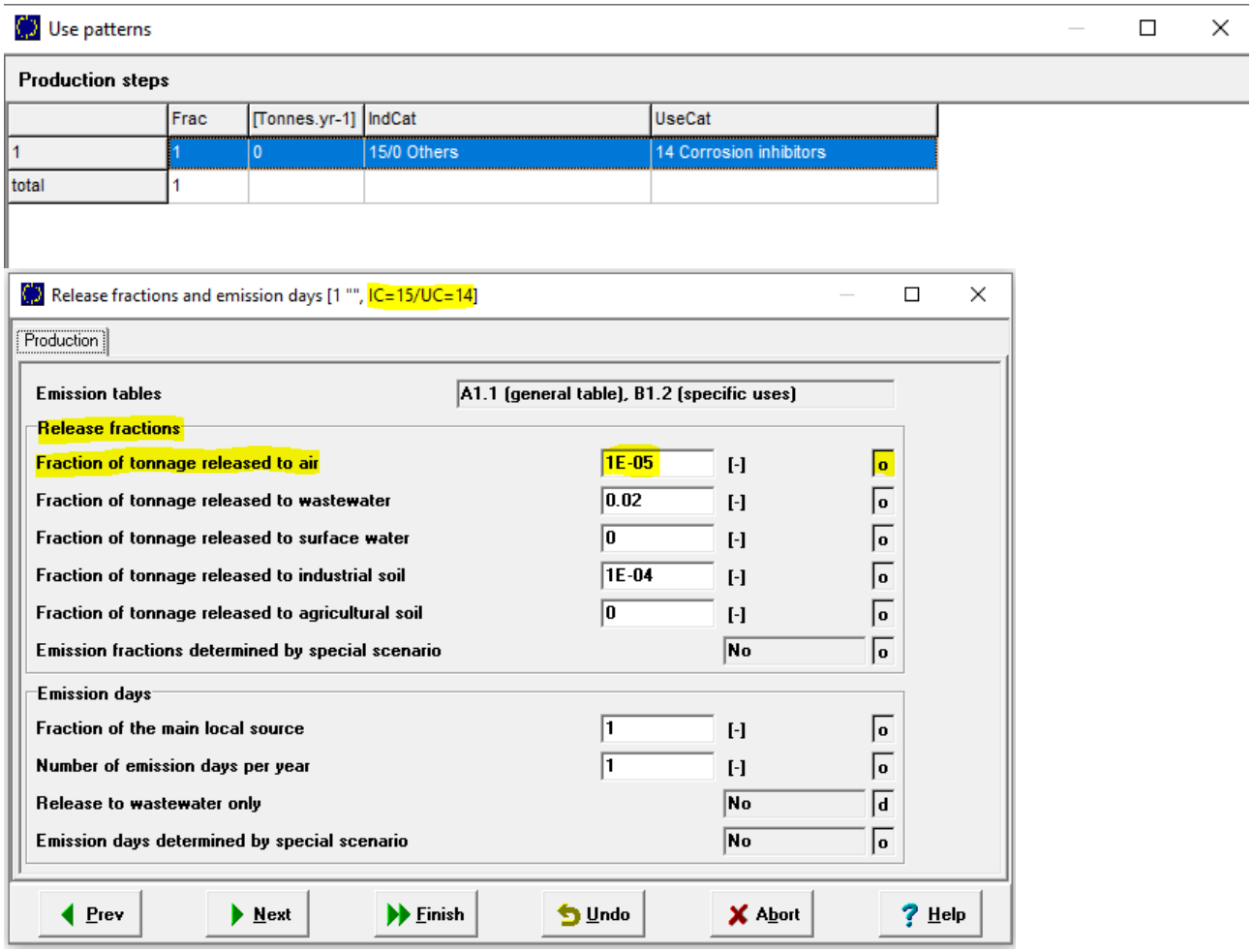
INDUSTRIAL USE Table A3.16

Compartment	Conditions Sol. (mg/l)	Vap. (Pa)	Emission factors MC=2	MC=3 [1)]	MC =4
Air	<100	<10	0.0001	0.001	0.01
		10-100	0.001	0.01	0.1
		100-1,000	0.01	0.1	0.25
		1,000-10,000	0.1	0.5	0.7
		≥10,000	0.5	0.75	0.9
	100-1000	<10	0.00001	0.0001	0.001
		10-100	0.0001	0.001	0.05
		100-1,000	0.001	0.05	0.1
		1,000-10,000	0.05	0.1	0.5
		≥10,000	0.25	0.5	0.75
	≥1,000	<10	0	0.00001	0.0001
		10-100	0.00001	0.0001	0.001
		100-1,000	0.0001	0.001	0.01
		1,000-10,000	0.001	0.01	0.1
		≥10,000	0.01	0.1	0.5

1) Default

The following input has been used in EUSES 2.1.2, where the general table A1.1 and table B1.2 (specific uses) are selected. Such input correspond, as shown in the screenshot below, to the above mentioned default releases (note: release to water and soil have been modified to 0, according to the reasoning described in the CSR):





12.How are work out or abandoned appliances taken care of? Is it possible for the refrigerant solution to be spilled to the environment? Sodium dichromate is a substance of environmental hazard, although it is, in this sense, not included in REACH Annex XIV.

When a GA appliance stops working and the owner decides to get rid of it, there are some possible solutions:

- the owner disposes of the equipment directly by contacting an authorized disposal centre;

- the owner contacts ROBUR who collects the appliance free of charge by sending it to authorized disposers (the appliance is treated as a waste electrical and electronic equipment-WEEE)

Obviously, the company does not abandon non-functioning equipment but fixes it, as indicated in the AfA, or sends it for external disposal. In the unlikely event that a customer abandons a device, the solution would remain inside the sealed circuit. Only after several years the external corrosion could affect the metal circuit causing a leak of the refrigerant solution, however it is very likely that the entire content of sodium dichromate has in the meantime already reacted with the metal of the inner surface reducing to chromium (III). In addition, corrosion runs slower in turned off GA appliances than in functioning ones because of the different GA appliance temperature of the solution. Also, it would be likely that after several years the abandoned would be recovered and properly disposed. The refrigerant solution is contained in a sealed circuit tested with several trials (see answer 13).

The appliance user manual clarifies that the GA appliance and its related accessories must be disposed in accordance with the regulation in force:

DISPOSAL
The appliance and all its accessories must be disposed of separately in accordance with the regulations in force.

[redacted]

Use of the WEEE symbol (Waste Electrical and Electronic Equipment) indicates that this product cannot be disposed of as household waste. Proper disposal of this product helps to prevent potential negative consequences for the environment and human health.

The user manual also clarifies to contact the manufacturer in order to dispose of the appliance:

Decommissioning and disposal

If the appliance is to be disposed of, contact the manufacturer for its disposal.

13.How are spillages of the refrigerant solution from accidentally broken appliances in use (at the customer site) treated? Are there any construction measures against leakage of the solution to the ground?

The GA appliances are hermetically sealed and cannot be intentionally opened or easily poked/broken accidentally. In any case, in the event of damage, significative exposure is very unlikely for the following reasons:

- The cooling unit has an additional safety feature: if pressure inside the system is too high (therefore leading to the opening of the safety valve to release gas, containing Cr (VI)), a safety additional circuit is opened to let pressure lower and avoid the security valve opening, till the system re-balances. This further lowers the chance of Cr (VI) release by the GA appliance.
- All cooling units undergo several tests to verify they are hermetically sealed during homologation, including test according to Directive 2014/68/UE (PED), [redacted] Blank #3 [redacted]
- most of the Cr(VI) contained in the cooling liquid is transformed to Cr(III) during the first year of operation, therefore exposure to Cr (VI) would be drastically lowered.

In order to prevent any contamination of permeable areas in the unlikely event of a breakage with spillage, as also provided for in the use and maintenance manual, the equipment must be installed on a concrete base:

(1) - installation at ground level

► Failing a horizontal supporting base, make a flat and level concrete base, at least 100-150 mm larger than the appliance size per side.

Questions on the AoA and Substitution Plan

Functions of sodium dichromate:

14. Resulting from the use of sodium dichromate, the AoA mentions that the GAHP has a long average product life, which is stated to be longer than the average life of other "products of the same category" (p. 49). The AoA provides a confidential figure of the GAHP machine life (p.68), which cannot be referred to in the public opinion document.

a. What are these "products of the same category" and how long is their typical product life? Please provide non-confidential ranges for any confidential figures.

In the following table the products of the same category are reported with a non confidential range of their product life.

Robur products that contain sodium dichromate as anti-corrosion agent	
Heat Pumps	**Average product life (public range)**
K18	14-25 years
GAHP A	14-25 years
GAHP – AR	14-25 years
GAHP – GS	14-25 years
GAHP – WS	14-25 years
Integrated Packages	
GITIE' AHAY	14-25 years
GITIE' ARAY	14-25 years
GITIE' ACAY	14-25 years
CHILLERS	
GA ACF HR	14-25 years

GA ACF	14-25 years
GA ACF TK	14-25 years
GA ACF HT	14-25 years
GA ACF LB	14-25 years

b. Please provide non confidential ranges for the typical product life of a GAHP under use of sodium dichromate and without.

The typical product life of a GAHP under use of sodium dichromate is in range: 14-25years. while without sodium dichromate, as emerged from the tests conducted by Robur and indicated in AoA, the GAHP would have a life cycle reduced by 1/4 compared to the normal one as the circuit without corrosion inhibitor would be subject to sudden breaks.

c. What is the minimum acceptable service life of a GAHP and why? Please provide non confidential ranges for any confidential figures.

Based on "IMPACT ASSESSMENT Accompanying the document Commission Regulation implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for air heating products, cooling products and high temperature process chillers" the average service life of the electric machines is 15 years and 15.9 years of gas machines. The document "Mapping and analyses of the current and future (2020 - 2030) - heating/cooling fuel deployment (fossil/renewables) - Work package 2: Assessment of the technologies for the year 2012" reports an average life of the GAHPs of 20 years. In the report "Space and combination heaters - Review Study Task 4 - Technologies - Final Report" is reported that the efficiency and the service life of GAHP are affected by the type of use of the pumps: "*Heat pump manufacturers and associations state that there is no ground for increasing the default design temperature for heat pumps, because the results of Fraunhofer study (which are one of the reasons for this proposal) are not correctly interpreted. Moreover, it would give the wrong signal by implying that (non-LT) heat pumps would in principle be suited for high temperature heating systems. In addition, supply temperatures of 65 °C (at -10ºC outdoor) cannot be realised by many heat pumps; it will reduce both the efficiency and the lifetime of the product*."

15. As another important factor for substitution, the AoA mentions a confidential figure of the target production rate of non-condensable gases (p.71), which cannot be used in the public opinion document. Please provide a non-confidential range of this figure.

Estimated Target: non-condensable production: 0.01-1.5 cc/h

16. It is understood that more frequent technical assistance and maintenance activity cannot abate the effects of a lower-performing inhibitor – only replacement of corroded parts would help, but this would mean the service life of the product is shortened (compared to the product using sodium dichromate as an inhibitor). Please confirm.

If, against the above-mentioned understanding, there is an effect of service activity on corrosion avoidance, please specify what the typical frequency of these service activities (i.e., technical assistance and maintenance of appliances) would be for the GAHP when using sodium dichromate as an inhibitor and when not using sodium dichromate. And if there is a cut-off frequency for the service activity to still be economically feasible (which should not be surpassed for economic reasons), please provide the cut-off figure and non-confidential ranges for any confidential figures.

Robur confirms that more frequent technical assistance and maintenance activity cannot abate the effects of a lower-performing inhibitor – only replacement of corroded parts would help, but this would mean the service life of the product is shortened (compared to the product using sodium dichromate as an inhibitor).

Analysis of potential alternatives currently known:

17. In Tables 26 and 27 (AoA, p. 87 and 88) under No. 2, it says "Glycerin-Grafted Starch as Corrosion Inhibitor of C-Mn Steel in 1 M HCl solution", but under the same number in Tables 28 and 29, it says: "Solvent: glycerin (Gly), hydrochloric acid 37%, and sodium hydroxide."

Please clarify whether the alternative is considered as a corrosion inhibitor or solvent.

The correct alternative in table 28 and 29 is: Glycerin-Grafted Starch as Corrosion Inhibitor of C-Mn Steel in 1 M HCl solution. The term "Solvent: glycerin (Gly), hydrochloric acid 37%, and sodium hydroxide" is a mistake.

18. Cerium Nitrate is considered to be economically feasible and available, but the AoA indicates that "it requires a long period to evaluate if it could reach the same technical key functionalities of sodium dichromate" (Table 27).

Please explain how long the expected assessment period is (compared to other alternatives) and why.

Robur is not able to define in this moment how long is the time require for the assessment of cerium compounds as a feasible alternative but based on the result of the test reported in the AoA it estimates a timeframe of minimum 8 years (research-testing-monitoring-identification), as indicated in the Substitution Plan (Phase 1 and 2).

19. The AoA states that sodium nitrite "could have a procurement cost such as to impact the final cost of the GAHP" (Table 26, No. 6, p. 88 of AoA). Similarly, in Table 27 on p. 90 it says: "At this time, it is not possible to understand if this substance is available on the market."

a. To SEAC sodium nitrite is known to be a low price and easily obtainable synthetic chemical similar to sodium dichromate. Please explain how you came to your conclusion.

The conclusion has been shared with the current suppliers of Robur.

b. It is also unclear why the applicant decides to terminate the investigation of this alternative in the context of GAHPs, given that the alternative substance is currently used as a corrosion inhibitor in cooling towers (Table 29). Please explain further.

The cooling towers represent a different and more complex system compared to GAHP circuits and it's impossible to determine a correlation between the effectiveness and efficiency as corrosion inhibitor in the cooling towers systems and the GAHP ones.

Substitution Plan (SP):

20. For most alternatives (Alternative 1, Alternative 2.1-2.5, Alternative 3), it is concluded in the AoA that the applicant needs to further study and evaluate the alternative.

a. Please explain what kind of information gathering and tests the applicant plans to conduct in the future to further study and evaluate the list of promising alternatives. If possible, could you please make a table with the more detailed course of action and foreseen tests for each promising alternative?

Alternative id	Activities and tests
1	• Literature search, information provided by customers, suppliers or competitors on possible alternative substances • Brainstorming of optimized control systems on the sealed circuit and possible reduction of the quantity of chromate inhibitor used in the units. • Consultation of several patent search databases • Planning and implementation of a testing prototype to achieve accelerated testing. • Validation of the prototype using the actual chromate inhibitor. • Start of HALT (High Accelerated Life Tests) tests also on GAHP units using reduced chromate inhibitor in parallel with validation of the testing prototype. • Start of life tests on GAHP units using the best solution found during previous testing campaigns. • Life tests surveillance also on GAHP units using reduced chromate inhibitor. • Tests are carried out to evaluate the effectiveness and efficiency of the potential alternatives. • First field tests will be carried out on internal Robur test plants consisting of Robur GAHP units.
2.1-2.5	• Literature search, information provided by customers, suppliers or competitors on possible alternative substances • Brainstorming of optimized control systems on the sealed circuit and possible reduction of the quantity of chromate inhibitor used in the units. • Consultation of several patent search databases • Planning and implementation of a testing prototype to achieve accelerated testing. • Validation of the prototype using the actual chromate inhibitor. • Start of HALT (High Accelerated Life Tests) tests also on GAHP units using reduced chromate inhibitor in parallel with

	validation of the testing prototype. • Start of life tests on GAHP units using the best solution found during previous testing campaigns. • Life tests surveillance also on GAHP units using reduced chromate inhibitor. • Tests are carried out to evaluate the effectiveness and efficiency of the potential alternatives. • First field tests will be carried out on internal Robur test plants consisting of Robur GAHP units.
3	• Literature search, information provided by customers, suppliers or competitors on possible alternative substances • Brainstorming of optimized control systems on the sealed circuit and possible reduction of the quantity of chromate inhibitor used in the units. • Consultation of several patent search databases • Planning and implementation of a testing prototype to achieve accelerated testing. • Validation of the prototype using the actual chromate inhibitor. • Start of HALT (High Accelerated Life Tests) tests also on GAHP units using reduced chromate inhibitor in parallel with validation of the testing prototype. • Start of life tests on GAHP units using the best solution found during previous testing campaigns. • Life tests surveillance also on GAHP units using reduced chromate inhibitor. • Tests are carried out to evaluate the effectiveness and efficiency of the potential alternatives. • First field tests will be carried out on internal Robur test plants consisting of Robur GAHP units.

b. If possible, please indicate in which packages and sequence alternatives will be assessed (during Phase 1-2). Are there alternatives that can be assessed in parallel (i.e. as a package) and for those that will be assessed sequentially, which ones have higher priority (i.e. will be studied first)?

Robur intends to test the alternatives in the following sequence: alternative 3, alternative 2.1-2.5, alternative 1. The alternatives 2.1-2.5 will be assessed as a package.

21. It seems that the whole first year in Phase 3 is allocated to the choice of the single best alternative and final testing on the corresponding product. In contradiction to this, it is indicated on page 14, section 2.1.3 of the SP, that one single best alternative should be more or less known in the end of Phase 1.

a. Please clarify when (at the earliest) the decision concerning the single best alternative can be made.

At the beginning of the Phase 2 of SP, Robur will be able to choose the best 3 alternatives to be tested in the following years. Only at the end of this testing period (4 years), Robur will choice the best alternative to be used for the next phase concerning product development (Phase 3).

b. Please explain why the technical checks of the best alternative(s), the performance comparison to the use of sodium dichromate and the evaluation of patent registration (currently indicated for 2029 / Phase 3) cannot occur earlier, e.g. in parallel to the accelerated testing or internal field tests (in Phase 2).

Some activities such as the performance comparison will be carried out both in Phase 2 and Phase 3. The difference is that during the Phase 2 the comparison will be carried out between all the 3 alternatives assessed, instead during Phase 3 the performance comparison will be between the best alternative chosen by Robur and the use of sodium dichromate. Robur based on the chosen alternative will evaluate if a new patent registration will be necessary.

22. Why is it required to test the product at customer facilities when there have been extensive external field tests already? How does the output of these activities differ?

The customer feedback is important because the products realized with the alternative inhibitors will be tested at the operative conditions of use of the customers (hours of use, customer indoor/outdoor temperature, etc) and the customers will be informed of the results of these tests.

The external tests are used both to enlarge the statistical sample (from a few units to a few tens\a hundred units) and to test its behaviour at different work conditions not all feasible internally (e.g. Low Delivery Temperature, 5 ° C, Delivery Temperature High 70 ° C; repeated on / off switches, different thermal load) and finally to test its behaviour in different system dynamic conditions. The conditions of external field tests will be the same to the conditions applied at customer facilities involved in the testing activities, but the results will be not shared with them.

23. Could the planning of the new production process take place in parallel to earlier steps, e.g. the testing of the new product at customer facilities?

It could be but Robur prefers to postpone the beginning of the planning of the new production process because each phase requires a specific economic budget and human resources that during the preparation of AfA has been evaluated following the Gannt attached to the SP.

24. Why does it take 1 year to implement the new production process and start selling the new product? And why is the disposal of the current production line included in the review period?

Based on activities carried out during the Phase 1, 2, 3, Robur has assessed that 1 year is the time sufficient to implement the new production process. Once reached the 100% of the production with alternative compared to the current one, Robur would dismantled according to Italian legislation (Legislative Decree n.152/06) the old production line. This activity was included in the SP because it will require a specific budget that Robur had to evaluate within the SP.

Question on the SEA

Confidentiality claims:

25. Some SEA figures have been provided as public ranges (e.g. Table 43) but for much of the AoA-SEA information that is considered commercially confidential by the applicant public ranges have not been included. In order for SEAC to discuss details of the application and justify conclusions about the importance of continued use in the public opinion document, it is essential to have at least non- confidential ranges that can be referred to.

Please provide non-confidential ranges for the following figures:

a. The number of exposed workers: public range 1-100

b. The number of workers at risk of job loss in the most likely NUS: public range 50-300

c. The turnover related only to products requiring the use of sodium dichromate. Public range 10-50M€ yearly

d. The turnover related to services and the sale of other products ("related market") connected to the products that are directly dependent on sodium dichromate. Public range: about 3-25% of the overall turnover

e. The turnover related to the total of all products and services sold by the applying entity. Public range 20-100M€

f. The profit related only to products requiring the use of sodium dichromate. Public range 0.5-3M€

g. The profit related to services and the sale of other products ("related market") connected to the products that are directly dependent on sodiumdichromate. Public range: 0.5-2M€

h. The profit related to the total of all products and services sold by the applying entity (only missing for the year 2020). Public range 2-5M€

i. Please confirm whether Appendix 5 including the financial reports 2018- 2019 can be considered commercially confidential and thus not already available as public records. If possible, please provide English versions ofthe financial reports.

The financial reports can be considered as not confidential. The English version is attached to this document.

Market and competition:

26. The application mentions two important competitors (Ariston and Dometic), both of which carry out similar production activity in the EU. In addition, it is indicated that GAHP producers located in China may respond to demand by EU customers and increase their market share in the EU market in the non-use scenario.

a. Please provide a list of known competitors and their market shares as estimated by Robur (including non-confidential ranges if applicable). If possible, please further indicate which of the identified competitors are relying on production facilities inside the EU and which competitors' production facilities are located outside the EU.

b. In light of the applicant's expectation regarding a distortion of the market and the prospect of increasing product prices in the NUS, please clarify which competitors are expected to increase their market share (other EU- based players vs. competitors producing GAHPs outside the EU) and explain how this would affect the prices of GAHPs available to EU-based customers.

Based on our information, the main producer of NH3 absorption GAHP is Chinese: Vicot (http://www.vicot.com.cn/english/index.html). It is the producer more similar than others to Robur in terms of technology used, type of products etc. to date. According to its website, it has no production sites in the EU.

Another competitor is Stone Mountain Technologies (https://stonemountaintechnologies.com/), a US company that had announced the launch of GAHP adsorption in the next time.

Concerning products similar to GAHPs, Ariston and Dometic are the two main European competitors with EU facility plants.

In the case of NUS, there could a market distortion and Ariston, Dometic and Vicot are the competitors that Robur expects to increase their market shares.

In particular, in the short term Vicot would act as a monopoly since produces the same articles of Robur. Instead in the medium term, Ariston and Dometic could recover market shares, but they need to modify their production lines.

27. According to available online information about heat pumps, there is a variety of different heat pump types available on the market (e.g. EHPA website). Are there technologies (GAHPs or other heat pumps) not requiring the use of sodium dichromate as an inhibitor and if yes, why (from a customer perspective) are these available products not considered to be suitable for use instead of those that currently require the use of sodium dichromate?

Based on our information, there are some models of heat pumps without sodium dichromate as corrosion inhibitor:

F-gas heat pumps: they are sources of fluorinated greenhouse gas (F-gas) emissions.

Ammonia heat pumps: they contain ammonia and have large dimensions. They are used especially for ice rinks because in this case the production of ice requires high energy power, very low evaporation temperatures and high efficency.

Human health impacts:

28. The CSR covers additional exposure scenarios for workers maintaining and repairing appliances and for consumers. Please consider if these potential impacts would need to be included in the monetarisation of health impacts (or the uncertainty analysis of health impacts) and if not, please explain why not.

As explained in par.5.4 of the AoA_SEA, concerning the exposure man via environment, this has been considered in relation to emissions only from ES1, since the emission source is limited to the industrial site of ROBUR. No emissions are foreseen from ES2 and ES3 for the reasons explained in par.9.2 and 9.3 of the CSR. Concerning the workers involved in maintenance and repair (ES3), this task is only performed by trained outside workers, acting following the company protocol with very limited frequency and the risk for local toxicity resulting from inhalation exposure and for systemic toxicity resulting from inhalation and dermal exposure is acceptable, as both calculated RCR is <0.01, monitoring data for inhalation exposure are all below the LOQ, not considering PPE and biomonitoring data suggest very low to negligible overall exposure to Cr (VI). It is difficult to estimate the maintenance and repair interventions necessary every year because this service is usually performed directly in Robur site (WCS 4 of ES1) and only, if necessary, this activity is done outside. For this reason, the monetisation of health impacts for this ES was not considered.

Non-use scenarios:

29. Page 99 of the AoA-SEA document says NUS 1 is the most likely non-use scenario (i.e. discontinuation of substance-dependent production at the Italian site and partial dismantling of the related infrastructure) but the costs cited in Table 43 etc. appear to include the closure and relocation of production, as mentioned in the context of NUS 3. Please clarify which NUS is the most likely NUS and, if applicable, why does the applicant anticipate relocation costs (AoA-SEA, p. 109).

NUS 1 is considered by ROBUR as the most likely applicable scenario for the reasons explained in par.6.4 of the AoA-SEA. As the relocation costs estimated by Robur are higher than the closure costs, as a precaution it was chosen to consider in table 43 the avoided relocation cost instead of the avoid closure costs.

30. Please clarify why NUS 1 (discontinuation of substance-dependent production) is considered to be the most likely consequence of non-authorisation, when the additional costs associated with relocation (NUS 3 compared to NUS 1) appear to be roughly comparable to less than 3 years of lost profit (according to the public range)3, which seems to suggest that relocation could potentially be attractive. Please also clarify the time scale involved – could some of the tasks identified in Table 30 not be carried out in parallel?

Even if the NUS3 (relocation) could be in terms of economic impacts more attractive than NUS 1 (downsizing), it has not been considered by ROBUR as feasible because in this scenario ROBUR will lose the "made in Italy" brand which is demanded worldwide with effects on its market position. Moreover, ROBUR excluded the NUS3 also because it is not a solution to reduce impacts associated to the use of the substance: the relocation outside EEA could lead a different approach of this use (maybe not required the authorisation) without the RMMs and OCs applied as a consequence of national and European legislation.

31. Why is item 1.1 N/A in Table 41, but included in Table 43?

Table 43 includes more detailed items than those in table 41 because in the continued use scenario there are more benefits than those reported in items of Table 41.

32. The SEA implies that resources used for the substitution of sodium dichromate would be impacted in the non-use scenario. Please explain this impact in more detail. Would costs incurred in adopting an alternative be experienced in both scenarios (continued use and no use)? What is the implied comparative saving in the continued-use scenario?

As explained in par.7.3, in the non-use scenario, due to loss of turnover and profit associate to GAHPs, ROBUR will be affected by a strong downsizing of its EU plant because it is expected that increased sales of other products will not offset the loss of turnover and profit associated with GAHP with sodium dichromate. This will affect the company capability to maintain the economic resources allocated in R&D division to search a viable alternative to sodium dichromate as anticorrosion agent in GAHPs.

In the applied for use scenario ROBUR will be able to follow as indicated in the substitution plan. The continued use scenario does not imply any comparative saving.

33. Please clarify how the decommissioning costs related to the plant modification and disposal of the old production line and equipment after successful substitution of sodium dichromate

(referred to in the SP, p. 11, 16) relate to the information in the SEA (especially the cost information summarized in Tables 41 and 43).

a. It seems that approximately equal amounts of decommissioning costs would be incurred in both the continued-use scenario and the non-use scenario (in both cases after 9-12 years). Please explain.

b. Similarly, it seems that previous investments in the old technology will not be further amortized in either case. Please provide further details on the reasoning and calculation of the avoided residual capital figure.

The decommissioning costs related to the plant modification and disposal of the old production line and equipment after successful substitution of sodium dichromate have been considered within the benefits of the applicant in the applied for use scenario as belong to the overall investments that ROBUR could maintain to implement the entire substitution plan.

These costs would be incurred in both continued use and non use scenario because the actual productive line will be dismantled in both cases: in applied for use scenario it will happen only at the end of the implementation of the new productive line with alternative, while in the non-use scenario ROBUR won't have economic resources in short and the medium term to dismantle the current productive line, because this activity requires an annual financial provision, estimated 30-70k€/year.

In both scenarios, the previous investments in the old technology will not be further amortized because as explained in ECHA guidance for the socio-economic analysis-authorisation, par.3.3 the residual capital value has not included the previous investments in old technology in case of the implementation of a new production process. The residual capital value reported in the SEA is calculated based on other investments not strictly connected to the old productive line (e.g. building, equipment, infrastructure etc.), but that could be lost in non-use scenario.

34. Profit loss – is this figure for the products no longer produced at the plant, if the AfA is not granted? Is any of this lost production likely to be shifted to another site, outside the EEA?

The profit loss is associated to the products no longer produced at the plant. It is not possible to be shifted to another site for ROBUR policy and the reasons explained in point 30.

35. The SEA calculates the value of saved CO2 emissions related to the use of GAHPs.

a. Please provide further details of the valuation approach used to value CO2. Confidential Appendix 4 refers to the market price of CO2 certificates (price of the European Emission Allowance-EUA certificate for EU ETS) but it is unclear what these values relate to or how they are derived.

The approach used to value saved CO2 emissions is the following:

- The value of CO2 saving for each GAHPs has been calculated by ROBUR considering that each GAHP can save 2.165 m3 of natural gas every year and 1 m3 of natural gas produces 1.94 Kg of CO2, assuming 1,000 hours of operation per year.
- To calculate the overall tons of CO2 avoided due to GAHPs installed, the total number of ROBUR GAHPs sold yearly (of the last 5 yrs.) worldwide has been considered. Then these figures have been multiplied for the value of CO2 saving for each GAHP
- The costs for the base year (2020) have been calculated multiplying the average market price of CO2 certificates in 2020 (25€/ton CO2) and the tons of CO2 saved associated to GAHPs sold by ROBUR in EEA in 2020.
- The costs for 2021 have been calculated considered the minimum and maximum values of the market price of CO2 certificates in the last 3 years (20 and 40€/ton CO2) and the average tons of CO2 saved in the last 5 years associated to GAHPs sold by ROBUR (3581 tonn CO2 saved), considering a discount factor of 4%.
- The costs for other years of the review period have been calculated considered the costs

of the previous year discounted of 4% and minimum and maximum values of the market price of CO2 certificates in the last 3 years (20 and 40€/ton CO2).

- Then the costs associated to each year are summed to give the overall costs associated to CO2 emission saved over the review period due the installations of ROBUR GAHPs in EEA.
- This calculation does not include the amount of CO2 saved every year due to previous installations of GAHPs, so the overall costs are underestimated. Moreover, only the CO2 emissions saved for installations in EEA of GAHPs have been considered since it has been used the price of the European Emission Allowance-EUA certificate for EU ETS.

The value of the market price of CO2 certificate has been extrapolated by this website https://ember-climate.org/data/carbon-price-viewer/, as reported in Appendix 4.

b. Please clarify if the impact of saved CO2 emissions would still occur if competitors (inside or outside the EU) are assumed to take over the applicant's market share in the NUS and work towards continued availability of the technology to customers.

ROBUR doesn't know the real efficiency real installed appliances and saved CO2 emissions associated to GAHPs realized by current competitors. For this reason, Robur is not able to evaluate if these saved emissions would still occur in case of not-granted authorisation.

36. What would be the consequence/impact of a review period less than the 12 years requested?

ROBUR requires a 12-years review period for the reasons listed in par.7.7 of the AoA-SEA. A shorted review period would be not enough to implement all activities described in the Substitution Plan, that ROBUR considers necessary to replace effectively the substance without significant socio-economic impacts for the company and other actors.

37. Please provide all excel files used to calculate economic, social, environmental and health impacts. Where applicable, confidentiality of contained information should be indicated in the file name (e.g. "socio-economic impacts_confidential", "environmental and health impacts_confidential").

The following xls files are attached to this document:

Appendix 1-Market and business trend for ROBUR_confidential
Appendix 2-Expected costs for Substitution plan_confidential.xlsx
Appendix 3- Social costs_confidential
Appendix 4-Costs associated to CO2 emissions saving_confidential
Appendix 6- Monetisation of health impacts_confidential
Appendix 8-ROBUR organizational chart in NUS_confidential

Annex 0: Justification for Confidentiality Claim
