Department for Environment Food & Rural Affairs

Authorisation Decision

by Marc Casale

Deputy Director, Chemicals and International (DEFRA)

On behalf of the Secretary of State for Environment, Food and Rural Affairs

Decision date: 24 March 2026

Application Ref: AFA058-01

Authorised use

Use of wash primers containing potassium hydroxyoctaoxodizincatedichromate in the aerospace and defence industry and its supply chains.

UK REACH authorisation number:

Authorisation Number	Authorisation Holder
UKREACH/26/04/00	PPG Industries (UK) Ltd

Preliminary Matters

- The substance potassium hydroxyoctaoxodizincatedichromate (PHD), is listed in Annex XIV to assimilated Regulation (EC) 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (UK REACH).[1] As such, PHD is subject to the authorisation requirement referred to in Article 56(1) of UK REACH.
- PHD was included in Annex XIV due to its intrinsic carcinogenic properties (Article 57(a) of UK REACH).
- Hexavalent chromium (Cr(VI)) is the form of chromium in PHD to which the hazardous properties are attributed.

[1] References to Regulation (EC) No 1907/2006, referred to in this decision as UK REACH, are to the assimilated law available online at https://www.legislation.gov.uk/eur/2006/1907/contents

- PPG Industries (UK) Ltd with company number 02110620, whose registered office is at Needham Road, Stowmarket, Suffolk, IP14 2AD, (the 'Authorisation Holder') was granted authorisation for the use of PHD on 15 April 2020, under EU REACH[2] (the 'Existing Authorisation'). The Authorisation Holder is an importer of PHD and is a member of the Aerospace and Defence Chromates Reauthorisation (ADCR) Consortium.
- In accordance with Article 127F of UK REACH, on 31 December 2020, the Existing Authorisation had the relevant connection with Great Britain (GB) as the Authorisation Holder is established in GB. Therefore, the Existing Authorisation continued to have effect in GB under UK REACH from 1 January 2021 with authorisation number 27UKREACH/20/6/5.
- On 17 July 2024, the Authorisation Holder submitted a review report (the 'Review Report') in relation to the Existing Authorisation to the Health and Safety Executive (the 'Agency'), with respect to the following continued use:
    a. Use of wash primers containing potassium hydroxyoctaoxodizincatedichromate in the aerospace and defence industry and its supply chains.
- On 17 September 2025, the Agency sent its opinion (the 'Opinion') to the Secretary of State for Environment, Food and Rural Affairs, and the Scottish and Welsh Ministers.

Decision

1. This decision is addressed to the Authorisation Holder.
2. In accordance with Article 61(1) of UK REACH, effective from 24 March 2026, the authorisation set out below shall apply instead of the Existing Authorisation.
3. For the avoidance of doubt, the Existing Authorisation will continue to apply to relevant activities which took place before 24 March 2026.
4. Authorisation is granted to the Authorisation Holder for the following use, under the following Authorisation number:
    a. **UKREACH/26/04/00** for the use of wash primers containing PHD in aerospace and defence industry and its supply chains.
5. Pursuant to Article 60(8) of UK REACH, the review period referred to in Article 60(9)(e) of UK REACH is set at 12 years. The authorisation will cease to be

[2] EU REACH refers to Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

valid on 22 January 2038 unless a review report is submitted in accordance with Article 61(1) of UK REACH by 22 July 2036.

6. The authorisation is subject to the following conditions in paragraphs 6 to 8, as well as the requirement in Article 60(10) of UK REACH to ensure exposure is reduced to as low a level as is technically and practically possible.

    a. The operational conditions (OCs) and risk management measures (RMMs) described in the Authorisation Holder's chemical safety report dated 17 July 2024[3] must be adhered to, subject to the following conditions in paragraphs 6.b. to 8, which take precedence over the OCs and RMMs described in the chemical safety report where these are incompatible.

    b. By 24 October 2026, there must be no spraying of a PHD based primer paint outside of an enclosed purpose designed paint spray facility, as defined by the specification for such in Annex 5 of the Agency's Opinion.[4]

    c. By 24 October 2026, rotary sanders must not be used to abrade any surface primed with PHD, unless the 90th percentile of the relevant operators' exposures to Cr(VI) dust at their site are kept below the Agency's benchmark exposure level of 5 μg/m^3 (the 'Agency Benchmark') over the period of the sanding activity, without taking into account the effect of any respiratory protective equipment (RPE) that may be worn. To demonstrate this:

        i. one or more qualified occupational hygienists that are listed on the UK Register[5] must be commissioned to undertake personal exposure monitoring on at least three separate days when the production conditions are considered by the occupational hygienist to be representative of typical exposure patterns for the task (operators using rotary sanders). The air monitoring must all be carried out in accordance with the sampling and analysis that is specified in BS ISO 16740:2005.

        ii. the qualified occupational hygienist must take a total of at least 10 separate personal exposure measurements from each similarly exposed group (SEG) – typically where each individual is carrying out

[3] This is a reference to the updated chemical safety report dated 17 July 2024 submitted by the Authorisation Holder as part of the Review Report. This is an updated version of the chemical safety report submitted within the Existing Authorisation, as was required by Article 62(4)(d) of EU REACH. The OCs and RMMs are described in sections 9 (exposure assessment) and 10 (risk characterisation related to combined exposure).

[4] The Agency's Opinion is available at https://www.hse.gov.uk/reach/applications-for-authorisation.htm

[5] A new Register of Occupational Hygiene Professionals was launched in 2024 – see Register of Occupational Hygiene Professionals - British Occupational Hygiene Society (BOHS) for further details. Frequently asked questions (FAQs) about the Register can be found at Professional-Register-of-Occupational-Hygiene-Professionals-FAQs-for-GP (bohs.org). A Directory of Occupational Hygiene Services can be found at Directory of OH Services (bohs.org).

the same task under the same operating conditions – and collect these into one single exposure data set for each SEG.

iii. no personal exposure measurements should be excluded in the data set as referenced above (in paragraph 4(c)(ii)). In particular, no assumptions must be made that a particular sample was contaminated during the sampling or analysis activity.

iv. a suitable statistics exposure calculation tool must be used to estimate the 90th percentile exposure level for each data set made up of at least 10 task-based personal exposure measurements.

d. By 24 October 2026, there must be no use of PHD on components which are subsequently sanded using powered sanding tools (either electrically powered or compressed air powered), unless the sanding takes place in:

i. a full enclosure or booth that is maintained under a negative static pressure with respect to the rest of the building, where the static pressure is monitored continuously, and where a visible and audible alarm is activated if/when the static pressure ever becomes zero or positive; or

ii. a purpose-designed bench-mounted back-draught dust extraction booth consisting of 3 sides and a top such that the only aperture is at the front where the operator stands with their breathing zone outside the booth; or

iii. a walk-in downflow booth providing a curtain of vertical laminar flow air which goes through 3-stage filtration (including an H14 high efficiency particulate air (HEPA) filter) before being recirculated through a special membrane in the ceiling back into the booth. The HEPA-filtered air should provide 90 percent of the air, with clean make-up air from the surrounding building providing the remaining 10 percent.

e. By 24 October 2026, there must be no use of media blasting of any surface primed with PHD outside any fully enclosed cabinet, unless:

i. the whole craft (or any component part thereof) is located entirely within a full enclosure or booth that is maintained under a negative static pressure with respect to the rest of the building; and

ii. the static pressure is monitored continuously; and

iii. a visible and audible alarm is activated if the static pressure ever becomes zero or positive.

f. By 24 October 2026, there must be no use of any compressed-air operated airgun to blow chromate dust (as a result of the use of PHD) after any paint, sanding, or blasting activity.

g. By 24 October 2026, there must be no use of any vacuum cleaner where chromate dust (as a result of the use of PHD) is liable to be present, unless it has been certified as meeting the Type H specification fitted with a HEPA filter.

h. By 24 October 2026, the use of breathing apparatus in demand mode must be mandated for any operator that is carrying out any of the following activities:

   i. spray painting of a PHD-based primer inside a paint spray booth/facility.

   ii. media blasting outside of a fully contained blasting cabinet.

i. By 24 October 2026, when using a breathing apparatus, a supply of breathable quality air must be available whenever the need reasonably arises or is required by these conditions, and the quality of that breathing air must be tested at a reasonable frequency to determine it is of breathable quality air.

j. By 24 October 2026, there must be no use of any fettling tools with respect to surface primed with PHD where the abrasive disc has a diameter in excess of 75 mm. A 75 mm diameter abrasive disc must not be used unless:

   i. the 90th percentile of the operator's Cr(VI) exposure (as a result of the use of PHD) for the duration of that fettling activity is less than the Agency Benchmark demonstrated by reliable and representative task-based air monitoring data; and

   ii. suitable RPE must be used during all fettling activities, unless the operator's Cr(VI) exposure (as a result of the use of PHD) for the duration of that fettling activity is less than the Agency Benchmark, demonstrated by reliable and representative task-based air monitoring data.

7. The authorisation holder must regularly engage with their downstream users to check that the appropriate OCs and RMMs remain in place where appropriate, and any additional conditions are understood. The authorisation holder must continue to monitor standards in downstream users by issuing downstream users with questionnaires, or by other means, at three intervals during the review period; at 24 March 2029, 24 March 2032, and 24 March 2035. These questionnaires must require downstream users to detail the OCs and RMMs that are currently in place, to provide any monitoring data collected during the applicable period and to detail any changes made by the downstream users to the OCs and RMMs during the applicable period. Any information gathered, including all relevant detailed

contextual information, must be kept and made available to the Agency if requested.

8. By 24 March 2032, the authorisation holder must submit a written substitution update report (the 'Substitution Update Report') to the Agency. The Substitution Update Report must provide details of their downstream users' substitution efforts, including updates on the progress that downstream users have made against their substitution plans. The authorisation holder must ensure that their Substitution Update Report is approved by their board of directors before it is submitted to the Agency.

9. The authorisation is subject to the following monitoring arrangements to monitor exposure of PHD to workers:

    a. At least 10 personal inhalation exposure monitoring measurements must be taken every 12 months within the duration of the review period, for each job role that covers all of the relevant worker contributing scenarios within the exposure scenario where significant Cr(VI) exposure is liable to occur as a result of the use of PHD. Workplace air sampling surveys must be undertaken by a suitable competent person[6] as per BS EN 689 and BS ISO 16740:2005.[7] Specifically, regular air sampling surveys must be carried out for each of the following activities if the activity is carried out:

        i. sanding/rubbing down activities – where relevant each separate sanding/rubbing down activity should be treated as a separate SEG, and the 90th percentile exposure level should be determined separately for each of these SEGs.

        ii. fettling activities – where relevant each separate fettling activity should be treated as a separate SEG, and the 90th percentile exposure level should be determined separately for each of these SEGs.

        iii. media blasting outside of any fully enclosed blasting cabinet.

    b. In every case, the exposure measurements referred to in paragraph 9.a. must be:

        i. based on the methodology specified in BS ISO 16740:2005.

[6] For example, a new Register of Occupational Hygiene Professionals was launched in 2024 – see Register of Occupational Hygiene Professionals - British Occupational Hygiene Society (BOHS) for further details. Frequently asked questions (FAQs) about the Register can be found at Professional-Register-of-Occupational-Hygiene-Professionals-FAQs-for-GP (bohs.org). A Directory of Occupational Hygiene Services can be found at Directory of OH Services (bohs.org).

[7] BS ISO 16740:2005 specifies a method for the determination of the TWA mass concentration of hexavalent chromium in workplace air. This international standard is applicable to the personal sampling of the inhalable fraction of airborne particles, as defined in ISO 7708, and to static (area) sampling. The analytical method is applicable to the determination of masses of 0.01 µg to 10 µg of hexavalent chromium per sample, without dilution.

ii. taken within the 30 cm (centimetre) breathing zone of the wearer with samplers positioned on the outside of any RPE that may be worn.

iii. representative of the range of tasks with possible exposure to Cr(VI), and of the total number of workers that are potentially exposed.

iv. supported by adequate contextual (and observational) information for each sampling event reasonably required to interpret and inform the results (as detailed within BS EN 689).

c. The information in paragraph 9.a. must be used to regularly review the effectiveness of the OCs and RMMs. If personal exposures are above the Agency Benchmark, prompt action must be taken, to reduce workers' exposure to Cr(VI) below the Agency Benchmark. The RMMs used must be appropriate and effective to limit the exposure risk to Cr(VI).

d. In instances where the RMMs have been modified to reduce exposures, as referenced in paragraph 9.c., a personal monitoring survey must be carried out at least every 3 months using the methodology that is given in BS ISO 16740:2005 until a minimum of 10 personal exposure data points have been obtained, from which the new 90th percentile of the worker's personal exposure to Cr(VI) after the change in the RMMs shall be determined. If personal exposures are still above the Agency Benchmark, further prompt action must be taken, as appropriate to reduce workers' exposure to Cr(VI) below the Agency Benchmark.

e. The results of the measurements referred to in paragraphs 9.a. and 9.d. must be made available to the Agency if requested (whether requested directly or indirectly), including all relevant detailed contextual information.

10. The authorisation is subject to the following monitoring arrangements to monitor human exposure of PHD to humans via the environment:

a. Measurements must be taken of the concentrations of total chromium and Cr(VI) released to air and wastewater (as appropriate) for each site covered by the authorisation. Where applicable, the frequency of sampling should be in accordance with what is stated in the downstream users' environmental permit and be representative of normal operational conditions and any prolonged increases in operation. In any case, sufficient measurements, including at a sufficient frequency, should be taken to demonstrate the data is robust and representative of emissions arising from the authorised use.

b. The samples must be taken in accordance with good practice, from the stack and the final discharge point to the foul sewer.

c. The samples must be measured for total chromium and Cr(VI) by a laboratory accredited by the Environment Agency's Monitoring Certification

Scheme for environmental permit holders (MCERTS) using an appropriate level of detection and recognised method (e.g., those available for air and water at GOV.UK).[8]

d. The measurements must be checked against any applicable permit's emission limit values and most up-to-date BAT (Best Available Techniques) standard.[9]

e. The monitoring data must be used to improve or maintain the effectiveness of the OCs and RMMs in limiting releases to the environment in line with most up-to-date BAT guidance and standards.

f. The monitoring data must be made available to the authorisation holder and the Agency upon request.

11. The authorisation holder must communicate the conditions and monitoring arrangements in paragraphs 6 to 10 to every downstream user to which they supply PHD-based paint (directly or via a distributer) by 24 April 2026.

12. The Agency has set out recommendations for the authorisation holder in section 10 of its Opinion, should a review report be submitted in accordance with Article 61(1) of UK REACH. These recommendations are not conditions of authorisation or conditions for any review report.

Background

13. In accordance with Article 61(1) of UK REACH, the Authorisation Holder submitted a review report containing updated versions of the following documents initially submitted with respect to the Existing Authorisation:

    a. the analysis of alternatives.

    b. the socio-economic analysis.

    c. the chemical safety report.

    d. the exposure scenarios for the use of PHD.

14. This decision is made pursuant to Article 61 of UK REACH and having obtained the consent of Scottish and Welsh Ministers.

15. In making this decision I have taken into account:

    a. the Existing Authorisation (including associated documentation)

    b. the Review Report submitted to the Agency.

[8] https://www.gov.uk/government/publications/monitoring-discharges-to-water-cen-and-iso-monitoring-methods/monitoring-discharges-to-water-cen-and-iso-monitoring-methods

[9] The BAT standards for emissions to wastewater are 0.1 mg/L for Cr(VI) and 1.0 mg/L for total chromium. It is not possible to determine the concentration of Cr(VI) using the concentration of total chromium.

c. the provisions of Article 60 and Article 61 of UK REACH, including the elements referred to in Article 60(4) and the requirements of Article 60(5) (as applicable).

d. the Agency's Opinion.

e. any change of circumstances detailed in the Review Report, which if known at the time of granting the Existing Authorisation, would have affected the decision to grant the Existing Authorisation or the terms of the Existing Authorisation.

Reasons

16. In its Opinion, the Agency concluded that it is not possible to determine a derived no-effect level for the carcinogenic properties of PHD. Therefore, for PHD, it is not possible to determine a threshold in accordance with section 6.4 of Annex I of UK REACH.

17. Therefore, and in accordance with Article 60(3)(a) of UK REACH, this means that Article 60(2) of UK REACH does not apply to the Review Report and authorisation may only be granted on the basis of Article 60(4) of UK REACH.

18. Authorisation may only be granted under Article 60(4) of UK REACH if it is shown that the socio-economic benefits outweigh the risk to human health or the environment arising from the use of PHD and if there are no suitable alternative substances or technologies.

Risk to human health

19. PHD presents a risk to human health due to its carcinogenic properties.

Workers

20. The potential human health risk to directly exposed workers is the risk of developing lung cancer as a result of the inhalation of Cr(VI) in the course of work activities.[10]

21. To assess worker exposure to PHD, the Authorisation Holder collected 314 personal air monitoring samples from GB sites and 606 personal air samples from European Economic Area (EEA) sites. The Agency considered that the 90th percentile values from the inhalation data reflected a reasonable worst-case exposure scenario and that the Authorisation Holder has demonstrated that the 90th percentile of personal exposures for each worker contributing scenario is less than the Agency Benchmark.

[10] Dermal and ingestion are other routes of exposure. However, exposure via ingestion is factored into the risk of inhalation exposure and exposure via the dermal route was not measured or modelled in the Review Report as there is no indication that dermal exposure to Cr(VI) compounds presents a cancer risk to humans.

22. The Authorisation Holder also collected 127 biological monitoring (BM) samples. Only one of the 127 urine monitoring results exceeded the UK biological monitoring guidance value (BMGV) of 10 µmol Cr/mol creatinine in urine. In cases of exceedance, the Authorisation Holder indicated that an investigation is carried out to identify the cause and implement corrective measures. In its Opinion, the Agency concluded that the BM samples enhance confidence in the Authorisation Holder's inhalation data. Additionally, the Authorisation Holder noted in their chemical safety report that BM data is collected but is not used for quantitative exposure assessments. This is because urinary BM does not allow a differentiation between Cr(III) and Cr(VI).[11] Therefore, I do not consider that the one BM exceedance increases uncertainty in the data.

23. The Authorisation Holder has OCs and RMMs in place to manage the risk to workers. These include, but are not limited to, purpose-designed paint spraying facilities (spray booth), best practices, local exhaust ventilation (LEV), personal protective equipment (PPE), RPE, annual monitoring programmes and hazardous waste management procedures.

24. The Agency noted concern regarding the various OCs and RMMs in place to limit worker exposure. Although the Agency noted in its Opinion that certain RMMs would be effective at limiting exposures, the Agency concluded that the Authorisation Holder has been too generic in their descriptions of their RMMs. Furthermore, the generic OCs and RMMs demonstrated too much reliance on RPE which the Agency does not consider appropriate within the hierarchy of control as RPE only protects the wearer and not others within the same work area, nor the environment. Noting the uncertainty in the OCs and RMMs, in its Opinion, the Agency recommended conditions to review and improve the RMMs, reducing the Authorisation Holder's overreliance on RPE and increasing worker protection. I agree with the Agency's rationale for the conditions.

25. Further concern was noted by the Agency in its Opinion regarding the Authorisation Holder's spraying facilities. In their Review Report, the Authorisation Holder's chemical safety report showed that at an individual EEA based site, spraying outside of the spraying facility occurs. This activity presents an additional risk to workers and the local population due to overspray, 'bounce back', and airborne mist being carried away. Although the Authorisation Holder stated that this activity does not occur at GB based sites, the Agency concluded in its Opinion that there is still remaining uncertainty as to whether this activity is performed in GB. Therefore, the Agency

[11] The Authorisation Holder noted in their chemical safety report that chromium levels in BM studies are influenced by factors other than occupational exposure (e.g., geographical region, smoking status, intake from food and drinking water etc.), making the interpretation of the measurements as regards their relation to occupational exposures difficult.

recommended a condition to ensure that this activity is prevented. I agree with the Agency's rationale for the condition.

26. In their Review Report, the Authorisation Holder showed a reliance on EEA data. The Agency noted that the EEA data provided by the Authorisation Holder, collectively with the GB data, is sufficient for an evidence-based decision to be made and I agree with this. Nevertheless, in its Opinion, the Agency concluded that due to a lack of GB data, there is some uncertainty regarding the effectiveness of the RMMs that are in place within GB. Therefore, the monitoring arrangements will limit reliance on EU data and reduce any remaining uncertainties. I agree with this conclusion and the proposed monitoring arrangements.

27. In its Opinion, the Agency did not provide a timeframe for when the Authorisation Holder must communicate the conditions and monitoring arrangements to their downstream users. Due to the Agency's above conclusion on the OCs and RMMs, I consider that the Authorisation Holder must communicate the conditions and monitoring arrangements (in paragraphs 6 to 10) to their downstream users within one month of the date of authorisation (24 April 2026). Additionally, the Agency did not provide a timeframe for when the downstream users should implement the conditions by. The Authorisation Holder therefore must instruct their downstream users to implement the conditions by 7 months from the date of authorisation (by 24 October 2026).

28. The Agency assessed the monetised human health impacts to workers to be up to £2.5 million over the 12-year review period using the willingness-to-pay methodology.[12] This accounts for 6,480 directly exposed workers across 70 sites in GB.

29. In its Opinion, the Agency concluded that the Authorisation Holder's OCs and RMMs are not appropriate and effective in limiting the risk to workers. The proposed conditions are expected to provide a mechanism to improve the shortcomings of the OCs and RMMs discussed above in paragraphs 21 to 26.

30. Having evaluated the Agency's assessment, I agree with its conclusions that the descriptions of the Authorisation Holder's current OCs and RMMs are too generic, and therefore that the OCs and RMMs are neither appropriate nor effective in limiting the risk to workers. However, I agree that the RMMs would

[12] The number of statistical cancer cases for workers is estimated by applying the 90th percentile inhalation exposure values for each worker contributing scenario to the number of exposed workers. This risk figure is then adjusted for the length of the review period, and a ratio of fatal to non-fatal cancer cases is applied (79:21). A 10-year latency period is applied to lung cancer cases, conservatively assuming constant exposure. To monetise these cases, a value for cancer morbidity (based on an ECHA study (2016) which adopts willingness-to-pay methodology) is applied; the value per statistical fatal cancer case is £3.9m-£5.4m and the value per statistical non-fatal cancer case is £0.4m- £0.5m. Discount rates of 1.5-3.5% are applied.

be effective at limiting exposures when considered in conjunction with the additional conditions (in paragraphs 6 to 8).

Humans via the environment

31. In its assessment of the appropriateness of the OCs and RMMs for humans via the environment, the Agency noted some uncertainty regarding the GB data set provided by the Authorisation Holder as 20 out of 70 sites provided full emission data sets.

32. Additionally, in their Review Report, the Authorisation Holder relied on EEA data to supplement GB data – this was used to provide a larger, more representative data set. In its Opinion, the Agency concluded that as the OCs and RMMs are broadly consistent across GB and EEA sites, that EEA data is representative of GB sites (due to the similarity of the OCs and RMMs in place in the EEA and GB sites). Nevertheless, the Agency further concluded that GB data is preferable and therefore proposed monitoring arrangements. I agree with the monitoring arrangements (see paragraph 10) and further agree with the Agency's conclusion that the GB monitoring data is preferable, and that the data received will provide feedback to the Authorisation Holder and downstream users for when the downstream users should take appropriate action to improve their OCs and RMMs.

33. According to the Authorisation Holder, Cr(VI) may be released to the environment from the use of PHD via emissions to air, water, soil and waste. For humans via the environment, the Agency concluded in its Opinion that the OCs and RMMs are likely to be appropriate, but due to the environmental emission monitoring data for GB sites being limited, the Agency concluded that the OCs and RMMs are not effective.

34. Furthermore, despite some evidence that the Authorisation Holder is compliant with permitting emission limits and BAT benchmarks, the Agency concluded in its Opinion that the 90th percentile of the data indicates that 0.5 kg of Cr(VI) may be released to air per site per year. The Agency therefore noted that Cr(VI) emissions are highly variable, which indicates the OCs and RMMs are not as effective as they could be and the BAT(s) are not being universally applied. I agree with the Agency's conclusion on the OCs and RMMs for exposures to humans via the environment.

35. The Agency assessed the monetised health impacts to humans via the environment to be up to £7.67 million over the 12-year review period using the

willingness-to-pay methodology.[13] This accounts for an estimated local population of 1.1 million people at 70 GB sites.[14]

36. In its Opinion, the Agency concluded that the OCs and RMMs which the Authorisation Holder has in place are not appropriate or effective. To address these issues, in its Opinion, the Agency recommended monitoring arrangements for humans via the environment to facilitate the ongoing assessment of the performance of OCs and RMMs. The monitoring arrangements (see paragraph 10) should identify where necessary improvements should be made. I agree with this conclusion.

Socio-economic analysis

37. In its Opinion, the Agency assessed the socio-economic benefits arising from the applied for use and the socio-economic implications of a refusal to authorise. The socio-economic benefits of authorisation consist of avoided producer surplus loss and avoided social cost of unemployment, and the Agency estimated this to be at least £81.3 million over 12 years.

38. The non-monetised benefits include avoided negative impacts on airlines, air passengers, customers, cargo, and avoided negative impacts on emergency services, military forces' operational capacity, mission readiness associated with service disruption.

39. Having evaluated the Agency's assessment, I agree with its conclusions on the quantitative and qualitative benefits.

Conclusion on whether the benefits outweigh the risk

40. In its Opinion, the Agency concluded that the Authorisation Holder has demonstrated that the monetised socio-economic benefits of granting authorisation (at least £81.3 million over 12 years) are greater than the monetised risks to human health (up to £10.2 million over 12 years).

41. I consider that the Authorisation Holder has shown that the socio-economic benefits outweigh the risk because of:

[13] To estimate the number of cases for humans via the environment, the Agency use 90th percentile humans via the environment exposure estimates and applied them to the population within 1km of the site (found using an online population estimation tool). The intestinal and lung cancer cases are separated due to different exposure-response relationships. A ratio of fatal to non-fatal cancer cases is applied for both lung cancer (79:21) and intestinal cancer (45:55). A 10-year latency period is assumed. To monetise these cases, a value for cancer morbidity (based on an ECHA study (2016) which adopts willingness-to-pay methodology) is applied; the value per statistical fatal cancer case is £3.9m-£5.4m and the value per statistical non-fatal cancer case is £0.4m- £0.5m. Discount rates of 1.5-3.5% are applied based.

[14] The local population that is estimated to be exposed through inhalation and oral routes is 4,860 per km^2 per site.

a. the likely quantitative benefits in respect of the avoided producer surplus loss and avoided social cost of unemployment to the Authorisation Holder.

b. the likely qualitative benefits in respect avoided negative impacts on airlines, air passengers, customers, cargo, and avoided negative impacts on emergency services, military forces' operational capacity, mission readiness associated with service disruption.

c. the assessed risks from the use of the substances.

42. Having evaluated the Agency's assessment, I agree with the Agency's conclusion that the socio-economic benefits of authorisation outweigh the risk.

Alternatives

43. In its Opinion, the Agency concluded that there are no available alternative substances or technologies with the same function and a similar level of performance that will be technically feasible for the Authorisation Holder by the expiry date of the authorised use (22 January 2026). The Agency also concluded that there are no available alternatives that will be economically feasible for the Authorisation Holder by the expiry date of the authorised use. One comment was received in the public consultation for this Review Report. The comment was supportive of the Review Report and explained the substitution process in the aerospace and defence sector, including the challenges and consequences of a review period shorter than 12 years.

44. The Authorisation Holder stated in their Review Report, that for an alternative to be suitable and viable, the technical functionalities and desired finish achieved by the Cr(VI) substances must be met. These essential criteria are corrosion resistance, active corrosion inhibition, adhesion promotion, layer thickness, chemical resistance, temperature resistance, compatibility with substrates/other coatings, applicability over large areas, method compatibility, detectability/visibility, and mechanical properties. Additionally, the Authorisation Holder stated in their Review Report that the alternatives need to fulfil safety-related requirements under the appropriate standards. In their Review Report, the Authorisation Holder noted that the technical feasibility of alternatives is defined in terms of their ability to provide all the required properties to treated surfaces covered in the scope of the Review Report.

45. In their Review Report, the Authorisation Holder proposed 6 candidate alternatives for consideration as an alternative to PHD in wash primers. These shortlisted alternatives were magnesium-rich primers, phosphate-based corrosion inhibitors, zinc-based inhibitors, silane-based coatings, zirconate-based corrosion inhibitors (organometallics), and proprietary mixtures of Cr(VI)-free test candidate corrosion inhibitors.

46. For all 6 shortlisted alternatives, the alternatives' technical feasibility was not met with respect to the use applied for. The alternatives therefore did not meet the essential criteria required for an alternative to be considered feasible. The Authorisation Holder indicated in their Review Report that:

    a. for magnesium-rich primers, zinc-based inhibitors and proprietary mixtures of Cr(VI)-free test candidate corrosion inhibitors, the alternatives showed regression in corrosion resistance performance and poor adhesion promotion.

    b. for zirconate-based corrosion inhibitors (organometallics), the alternative is currently unsuitable due to poor corrosion inhibition.

    c. for phosphate-based corrosion inhibitors and silane-based coatings, the alternatives are currently unsuitable due to poor corrosion protection.

47. In its Opinion, the Agency considered the analysis of alternatives to be detailed and was reassured that a range of alternatives are being considered and tested on a range of components but acknowledged that it is unlikely one alternative will meet all the varying performance characteristics. I agree with this conclusion and agree that no alternative was technically and economically feasible by 22 January 2026.

48. In their Review Report, the Authorisation Holder also submitted substitution plans as part of the Review Report. The substitution plans are split into six key stages: development, qualification, validation, certification, industrialisation and manufacturing readiness level (MRL). MRL 10 is the stage at which manufacturing in full rate production is possible (however customer approval would still need to follow). The Authorisation Holder has anticipated that 100 percent of substitution plans could achieve MRL 10 by 2038. However, it was also noted that reaching MRL10 is likely to be delayed in many cases due to knock-on effect of the bonding primers and protective primers substitution plans, compatibility with other processes, the constriction from high costs, and strict industry regulations, and the complexity to deliver multiple substitutions for a component/component family.

49. I consider that requiring the Authorisation Holder to submit a Substitution Update Report (see paragraph 8) will allow continued monitoring of the substitution efforts of downstream users throughout the 12-year review period.

50. Having evaluated the Agency's assessment, I agree with the conclusion that there was no available alternative by the expiry date of the authorised use (22 January 2026) and consider that the Authorisation Holder has discharged their burden of proof in demonstrating the absence of suitable current alternatives. In reaching this conclusion, I have considered the Agency's assessment of the technical and economic feasibility of alternatives and the consistency with the analysis of alternatives provided.

Review period

51. In its Opinion, the Agency recommended the review period referred to in Article 60(8) of UK REACH should be set at 12 years.

52. In their Review Report, the Authorisation Holder requested a 12-year review period to allow sufficient time for substitution efforts to progress. The Authorisation Holder noted that a 12-year review period is necessary due to the technical complexity of replacing Cr(VI), long development cycles and the regulatory requirements for airworthiness certification.

53. When considering the Authorisation Holder's requested review period, the Agency considered the timescales for substitution and concluded that typical development, implementation, and production phases for aerospace uses can last longer than 12 years. In its Opinion, the Agency agreed with the Authorisation Holder that a 12-year review period is suitable, noting:

    a. there is a complex set of technical design parameters and logistical factors affecting how quickly substitution can be achieved within the aerospace industry. There are also extensive efforts to eliminate the use of Cr(VI) wherever technically feasible. In this respect there are rigorous programs in place requiring extensive documentation, reviews and approvals to justify the use of Cr(VI) in new designs and changes to existing designs.

    b. the need to balance worker and public health protection concerns with aviation safety and security concerns adds a significant layer of complexity and cost in the search for alternatives, which underlie the highly conservative approach to substitution and the search for alternatives adopted by the sector.

54. Having evaluated the Agency's assessment, I agree with the Agency's conclusions on these points and its proposal for a 12-year review period for the following reasons:

    a. The Authorisation Holder noted in their Review Report that some ADCR members are further along in their substitution efforts then others and some may be able to achieve MRL 10 before the end of the requested review period, but substitution may still not be possible within the 12 years as it may take several years following that for qualification and customer approval. In addition, the members who are still in the early testing phase will likely require the full 12 years (if not more) to reach MRL 10, presuming candidates continue to pass each round of testing. This is a best-case assumption assuming members are able to progress through the various stages prior to reaching MRL 10 without significant setbacks (which is unlikely), and these timelines are dependent on resource availability as multiple projects seeking alternatives for the use of Cr(VI)

are running in parallel. Therefore, I consider that it is unlikely that substitution will be possible within 12 years.

Conclusion

55. For the reasons set out above I conclude that the socio-economic benefits outweigh the risk to human health for the use of PHD referred to in paragraph 2 and that there are no suitable alternative substances or technologies. I am content that a 12-year review period is appropriate.

56. The Scottish Ministers and the Welsh Ministers have given their consent to this decision in accordance with the requirements of UK REACH.

57. In accordance with the provisions of Article 61(1), the Existing Authorisation is amended as outlined effective from 24 March 2026.

Marc Casale

Deputy Director, Chemicals and International

On behalf of the Secretary of State for Environment, Food and Rural Affairs