Department for Environment Food & Rural Affairs

Authorisation decision on AFA066-01

By Marc Casale, Deputy Director, Chemicals and International (Defra)

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

Decision date: 25 August 2026

Application ref: AFA066-01

Preliminary matters

- Chromium trioxide is listed in Annex XIV to EUR 2006/1907 concerning the registration, evaluation, authorisation and restriction of chemicals (UK REACH)[1] As such, chromium trioxide is subject to the authorisation requirement referred to in Article 56(1) of UK REACH.
- Chromium trioxide was included in Annex XIV due to its intrinsic carcinogenic and mutagenic properties (Article 57(a) and Article 57(b) of UK REACH).
- Hexavalent chromium (Cr(VI)) is the form of chromium in chromium trioxide to which the hazardous properties are attributed.
- The application is made by Vertik-Al Limited for seven companies:
    a. Vertik-Al Limited, with company number 02634525, whose registered office is at Yardley Brook Industrial Park, Lea Ford Road Shard End, Birmingham, West Midlands, B33 9TX;
    b. Alucoat Limited, with company number 06515016, whose registered office is at 495 Green Lanes, London, N13 4BS;
    c. Architectural Powder Coatings Limited, with company number 04384366, whose registered office is at Blaydon Industrial Park, Chainbridge Road, Blaydon on Tyne, Tyne and Wear, NE21 5AB;

[1] References to EUR 2006/1907, 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

d. Custom Wytelyne Powder Coating Limited, with company number 02994947, whose registered office is at 2nd Floor Medway Bridge House, 1-8 Fairmeadow, Maidstone, Kent, England, ME14 1JP;

e. Protective Metal Finishing Limited, with company number 14186791, whose registered office is at 59-61 Charlotte Street, Birmingham, United Kingdom, B3 1PX;

f. Senior Architectural Systems Limited, with company number 03909137, whose registered office is at Portobello, School Street, Willenhall, England, WV13 3PW;

g. Superior Paint & Powder Coating Limited, with company number 04334804, whose registered office is at Units 2a and 3 Curriers Close, Canley, Coventry, West Midlands, CV4 8AW,

(together, the 'Applicants').

- The Applicants were previously covered as downstream users under the EU REACH authorisation REACH/20/18/25 which expired on 21 September 2024. The Health and Safety Executive (the 'Agency') allowed the Applicants to continue the use of chromium trioxide, subject to certain conditions including that a UK REACH application for this use should be submitted to the Agency.
- On 29 October 2024, the Applicants submitted an application for authorisation (the 'Application') to the Agency for the use of chromium trioxide for pre-treatment conversion coating of aluminium for the construction industry by spray and dip process.
- The Agency permitted the Applicants to continue this use pending a decision on the Application.
- On 21 November 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 Applicants.
2. Pursuant to Article 60(4) of UK REACH, the Applicants are refused authorisation for the following use of chromium trioxide:

   a. pre-treatment conversion coating of aluminium for the construction industry by spray and dip process.

Background

3. This decision is made pursuant to Article 60(4) of UK REACH and having obtained the consent of Scottish and Welsh Ministers.

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

   a. the Application submitted to the Agency;

   b. the provisions of Article 60 of UK REACH, including the elements referred to in Article 60(4) and the requirements of Article 60(5);

   c. the aim of authorisation as set out in Article 55 of UK REACH; and

   d. the Agency's Opinion.

Reasons

5. In its Opinion, the Agency concluded that it is not possible to determine a derived no-effect level for the carcinogenic and mutagenic properties of chromium trioxide.[2] Therefore, for chromium trioxide, it is not possible to determine a threshold below which exposure can be considered safe in accordance with section 6.4 of Annex I of UK REACH.

6. 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 this Application, and authorisation may only be granted on the basis of Article 60(4) of UK REACH.

7. 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 chromium trioxide and there are no suitable alternative substances or technologies.

8. Having assessed the elements set out in Article 60(4), I have concluded that it is shown that the socio-economic benefits outweigh the risk to human health arising from the applied-for use. However, I have concluded that it is not shown that there are no suitable alternative substances or technologies, which must also be demonstrated in order to grant authorisation under Article 60(4).

Risk to human health

9. Chromium trioxide presents a risk to human health due to its carcinogenic and mutagenic properties.

[2] The cancer risk is estimated according to the Committee for Risk Assessment (RAC) reference dose-response relationships for Cr(VI) carcinogenicity (RAC/27/2013/06 Rev.1). As a genotoxic mode of action (mutagenicity) is thought to be at least partially responsible for the carcinogenicity of Cr(VI), these relationships also account for the intrinsic property mutagenicity.

Workers

10. 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.[3]

11. To assess worker exposure to chromium trioxide, the Applicants conducted some degree of personal air sampling. The Agency concluded in its Opinion that, despite some Applicants having limited sample numbers, all air monitoring results indicated that worker exposure to chromium trioxide was below the limit of detection for the analytical method used by the laboratory.

12. Four of the Applicants also collected biological monitoring samples. The Agency concluded that results of the biological monitoring are generally significantly lower than the biological monitoring guidance value of 10 µMol Cr/Mol creatinine. Overall, in its Opinion, the Agency noted that, based on the monitoring data provided, there is likely to be no significant exposure to workers with the risk management measures (RMMs) currently in place.

13. The Applicants have operational conditions (OCs) and RMMs in place to manage the risk to workers. These include, but are not limited to, personal protective equipment, safe storage, maintenance of equipment, and pumps contained within an enclosure in case of spillage.

14. Despite the OCs and RMMs in place, the Agency noted concern regarding the potential for fugitive emissions from the entrance and exits of the spray chambers entering the workplace. In its Opinion, the Agency noted that regular air monitoring would be required to ensure that the RMMs remain effective and operate within the design specifications.

15. The Agency assessed the monetised human health impacts to workers to be up to £7,000 over a 12-year period using the willingness to pay methodology [4]. This accounts for 44 directly exposed workers across 7 sites in Great Britain.

16. In its Opinion, the Agency concluded that the Applicants (specifically two of the seven Applicants) did not fully demonstrate that the OCs and RMMs to limit the

[3] 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 Application as there is no indication that dermal exposure to Cr(VI) compounds presents a cancer risk to humans.

[4] The Agency revised the monetised risk provided by the Applicants due to shortcomings in the underlying exposure data and methodology for calculating the disease burden for both workers and humans via the environment. The risk figures are adjusted for the length of the review period, and a ratio of fatal to non-fatal cancer cases is applied (79:21 for lung cancer and 83:17 for intestinal cancer). A latency period of 10-years is applied to lung cancer cases and 26 years for intestinal cancer cases. To monetise these cases, the Agency used willingness-to-pay methodology (based on an ECHA study (2016). The Agency applied values of £5.9m per statistical fatal cancer case and £0.4m per statistical non-fatal cancer case. A discount rate of 1.5% is applied.

risk to workers are fully effective. This is due to the Agency's observations that spray mist has been emitted from the entrance and exits of the spray chambers, suggesting that spray mist containment may need improving. I agree with the Agency's conclusion that the Applicants did not demonstrate that the OCs and RMMs for workers are effective.

Humans via the environment

17. According to the Applicants, Cr(VI) could potentially be released to the environment from the use of chromium trioxide 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 appropriate and effective in limiting release and exposure to air. However, the OCs and RMMs for releases to soil, waste and water are neither appropriate nor effective.

18. Based on the Applicants' processes, the Agency concluded in its Opinion that releases to the environment could occur via air vented to the atmosphere, wastewater discharged to the public foul sewer, release to soil from atmospheric deposition, release to soil from the application of treatment sludge to land or landfill and waste disposal of liquid and solid waste.

19. The Applicants claim that there are no discharges to air as sites either do not have local exhaust ventilation or they use an air seal in the case of the cascade plants. Additionally, due to the nature of the process, Cr(VI) will not normally be present in air. In its Opinion, the Agency accepts that no significant airborne emissions are expected from the sites.

20. The Applicants have various RMMs in place to mitigate releases to water. These include, but are not limited to, modern acido-basic wastewater treatment plants, ion exchange resins to treat rinse water, and contractors to collect and dispose of the spent solutions from the treatment baths.[5] The Agency concluded in its Opinion that the Applicants' spill prevention and containment measures are appropriate and effective in limiting exposure via water. However, for several of the Applicants, the Agency noted that despite evidence of managing the risk from spills, the current practices of discharging untreated wastewater to sewer or ineffective treatment show that their RMMs are either not appropriate or not effective in limiting exposure and risk. The Agency also noted that discharging untreated wastewater to sewer could result in residual Cr(VI) in the sewage sludge which is subsequently applied to soil. Therefore, the Agency concluded

[5] Acido-basic treatment is designed to reduce Cr(VI) to Cr(III) and precipitate it as an insoluble sludge – the Applicants indicated that this is the process used by external contractors and the Agency assumes that where the fate of the liquid waste sent for disposal is unknown, it is either treated using this process or the Cr is otherwise recovered. The Applicants provided a copy of at least one waste contractor's permit, which states there is a maximum permissible effluent concentration of 3.4 µg/L of Cr(VI) in discharges to surface water.

that the OCs and RMMs for releases to water and soil are neither appropriate nor effective.

21. The Applicants claim that their pretreatment bath chemistry is checked regularly at each site by either third party companies or on-site laboratories. The Agency considers this to be an appropriate and effective measure in minimising waste. However, the Agency noted that it is unclear as to how all Applicants deal with solid waste and items contaminated with Cr(VI). Therefore, the Agency concluded that the OCs and RMMs for solid waste are neither appropriate nor effective.

22. The Agency assessed the monetised human health impacts to humans via the environment to be up to £94,000 over 12 years using the willingness to pay methodology.[6] This accounts for an estimated local population of 59,145 at 7 sites in Great Britain.

23. Having evaluated the Agency's assessment, I agree with the Agency's conclusions that the OCs and RMMs described in the Application are appropriate and effective in limiting the risk to humans via the environment through air, and that the OCs and RMMs for releases to soil, waste and water are neither appropriate nor effective.

Socio-economic analysis

24. In their Application, the Applicants presented two non-use scenarios (NUS): the Applicants would react to a refusal of authorisation either by ceasing their applied for use or attempting to transition to the alternative. The Applicants made the case that for each Applicant, the benefits of continued use outweigh the monetised health risks regardless of whether the NUS for that Applicant is ceasing the use applied for or transitioning to an alternative.

25. 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 Agency also identified the same two plausible NUS as the Applicants: one where the use applied for ceases and one where the Applicants transition to a chrome-free alternative. Under the NUS where the use applied for ceases, the socio-economic benefits of authorisation consist of avoided producer surplus loss and

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avoided social cost of unemployment, and the Agency estimated this to be at least £20.3m over 12 years.

26. Under the NUS where the Applicants transition to a chrome-free alternative, the socio-economic benefits are the investment costs to the Applicants, totalling £3.5m over 12 years.

27. 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

28. In its Opinion the Agency concluded that the Applicants have demonstrated that the monetised socio-economic benefits of granting authorisation (at least £20.3m over 12 years under the NUS where the use applied for ceases, or £3.5m under the non-use scenario where a chrome-free alternative is transitioned to) are greater than the monetised risks to human health (up to £101,000 over 12 years).

29. This gives a benefit-risk ratio of at least 201 under the NUS where the use applied for ceases, and a benefit-risk ratio of at least 34 under the NUS where the Applicants transition to a chrome-free alternative

30. Notwithstanding my conclusions in paragraphs 16 and 23 on the appropriateness and effectiveness of certain OCs and RMMs, I consider that the Applicants have shown that the socio-economic benefits outweigh the risk because of:

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

    b. the assessed risks from the use of chromium trioxide.

31. Notwithstanding my conclusion on socio-economic benefits outweighing the risk for this Application, to grant an authorisation under Article 60(4) of UK REACH, it must also be shown that there are no suitable alternative substances or technologies.

Alternatives

32. Comments relating to alternatives were received in the public consultation for this Application.[7] These comments, submitted on behalf of 12 companies, challenged the information on alternatives provided by the Applicants in their Application. In their responses to the public consultation, the companies identified two alternative technologies capable of achieving the same objectives as chromium trioxide.

33. As a result of the comments received during the public consultation, the Agency held a stakeholder consultation meeting on 19 June 2025. The stakeholder

[7] The public consultation on this Application opened on 6 February 2025 and closed on 3 April 2025.

consultation meeting provided an opportunity for the Agency to discuss in an interactive manner any information on alternatives provided in the public consultation with the Applicants and those third parties who provided comments during the public consultation. During this meeting, companies within the same sector as the Applicants made the case that there are alternative substances available that have achieved the same goals as chromium trioxide in the applied for use. The following points were raised during the stakeholder consultation meeting:

a. alternatives are available and are being used by approximately 80% of the same sector;

b. other companies have invested large sums to switch to an alternative;

c. switching to an alternative can be done at a lower cost than claimed by the Applicants in their Application;

d. switching to an alternative can be done in much less time than the 12 years requested by the Applicants in their Application. Other companies who switched to an alternative also experienced technical difficulties (wet adhesion failure) at the beginning of switching to an alternative but have since been able to make the alternative work as a substitution for chromium trioxide;

e. customers no longer specify chromium trioxide-treated parts;

f. other companies claimed to work with various grades of aluminium using a chromium trioxide-free alternative and did not encounter issues.

34. I consider that it is not shown that there are no suitable alternatives. This is because:

a. two of the Applicants reported in the Application that they are currently operating using their preferred alternative (conversion coatings/pre-treatments based on zirconium or titanium hexafluoride, or both). I consider that the Applicants operating chrome-free demonstrates that the alternative is both technically and economically feasible for these Applicants;

b. some of the Applicants already have the necessary infrastructure in place to enable a switch to their preferred alternative. I consider that this further indicates that the alternative is technically and economically feasible;

c. many of the Applicants have indicated in their NUS that they would switch to the preferred alternative. Although the Applicants provided information in their Application to show that this would cause disruption to business, the Applicants did not provide sufficient information to demonstrate that this switch would be infeasible. Therefore, I consider that it cannot be reasonably concluded that a switch to the alternative is infeasible for the Applicants;

d. the Applicants did not robustly show that the costs of substitution were disproportionate or infeasible. While some of the Applicants did provide costings for switching to the alternative in their Application, they did not evidence that these costs would be infeasible;

e. the Applicants provided limited information in their substitution plan regarding the timeframe for progressing substitution over the requested review period;

f. as reported during the stakeholder consultation and the stakeholder consultation meeting, approximately 80% of the same sector are using the alternative. I therefore conclude that, as alternatives are being widely used in the same sector (even by some Applicants), this indicates that there are suitable available alternatives. I conclude that the Applicants have not provided sufficient evidence to demonstrate that alternatives that are generally available are not suitable for them.

35. Pursuant to UK REACH, applications for authorisation may be made by several persons, and such applications result in a single decision. I consider that the necessary part of the test of authorisation in Article 60(4) – namely that there are 'no suitable alternative substances or technologies' – has not been met by the Applicants for this Application for authorisation.

36. In reaching the conclusion that it is not shown that there are no suitable alternatives, I have considered:

    a. the Agency's assessment of the technical and economic feasibility of alternative substances already on the market;

    b. the Applicants' analysis of alternatives;

    c. the comments received during the public consultation on alternatives;

    d. the comments received during the stakeholder consultation meeting.

Conclusion

37. For the reasons set out above I conclude that it has not been shown that there are no suitable alternative substances or technologies.

38. Authorisation is refused in accordance with Article 60(4) of Regulation (EC) No 1907/2006 for the use of pre-treatment conversion coating of aluminium for the construction industry by spray and dip process.

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

Marc Casale

Deputy Director, Chemicals and International

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