Department
for Environment
Food & Rural Affairs

Authorisation Decision

by Marc Casale

Deputy Director, Chemicals, Pesticides and Hazardous Waste (DEFRA)
On behalf of the Secretary of State for Environment, Food and Rural Affairs

Decision date: 19 February 2025

Application Ref: AFA051-01
UK REACH authorisation number:

Authorisation number	Authorisation holder	Authorised use
UKREACH/25/06/00	Hard Anodising Surface Treatments Ltd.	Use of chromium trioxide for the surface treatment of engineering components, mainly for the aerospace and defence sector, with the purpose of creating a coating to meet specific and critical performance characteristics by means of chromic acid anodising, chromate conversion coating, passivation of metals and sealing after anodising.
UKREACH/25/06/01	Nu-Pro Limited / Magnaghi UK Limited	
UKREACH/25/06/02	Walton Plating Ltd	
UKREACH/25/06/03	Russell Laboratories Ltd	Use of chromium trioxide for the surface treatment of engineering components, mainly for the aerospace and defence sector, with the purpose of creating a coating to meet specific and critical performance characteristics by means of chromate conversion coating, passivation of metals and sealing after anodising.

UKREACH/25/06/04	East Lancashire Platers Ltd	Use of chromium trioxide for the surface treatment of engineering components, mainly for the aerospace and defence sector, with the purpose of creating a coating to meet specific and critical performance characteristics (by means of chromate conversion coating and passivation of metals).
UKREACH/25/06/05	Global Metal Finishing Ltd	
UKREACH/25/06/06	Twickenham Plating Ltd	

Preliminary Matters

- Chromium trioxide is listed in Annex XIV to assimilated Regulation (EC) No 1907/2006 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 members of the Surface Engineering Association Chromium Trioxide Authorisation Consortium (SEA), which consists of:
    a. East Lancashire Platers Limited, with registration number 01278186, of Oxford Mill, Oxford Road, Burnley, Lancashire, BB11 3BA
    b. Global Metal Finishing Limited, with registration number 03674102**,** of Unit 1 Moorfield Road, Off Upper Villiers Street, Wolverhampton, West Midlands, WV2 4QT
    c. Twickenham Plating Limited, with registration number 00463525, of 7-9 Edwin Road, Twickenham, Middx, TW1 4JJ
    d. Hard Anodising Surface Treatments Limited, with registration number of 14287149, Firs Industrial Estate, Stourport Road, Kidderminster, Worcestershire, United Kingdom, DY11 7QN

[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

e. Magnaghi UK Limited (known as Nu-Pro Limited at the time of the Application), with registration number 03544952, of Eagle Works London Road, Thrupp, Stroud, Gloucestershire, GL5 2BA

f. Walton Plating Limited, with registration number 01846778, of 118 Ashley Road, Walton-On-Thames, Surrey, KT12 1HN

g. Russell Laboratories Limited, with registration number 06599885, of Rivermead Drive Rivermead Industrial Estate, Westlea, Swindon, Wiltshire, SN5 7EX

(each an 'Applicant', together the 'Applicants') who are downstream users of chromium trioxide.

- On 21 March 2023, the Applicants submitted an application for authorisation (the 'Application') to the Health and Safety Executive (the 'Agency'), for the use of chromium trioxide for the surface treatment of engineering components, mainly for the aerospace and defence (A&D) sector, with the purpose of creating a coating to meet specific and critical performance characteristics. Chromium trioxide is used to make chromic acid solutions which are used in one of the following surface treatment processes on metal engineering components:

    a. Chromic acid anodising

    b. Chromate conversion coatings

    c. Passivation of metals, and

    d. Sealing after anodising.

    Not all seven Applicants undertake the four different surface treatment processes using chromium trioxide covered in this Application. Paragraph 2 specifies which processes each authorisation holder is authorised to carry out.

- On 11 September 2024, the Agency sent its opinion for this Application (the 'Opinion') to the Secretary of State for Environment, Food and Rural Affairs, and Scottish and Welsh Ministers.

Decision

1. This decision is addressed to the Applicants.

2. In accordance with Article 60(4) of UK REACH, authorisation is granted to the Applicants as set out under the following authorisation numbers in the above 'UK REACH authorisation numbers' section for the following uses:

    a. UKREACH/25/06/00, UKREACH/25/06/01 and UKREACH/25/06/02 for the use of chromium trioxide for the surface treatment of engineering components, mainly for the aerospace and defence sector, with the purpose of creating a coating to meet specific and critical performance

characteristics by means of chromic acid anodising, chromate conversion coating, passivation of metals and sealing after anodising.

b. UKREACH/25/06/03 for the use of chromium trioxide for the surface treatment of engineering components, mainly for the aerospace and defence sector, with the purpose of creating a coating to meet specific and critical performance characteristics by means of chromate conversion coating, passivation of metals and sealing after anodising.

c. UKREACH/25/06/04, UKREACH/25/06/05 and UKREACH/25/06/06 for the use of chromium trioxide for the surface treatment of engineering components, mainly for the aerospace and defence sector, with the purpose of creating a coating to meet specific and critical performance characteristics by means of chromate conversion coating and passivation of metals.

3. The review period referred to in Article 60(9)(e) of UK REACH is set at 12 years. The authorisation will cease to be valid on 19 February 2037 unless a review report is submitted in accordance with Article 61(1) of UK REACH by 19 August 2035.

4. The authorisation is subject to the following condition (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 authorisation holders must adhere to the operational conditions (OCs) and risk management measures (RMMs) described in the chemical safety report referred to in Article 62(4)(d) of UK REACH,[2] subject to the monitoring arrangements set out below.

5. The authorisation is subject to the following monitoring arrangements for exposure of workers to Cr(VI):

    a. The authorisation holders must undertake measurements of personal exposures to Cr(VI) that are supported by appropriate contextual information regarding descriptions of the work activities being undertaken during each monitoring period. Air sampling surveys representative of employees' exposures to Cr(VI) shall be undertaken by a professionally qualified occupational hygienist.[3] In every case, these exposure measurements (and any reports on them) must:

[2] This is a reference to the chemical safety report submitted by the Applicants on 21 March 2023 as part of the Application. The risk management measures and operational conditions are described in sections 9 (exposure assessment) and 10 (risk characterisation related to combined exposure).

[3] A professionally qualified occupational hygienist refers to professionals who are entitled to put LFOH after their name or professionals of verified equivalent qualifications and status.

a) be based on the methodology specified in BS ISO 16740:2005

b) include personal inhalation exposure sampling measured on the lapel, and on the outside of any respiratory protection equipment that may be worn

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

d) include all relevant contextual information and observational data in the reports of the surveys, in particular details of the work activities that took place during each monitoring period, and identify the similarly exposed groups (SEGs) for each authorisation holder concerned

e) include details of actions taken to prevent personal sampling equipment from transferring Cr(VI) contamination to any Cr(VI)-free area during any breaks that the employee takes away from the plating area during the air monitoring exercise

b. As part of the monitoring arrangement outlined in paragraph 5.a, by 19 February 2032 each authorisation holder shall obtain a minimum of 10 personal exposure data points for each job role, SEG, or task where significant inhalation exposure to Cr(VI) is liable to occur. Where an authorisation holder has submitted exposure data using the BS ISO 16740:2005 methodology to the Agency, the data points concerned shall be included in the minimum of 10 personal exposure data points. Data points shall be counted from where the methodology outlined in BS ISO 16740:2005 has been used or the existing RMMs have been modified. Once the data indicates that the exposure is below the benchmark of 5 $\mu g/m^3$ as a time-weighted average (TWA) (the 'Exposure Benchmark'), the minimum frequency for further air monitoring for the relevant job role SEG or task can be reduced to carrying out annual surveys.

c. As part of these 10 personal exposure data points, where the 90th percentile of either the anodising operator's personal exposure or the other surface treatment operator's personal exposure to Cr(VI) (measured using the methodology that is given in BS ISO 16740:2005) exceeds the Exposure Benchmark level during any particular task (that is, with no account being taken for the duration of the task concerned, and so this Exposure Benchmark is a task-based criterion and not necessarily an 8-hour TWA based criterion) at any of the authorisation holders:

a) The RMMs shall be modified by the authorisation holder concerned such that the 90th percentile exposure is brought below the

Exposure Benchmark. In particular for any anodising operation, if the authorisation holder concerned is not currently using a chemical mist suppressant, the Exposure Benchmark level should be used to decide on whether the introduction of the use of a chemical mist suppressant would be warranted

b) If the RMMs have to be modified to reduce exposures to satisfy the criterion specified in paragraph 5.c., the authorisation holder concerned shall undertake a personal monitoring survey on the operators concerned at least 6 times per year using the methodology that is given in BS ISO 16740:2005 until they have obtained a minimum of 10 new personal exposure data points, from which the new 90th percentile of the operator's personal exposure to Cr(VI) after the change in the RMMs shall be determined.

c) If that new 90th percentile exposure value is still over the Exposure Benchmark level specified above, the cycle of modifying the RMMs and then collecting a new set of 10 personal exposure data points should be repeated until the data demonstrates that compliance with the Exposure Benchmark has been achieved

d) The results of the measurements referred to in paragraph 5.a to paragraph 5.c. must be documented by the relevant authorisation holder, including the relevant contextual information and made available, upon request, to the Agency.

6. The authorisation is subject to the following monitoring arrangements for exposure of humans to Cr(VI) via the environment.

    a. The authorisation holders must:

        a) undertake measurements of the concentrations of total chromium and Cr(VI) in wastewater using a method with a suitable Limit of Detection (LOD) as to ensure comparison and compliance with the Best Available Techniques (BAT) emission standard or the authorisation holder's environmental permit emission limit values [4]

        b) use the monitoring data to improve or maintain the effectiveness of the OCs and RMMs in limiting releases to the environment

        c) make monitoring data available to the Agency upon request

    b. The samples outlined in paragraph 6.a. should be taken in accordance with good practice, from the final discharge point to the foul sewer. Laboratory analysis of total chromium and Cr(VI) should be undertaken by

[4] The BAT standard 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.

an accredited (e.g. MCERTS) laboratory using an appropriate LOD and recognised method. Suitable sampling duration and replication should be conducted in accordance with the recognised method(s). Where applicable, the frequency of sampling should be in accordance with what is stated in the authorisation holder's environmental permit and be representative of normal operating conditions. In any case, measurements should demonstrate that the data is robust and representative of emissions arising from the authorised use.

c. The measurements should be checked against any applicable permit emission limit values and the most up-to-date BAT standard, which will help inform the assessment of the appropriateness and effectiveness of the authorisation holders OCs and RMMs and risks to human health via the environment.

7. By 21 February 2032, each authorisation holder must submit an additional written interim update report to the Agency. This interim update report must include the data required from the monitoring arrangements set out in paragraph 5 and paragraph 6, above. This interim update report should be used to demonstrate each authorisation holder's compliance with conditions and monitoring arrangements outlined in paragraph 4 to paragraph 6.
8. The Agency has set out recommendations for the authorisation holders 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

9. This decision is made under Article 60(4) of UK REACH and having obtained the consent of Scottish and Welsh Ministers.
10. 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 Agency's Opinion.

Reasons

11. 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.[5] Therefore, for chromium trioxide, it is not possible to determine a threshold in accordance with section 6.4 of Annex I of UK REACH.

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

13. 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 if there are no suitable alternative substances or technologies.

Risk to human health

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

Workers

15. In its Opinion, the Agency noted limitations in the data supplied by the Applicants regarding the potential risk to workers, which led to uncertainties regarding the effectiveness of the RMMs, specifically the exceedance of the Exposure Benchmark level in air monitoring results by one Applicant on two separate occasions. The Agency also noted the lack of examination and test reports on the effectiveness of local exhaust ventilation (LEV) systems, poor respiratory protective equipment usage and management, and the lack of visible indicators on LEV in order to test its effectiveness.

16. In its Opinion, the Agency noted that there was a level of uncertainty regarding the effectiveness of the RMMs in the case of six out of seven of the Applicants. This was due to a lack of sufficient and sufficiently reliable exposure data on the surface treatment operators' exposure to Cr(VI). The Agency also noted that for inhalation exposure to workers, only one of the seven Applicants provided sufficient information to conclude that their RMMs are appropriate and effective in reducing inhalation exposure to Cr(VI) to below the Exposure Benchmark, thereby minimising the risk to workers. However, the Agency also concluded that, in the case of the other six Applicants, most of the necessary OCs and RMMs are in place in order to minimise exposure of Cr(VI) to workers. In its Opinion, the Agency concluded that this uncertainty should be addressed by all Applicants via the implementation of the monitoring arrangement specified in paragraph 5. I agree that the implementation of routine monitoring will address the uncertainties

[5] 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.

in the exposure data and will provide assurance that the RMMs will continue to remain effective at minimising the exposures to Cr(VI).

17. In its Opinion, the Agency considered that the biomonitoring results provide good evidence that the OCs and RMMs are appropriate and effective at controlling exposures from all routes. The Agency therefore concluded that the described OCs and RMMs are both appropriate and effective for worker exposures.

18. The Agency assessed the monetised human health impacts to workers to be up to £403,000 over the 12-year review period using the willingness to pay methodology.[6] This accounts for 38 directly exposed workers across seven sites in GB.

19. Having evaluated the Agency's assessment, I agree with its conclusion that the OCs and RMMs described in the Application are appropriate and effective in limiting risk to workers provided they are adhered to.

Humans via the environment

20. In its Opinion, the Agency noted three potential routes of exposure by which chromium trioxide could be released to the atmosphere – air, water and waste. The Agency noted specific concerns in relation to releases to air, namely that three Applicants did not provide monitoring data for emissions. The Agency also judged that monitoring data for releases to water suggested that not all of the emission concentrations are below the total chromium BAT exposure benchmark for wastewater. Furthermore, the Agency noted that the Applicants do not state how solid waste (e.g. personal protective equipment, wipes, rags or contaminated equipment such as empty chemical containers) is disposed of. However, it is noted by the Agency that the overall releases from this route are expected to be low.

21. In its Opinion, the Agency considered that the described OCs and RMMs are appropriate and effective in limiting human exposure via the environment for the majority of Applicants, particularly where abatement technologies are used and where the performance of OCs and RMMs is maintained and monitored. However, in the case of one Applicant, the Agency considered the described OCs and RMMs to be neither appropriate nor effective as they did not include Cr(VI) abatement measures, such as the presence of an air filter or wet scrubber on their LEV system. The Agency considers that adoption of abatement technology by this Applicant would likely be effective in reducing emissions.

22. The Agency noted that the three Applicants that have not provided monitoring data for emissions to air have committed to do so in the near future. The Agency

[6] Monetised statistical cancer cases were calculated using the formula - Discount factor x (fatality probability x value of a statistical life + value of cancer morbidity). Figures from an ECHA 2012 willingness to pay study are used for the value of a statistical life (€3.5 million to €5 million) and value of cancer morbidity (€0.41 million).

judged that this will alleviate some of the current uncertainties surrounding emissions to air, but also recommended a monitoring arrangement mandating a routine air monitoring programme, which is specified in paragraph 5.

23. The Agency also recommended a monitoring arrangement to address concerns regarding the treatment of wastewater, which is specified in paragraph 6, as well as a recommendation specifically relating to the adoption of abatement technology in relation to the reduction of emissions from the Applicant's site**.** The Agency expects this monitoring arrangement to address concerns surrounding potential exposure of humans to Cr(VI) via the environment. The monitoring arrangement should ensure that OCs and RMMs continue to be appropriate and effective, and to trigger a review of the OCs and RMMs if they are not.

24. The Agency assessed the monetised human health impacts to humans via the environment to be up to £2.71 million over the 12-year review period using the willingness to pay methodology. This accounts for an estimated general population of 65,730 people across seven sites in GB.

25. Having evaluated the Agency's assessment, I agree with the Agency that the OCs and RMMs described in the Application are appropriate and effective in limiting human exposure to Cr(VI) via the environment for most sites, particularly where abatement technologies are used, and that the described monitoring arrangement should address concerns relating to the exposure of humans to Cr(VI) via the environment where these concerns are present.

Socio-economic analysis

26. 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 are based on the avoided profit losses and the avoided social costs of unemployment if authorisation was not granted. The Agency estimated this to be at least £21.8 million 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 £21.8 million over 12 years) are greater than the monetised risks to human health (up to £3.11 million over 12 years).

29. I consider that the Applicants have shown that the socio-economic benefits of granting authorisation outweigh the risk to human health because of:

a. the likely quantitative benefits in respect of avoided producer surplus loss due to ceasing the use applied for and the avoided social cost of unemployment

b. the likely qualitative benefits in respect of avoided costs associated with closure

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

Alternatives

30. In its Opinion, the Agency concluded that there were no available alternative substances or technologies with the same function and a similar level of performance that were technically and economically feasible for the Applicants by the expiry date of the authorised use under EU REACH of 21 September 2024[7]. There were no comments submitted by interested third parties in the consultation indicating that there are alternatives available that are technically and economically feasible.

31. The Applicants use chromium trioxide for a range of surface treatments with the purpose of creating a coating to meet specific and critical performance characteristics. The main Application is for components for the A&D sector, such as landing gear, fasteners and engine parts. These coatings can be broken down into four categories – chromate conversion coatings, passivation of metal, chromic acid anodising and sealing after anodising.

32. The Applicants established four requirements that would need to be met for an alternative to chromium trioxide for functional chrome plating to be considered feasible: corrosion resistance, improvement adhesion of subsequent coatings (such as paint), low electrical contact resistance, and wear resistance. The Applicants therefore concluded that the three alternatives considered as part of this analysis of alternatives are not technically feasible alternatives for the Applicants for this use, and the Agency agreed with this.

33. The Applicants shortlisted three alternatives to chromium trioxide (acidic-based surface treatments, trivalent-based treatments, and sol-gel type coatings), but none of these were deemed to be feasible by the Applicants due to several performance issues, specifically a lack of ability to self-heal when damaged, lack of sufficient corrosion protection and a lack of reproducibility of the final coating respectively.

34. A substitution plan was not submitted by the Applicants. The Agency deemed the absence of a substitution plan to be understandable, as even in the event of a suitable alternative being developed, a hypothetical substitution plan would

[7] As a result of the conditions of Article 127H of UK REACH having been met, the use of chromium trioxide authorised under EU REACH was able to continue until 21 September 2024.

likely vary between consortium members due to the variety of processes, thus making estimated time scales vague and subject to change. The lack of a substitution plan is therefore not a significant concern for the Agency.

35. Having evaluated the Agency's assessment, I agree with the conclusion that there were no available alternatives by the expiry date of the authorised use under EU REACH and consider that the Applicants have 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 alternative substances already on the market. The Agency did not evaluate the risk of alternatives due to the alternatives not being technically feasible.

Review period

36. In its Opinion, the Agency recommended that the review period referred to in Article 60(9)(e) of UK REACH should be set at seven years from the date that authorisation is granted.

37. In the Application, the Applicants requested a 12-year review period. The Agency noted that this was not linked to a particular timescale for substitution, and that the Applicants did not specifically demonstrate why, in the event of an alternative becoming available, substitution could take longer for the products they make. In addition, the Agency expressed concerns regarding the effectiveness of the OCs and RMMs, as well as the reliability of the exposure assessments and exposure monitoring data. The Agency therefore concluded that there was insufficient justification for a 12-year review period and therefore recommended a seven-year review period.

38. I instead consider a 12-year review period, with an interim update report to be provided at seven years from the authorisation date, to be more appropriate. In reaching this conclusion I have noted that the Applicants have demonstrated there are no technically or economically feasible alternatives and the benefits outweigh the risks. Additionally, in its Opinion, the Agency identified that the Applicants needed to obtain more sufficient air monitoring and biomonitoring data sooner to provide additional in-depth information on potential risks to workers and to demonstrate the Applicants have improved their OCs and RMMs. The condition for the authorisation holders to submit an update report by 21 February 2032 will allow for updated information on the risk to workers to be provided sooner, lessening the concerns regarding the insufficient data and removing the need for a shorter review period. The update report will also allow the Applicants a sufficient amount of time to conduct a review of, and implement improvements to the OCs and RMMs so that they are appropriate and effective at minimising exposures to Cr(VI). I conclude that any issues with the current data do not justify a shorter review period of seven years.

39. Therefore, with the condition of the requirement to submit an update report by 21 February 2032, as outlined in paragraph 7, I consider a 12-year review period to be appropriate.

Conclusion

40. For the reasons set out above I conclude that the socio-economic benefits outweigh the risk to human health for the use of chromium trioxide referred to in paragraph 2 and that there are no suitable alternative substances or technologies.

41. 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, Pesticides and Hazardous Waste

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