

SURFACE ENGINEERING, COMAH APPLICATION & MAIN DUTIES

This information sheet explains:

- how surface engineering sites holding very toxic, toxic, and dangerous for the environment substances (including cyanides, dichromates and chromium trioxide) above certain quantities come within the scope of COMAH (Control of Major Accident Hazards Regulations 1999, as amended 2005);
- how some sites may have been brought into COMAH as a result of CHIP3 (The Chemical [Hazard Information and Packaging for Supply] Regulations 2002) amending the classification of chromium (VI) trioxide from toxic to very toxic on 31 October 2005.
- COMAH application rules specifically for surface engineering sites and substances in plating bath mixtures;
- the main COMAH duties in outline, the timescales involved and what action needs to be taken by those affected.

CHIP CLASSIFICATION & COMAH APPLICATION AT SURFACE ENGINEERING SITES

1. COMAH application is based on the presence of dangerous substances at a site in quantities at or above qualifying thresholds. CHIP3 is the hazard classification system used to define 'dangerous substances' for COMAH.
2. The COMAH definition of "Dangerous substances" is comprehensive in scope and includes ALL chemicals present at a site, whether as a 'raw material, product, by-product, residue or intermediate' (and includes waste materials).
3. A site may gain Lower Tier (LT) or Top Tier (TT) COMAH status depending on the quantity of dangerous substances held. The table below lists the generic categories of relevance to electroplating and surface treatment processes and their COMAH qualifying thresholds:

Generic Categories of Dangerous Substances	LT	TT
	Quantity in tonnes (\geq)	
VERY TOXIC	5	20
TOXIC	50	200
9 DANGEROUS FOR THE ENVIRONMENT in comb. with risk phrases: (i) R50: "Very toxic to aquatic organisms" (<i>inc.R50/53</i>) (ii) R51: "Toxic to aquatic organisms"; and R53: "May cause long-term adverse effects in aquatic environment"	100 200	200 500

4. As the very toxic and toxic generic hazard categories have much lower COMAH qualifying thresholds than those for environmental hazards, the COMAH application guidance below focuses on the former.

CHIP Reclassification of Chromium (VI) Trioxide

5. Chromium (VI) trioxide was reclassified from toxic to very toxic by amendments to CHIP3 on 31 October 2005. This moved it from the COMAH generic hazard category of toxic into very toxic, subsequently reducing its COMAH qualifying quantities.
6. Chromium (VI) trioxide and chromic acid are generally used synonymously, however, it is not clear whether the latter should also attract the revised CHIP classification. There has been considerable discussion (including at EC level) over the correct classification of baths containing chromic acid and subsequent COMAH application. This is yet to be resolved at a European level and is still under discussion. Pending an agreed outcome the following approach, which has been agreed by the CA, should be taken when determining whether COMAH applies.
7. The addition of chromium (VI) trioxide to water in plating solutions creates chromic acid (H₂CrO₄), which:
 - is a substance in its own right, rather than a preparation containing chromium (VI) trioxide
 - comes within the ASL classification for '*Chrome VI compounds, with the exception of barium chromate and other compounds specified elsewhere in the ASL*'
 - is classified as 'very toxic to aquatic organisms' (R50/53) (a classification relevant for COMAH application), and in dilution may remain 'toxic to aquatic organisms' (R51/53)
 - is subject to COMAH application rules for the addition of substances and preparations dangerous for the environment.
8. Chromium trioxide as crystal or flake (i.e. raw, dry material) should be included in any COMAH application sums for very toxic and toxic (to humans) quantities of substances present on site. (As it is also classified R50/53 'very toxic to aquatic organisms' it should also be included in any COMAH application sums for substances or preparations 'very toxic' or 'toxic' to aquatic organisms).
9. Chromic acid should only be included in COMAH addition sums for 'very toxic – or toxic – to aquatic organisms' (R50/53 or R51/53) but NOT towards COMAH application sums for toxicity to humans.

COMAH Application to Substances in Dilution or Mixtures (Preparations).

10. Human Toxicity: When aggregating quantities of toxic and very toxic dangerous substances on site for the purposes of COMAH application, very toxics and toxics in solution must be included as well as substances in their pure form. The table below indicates the classification for the whole solution/preparation where it contains a toxic or very toxic constituent at or above the following concentration limits:

Classification	Concentration	Classification of Whole Mixture/Preparation
Very Toxic substance	$C_n \geq 7\%$	Very Toxic
(in dilution)	$1\% \leq C_n < 7\%$	Toxic
(in dilution)	$C_n < 1\%$	Not relevant to COMAH
Toxic substance	$C_n \geq 25\%$	Toxic
(in dilution)	$C_n < 25\%$	Not relevant to COMAH

11. So, where a solution/preparation contains 7% or more of a very toxic substance, it is treated as if it were the pure substance and the weight to be considered for COMAH application is the total weight of the preparation, not just that of the particular constituent. A very toxic constituent at and above concentrations of 1% but below 7% renders the whole solution toxic.
12. Below 1% concentration a very toxic substance becomes harmful, likewise a toxic substance below 25% concentration. This is a classification not relevant to COMAH. Some surface treatment and electroplating processes relevant to COMAH have been listed in Annex 1 along with the typical concentrations at which the toxic and very toxic substances would be used.

COMAH Aggregation Rule

13. Where no single substance present exceeds a relevant qualifying threshold and there are several dangerous substances on site, its actual quantity (q) should be aggregated with any other substances of a similar classification in accordance with the COMAH aggregation rules:

Very toxic and toxic substances are aggregated together, each as a partial fraction over the relevant qualifying threshold (Q) for their COMAH dangerous substance category (ie very toxic or toxic) as follows:

$$q^1/Q + q^2/Q + q^3/Q + q^4/Q + q^5/Q + \dots = Total$$

14. The LT qualifying thresholds for each substance present should be used first in this equation, and where the sum of the partial fractions is equal to or greater than 1, COMAH applies. The TT qualifying thresholds should then be used to check whether aggregation of the substances attract top tier status. A worked example is given in Annex 2.
15. Dangerous to the Environment: substances in solution must also be included as well as these substances in their pure form. The table below indicates the classification for the whole solution/preparation where it contains a substance 'very toxic to aquatic organisms' (N, R50, including R50/53) or 'toxic to aquatic organisms: may cause long term adverse effects in the aquatic environment' (N, R51/53) at or above the following concentration limits:

Classification	Concentration	Classification of Whole Mixture/Preparation
N R50 (inc 53) substance	$C_n \geq 25\%$	N R50 (inc 53)
(in dilution)	$2.5\% \leq C_n < 25\%$	N R51/53
(in dilution)	$C_n < 2.5\%$	Not relevant to COMAH
N R51/53 substance	$C_n \geq 25\%$	N R51/53
(in dilution)	$C_n < 25\%$	Not relevant to COMAH

16. As before, where no single substance present exceeds a relevant qualifying threshold and there are several dangerous substances on site, its actual quantity (q) should be aggregated with any other substances of a similar classification in accordance with the COMAH aggregation rules:

Very toxic and toxic to aquatic organisms substances are aggregated together, each as a partial fraction over the relevant qualifying threshold (Q) for their relevant COMAH dangerous substance category as follows:

$$q^1/Q + q^2/Q + q^3/Q + q^4/Q + q^5/Q + \dots = Total$$

17. Again, the LT qualifying thresholds for each substance present should be used first in this equation, and where the sum of the partial fractions is equal to or greater than 1, COMAH applies. The TT qualifying thresholds should then be used to check whether aggregation of the substances attract top tier status.

MAIN COMAH DUTIES

18. Depending on the total quantity of dangerous substances held, a site may be COMAH either Lower or Top Tier. The main COMAH duties are summarised below:

Duty		By	Reg.
COMAH LT & TT Operators			
General Duties	Take 'all measures necessary' to prevent major accidents and to limit their consequences to people and the environment. Any major accidents must be reported to the Competent Authority (CA).	From date COMAH first applies	4 & 15
Notification	Send to the CA. To include details on the site and the dangerous substances held.	31-01-06	6
MAPP	Prepare a Major Accident Prevention Policy document outlining the management system and measures in place to prevent major accidents and to minimise their consequences. (For TT sites, the MAPP is provided as an integral part of the Safety Report).	31-01-06	5
Share & Cooperate	Provide information to the CA and other establishments. Cooperate with other nearby COMAH operators.	See Regulations	16
COMAH TT Operators			
Safety Report	Provide a written demonstration of safety operation (i.e. that all measure necessary have been taken to prevent major accidents and to limit their consequences).	31 –10-06	7
On-Site Emergency Plan	Ensure emergency arrangements are in place for dealing with major accidents. Review, test, and if necessary, implement the emergency plan.	31 –10-06	9 11, 12
Provide Information	Send information to the Local Authority to enable an off-site emergency plan to be drawn up. Provide information for the public around the site.	See Regulations	10 14

CONSENT

19. Where COMAH does apply, consent to hold dangerous substances on site above specified thresholds is also required (from your Local Planning Authority) under the Planning (Hazardous Substances) Regulations 1992.

FURTHER GUIDANCE

20. The general COMAH page www.hse.gov.uk/comah provides further guidance on COMAH. The COMAH Notification form is also available on the HSE Surface

Engineering webpages (and can either be sent online, by email or by post). Further guidance is available:

- on CHIP and classification in 'The Chemicals (Hazard Information and Packaging for Supply) Regulations 2002', as amended (SI 2002 No.1689) (ISBN 0-11-042419-0)
- on COMAH duties in L111 (revised), 'A Guide to the COMAH Regulations' (ISBN 0-7176-6175-X)
- on writing safety reports in HSG190 'Preparing Safety Reports' (ISBN 0 7176 1687 8)
- from www.hsebooks.com (tel. 01787 881165).

21. If you wish to discuss any of the above matters further, please contact your local HSE office (area map available as a download on this webpage) and ask to speak to an inspector in the HID Chemical Industries Division.

**SOME SURFACE TREATMENT/ELECTROPLATING SUBSTANCES
RELEVANT TO COMAH**

Process	Substance	Classification	Typical conc.	Solution classification
Hard chrome	Chromium trioxide	very toxic (Oct 2005)	26%	toxic very toxic
Copper	Potassium cyanide Copper cyanide	very toxic very toxic	3.5%	toxic
Silver plate	Silver cyanide Sodium cyanide	very toxic very toxic	5% 7%	toxic very toxic
Bright cadmium	Cadmium oxide Sodium cyanide	toxic very toxic	2.5% 10%	very toxic
Passivation	Sodium Dichromate	very toxic	15%	very toxic
Nickel strip	Sodium cyanide	very toxic	11%	very toxic

Annex 2

Worked Example – COMAH application at surface treatment company

A company has a silver plating tank with **5 tonnes of solution containing 0.25 tonnes of sodium dichromate at 5% concentration**. As sodium dichromate is classified as very toxic, which needs to be at a concentration of at least 7% in solution for the overall solution to retain a very toxic classification, the **5 tonnes of solution is classified as toxic**.

Also present on site are **4 nickel striping tanks, each containing 3.5 tonnes of solution with 0.385 tonnes of sodium cyanide at 11% concentration**. As sodium cyanide is classified as very toxic, which needs to be at a concentration of at least 7% in solution for the overall solution to retain a very toxic classification, the solutions in **all 4 tanks, a total 14 tonnes, are classified as very toxic**. Therefore:

Process	Silver Plate	Nickel strip	COMAH Aggregation
Classification	Toxic	Very Toxic	
LT	$5/50 + 14/5$	$= (0.1 + 2.8) = 2.9 > 1$, so COMAH LT applies	
TT	$5/200 + 14/20$	$= (0.03 + 0.7) = 0.73 < 1$, so COMAH TT does NOT apply	

However, if the site (post 31 October 2005) in addition held 6 tonnes of chromium (VI) trioxide (very toxic):

$$6 / 20 = 0.3, \text{ plus the total } + 0.73 = 1.03 > 1 \text{ so COMAH TT applies.}$$