

BAE SYSTEMS

LAPPC Permit PPC/B/05

LAPPC Annual Report 2011

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Executive Summary

BAE Systems Submarine Solutions at Barrow-in-Furness apply more than 5 tonnes of surface coatings and use more than 5 tonnes of isocyanate based products in any 12 month period. As a result there is a legal requirement under the Environmental Protection Act to apply for a Permit to carry out these activities with the Local Authorities at the Town Hall. The permit for the site was updated and the current permit is PPC/B/05 dated November 2008.

1. Introduction

The activities covered by this Permit include all preparation, shot blasting and painting activities on site involving the vessel(s) and all processes involving nitrile tiles and casting.

The Departments involved are Subcontract Alliance Partnership (IOP) arrangement for shot blasting, painting etc. (Redhall Marine/Barrier), DDH Paint Shop, and External Sonar/Flank Array, along with the Health, Safety Environment Department and the Maintenance Department. The IOP was formerly Chieftain and Barrier however this year Chieftain was taken over by Redhall Marine.

2. Non VOC Emissions Limits

The annual monitoring of particulates and isocyanates was carried in August 2011. This was done slightly out of the 12 month period allowed for monitoring given in the permit, the reason for this was to measure the actual emission of isocyanates from the flank array process rather than a simulated emission at the request of Barrow Council. The monitoring was carried out by EPA environmental consultants and the report was issued to Barrow Council on 6-10-11, no emission limits were exceeded.

3. Reduction Scheme

BAE Systems Submarine Solutions has adopted the Solvent Reduction Scheme to minimise the use of solvents on site. The information on the paint and adhesives used between the 1st November 20010 and 31st October 2011 are collated separately as required and are attached to this report.

BAE Systems Submarine Solutions emissions are within the targets set by the guidance. The emission of solvents from painting activities this year was 6.293 tonnes compared to last year's emission of 8.84 tonnes. The solvent emission from adhesive use this year was 841 kg compared to last year's emission of 1,621 kg. The reduction is largely due to the fluctuations in the boat program as for the majority of this year Ambush was situated in the dock and all of its painting was complete beforehand.

4. Future Reduction Issues

The 2010 internal audit identified that BAE Systems were delinquent in reviewing the solvent cleaning process to try and identify ways in reducing solvent usage. As a result quarterly meetings are now held between the Matt Roskell (Environmental Advisor) and John Hargreaves (Project Leader for surface coatings). These meetings look into what measures can be taken to reduce solvent emissions during the cleaning process. A copy of the findings from these meetings will be submitted with this report.

5. Designated Risk Phrase Material – Methylene Chloride (R40)

Last year was the first year the formula below was used to calculate the mass flow of the discharges of Methylene Chloride. This formula was used as it was more accurate than the previous method. This is because the previous method involved weighing the amount that was sprayed into drums directly from the spray guns. This spray also contained the polyurethane that was being cleaned out and hence did not give a true reflection of the Methylene Chloride that was being lost to atmosphere. Both last year and this, the Methylene Chloride has been used more efficiently than previous years.

The consequences of the more efficient use of the CH_2Cl_2 are that the material sent for disposal as CH_2Cl_2 has a much higher level of contamination within the mixture.

More waste as CH_2Cl_2 was disposed of than CH_2Cl_2 was input into the Company, thus giving rise to the requirement to change the previous assessment method.

We have been able to adapt a formula used by the USAAF for the calculation of the evaporation of the rocket fuel hydrazine.

This calculation gives an absolute figure related to several measure factors; the important one being the time of exposure of CH_2Cl_2 to atmosphere.

All we need once the evaporation flux rate is calculated is to make adjustment for area and then all that is needed is to relate to the time of exposure, which is given from the average time it takes to “flush” the system.

Evaporation Flux rate
For
Dichloromethane

Parameters

The evaporation of the CH₂Cl₂ during the usage within the Devonshire dock complex is not influenced by a wind speed just above the liquid surface.

The exposure time of CH₂Cl₂ was calculated last year to be 2 minutes 20 seconds; the check this year gave the same result.

CH₂Cl₂ vapour pressure @ 20°C is 348.9 mm of Hg .

Hydrazine vapour pressure @ 20°C is 12.38 mm Hg.

CH₂Cl₂ molecular wt. 84.93

Equation to calculate evaporation flux using USA Air Force / US EPA / & in the manner of Stiver & McKay.

$$1) E = (4.161 \times 10^{-5}) u^{0.75} TF M (PS / PH)$$

where: E = evaporation flux, (kg / minute) / m² of pool surface
u = wind speed just above the liquid surface, m / s
TA = ambient temperature, °K
TF = pool liquid temperature correction factor
TP = pool liquid temperature, °C
M = pool liquid molecular weight
PS = pool liquid vapour pressure at ambient temperature, mm Hg
PH = hydrazine vapour pressure at ambient temperature, mm Hg

$$\text{If } TP = 0 \text{ } ^\circ\text{C or less, then } TF = 1.0$$
$$\text{If } TP > 0 \text{ } ^\circ\text{C, then } TF = 1.0 + 0.0043 TP^2$$

Inputting values:-

$$TF = 1 + 0.0043 \times 202 = 2.72$$

$$U = 1 \text{ default}$$

$$E = (4.161 \times 10^{-5}) (1) \times 2.72 \times 84.93 (348.9/12.38)$$

The evaporation flux rate of dichloromethane @ 20°C is 162539.65 g /hour per m²

The pool area of evaporation is taken to be 50mm diameter lid (it will in practice be smaller than this but it will be taken as worst case).

$$0.025E2 \times \pi = 0.0019634 \text{ m}^2$$

$$0.0019634 \times 162539.65 = 319.145 \text{ g / hour}$$

As the exposure as measured only lasts 2 minutes and 20 seconds out of each hour then the actual release of CH₂Cl₂ calculated as

$$2.33/60 \times 319.145 = 12.3948 \text{ g /hour}$$

Therefore the release of CH₂Cl₂ to atmosphere at Devonshire dock complex has not exceeded 12.4 g / hour in the period between November 2010 and November 2011.

6. Di-Isocyanate

The strict requirements for the quality of the conformal bond and casting material are such that there are never any issues with ensuring the catalyst reacts with the correct amount of base product. Samples are taken regularly to check the quality of the material poured and records are kept of every step of the process. Therefore, the quality requirements also ensure the environmental requirements are met.

7. Other Provisions

The replacement of the extraction fans in the NAS, which in previous years had been the cause of noise complaints, has now been completed on 3 bay NAS.

8. Control Techniques

As shown during the recent internal audit BAE Systems are demonstrating good working practices with regards to minimising the release of solvents into the atmosphere during all steps of the processes including waste storage and disposal.

9. Air Quality

All stacks meet the requirement of the permit.

10. Appropriate Management Systems

In November 2011 BAE Systems Submarine Solutions went through a re-certification audit conducted by LRQA. This was to assess whether the company can be re-certified to the ISO 14001 Environmental Management System. The result of the audit was that BAE Systems have been recommended for re-certification.

11. Other Issues

The replacement of the water wash spray booth in the DDC paint shop has now been completed and commissioned. There were some problems initially with the plant; however these problems did not result in any fugitive emissions. The issue was that the filters were becoming blocked too quickly and nothing was being extracted and discharged to air. The monitoring results actually showed a small improvement in the amount of particulate that was being extracted compared to last years results.

A new extraction stack was erected on the paint shop this year. The emissions are from a new shot blasting facility and hence only extract air and particulate matter. The stack was initially erected with a cowl that did not discharge vertically and as a result did not comply with the permit. The council were informed and gave BAE Systems 1 month to alter the plant. This was done within the timescale and observed by the council during their visit to observe the stack monitoring in August. The monitoring on the new stack showed that very little particulate matter was being discharged and hence was well within the limits set by the permit.

At the start of the year BAE Systems received two noise complaints from the same individual on Walney. As a result Matt Roskell (Environmental Advisor) came in on nightshift to conduct noise monitoring. The result of the monitoring showed no obvious excessive noise. The individual was advised to contact the council if he wished to take the matter further as BAE Systems didn't believe that they were making excessive noise and had received no other complaints. On discussions with the council during their site inspection in March 2011 Anne Pearson and Damon Pearson confirmed that they had received no noise complaints about BAE Systems.