

**BAE SYSTEMS**

**LAPPC Permit PPC/B/05**

# *LAPPC Annual Report 2012*

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## **Executive Summary**

BAE Systems Maritime – Submarines (BAESMS) are required to submit a report along with a solvent management plan each year in order to comply with the conditions of the Part B permit. This year no emission limits were breached and both of the solvent management plans show that the actual amount of VOC emitted was well below the maximum target emissions. This year has also seen a variation to the permit with the tiling and casting process no longer coming under the surface coatings authorisation. An exemption under triviality was claimed by BAESMS so there was no requirement for an isocyanate processes permit.

### **1. Introduction**

BAE Systems Maritime – Submarines (BAESMS) apply more than 5 tonnes of Volatile Organic Compounds (VOCs) to the surfaces of the product contained in various paints and solvents over a twelve month period. As a result BAESMS are required under the Environmental Permitting Regulations to comply with the conditions of a Part B permit.

The activities covered by this Permit include all preparation, shot blasting and painting activities on site involving the vessel(s). Previously this permit also covered the tiling and casting activities, however after discussion with the regulatory body (Barrow Borough Council) it was agreed that this was not a surface coating activity as described in PG 6/23 (11) and was exempt from permitting as an isocyanate activity due to triviality. As a result the permit was amended in November 2012 to reflect this.

The Departments affected by the permit are the Integrated Outfit Package (IOP) arrangement for shot blasting, painting etc. (Redhall Marine/Barrier), DDH Paint Shop, the Safety, Health and Environment Department and the Maintenance Department. The IOP was formerly Chieftain and Barrier however last year Chieftain was taken over by Redhall Marine.

### **2. Non VOC Emissions Limits**

The annual monitoring of particulates and isocyanates was carried out in September 2012. The isocyanates were monitored at this time as they were still listed on the active permit. Now the permit has been updated there will no longer be cause to monitor for isocyanates. The report was issued to the Council on the 8<sup>th</sup> of October 2012; all results were found to be within the specified limits.

### **3. Reduction Scheme**

BAESMS complies with the Solvent Emissions Directive through the solvent reduction scheme. This requires BAESMS to log the use of paints, adhesives and solvents containing VOCs that are applied to the product in a solvent management plan. The management plan for 2012 contains data from the 1<sup>st</sup> of November 2011 until 31<sup>st</sup> October 2012.

The management plan calculates a target value for VOCs based on the total amount of paints, adhesives and solvents used during the year. This year the target value for VOCs from painting activities was: 10.4 tonnes, the actual emission was 7.5 tonnes meaning that BAESMS were well within the target limit. For adhesive activities the target emission was: 1.1 tonnes and the actual emission was 0.66 tonnes, meaning again that BAESMS were well within the target value.

#### **4. Designated Risk Phrase Material – Methylene Chloride (R40)**

BAESMS use Methylene Chloride to clean residual polyurethane from the casting machines. As this is an activity directly associated with tiling and casting there will no longer be a requirement to report on it. However, the methods used by BAESMS to minimise emissions of this substance will not change. The rate of release of Methylene Chloride can be calculated.

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  $\text{CH}_2\text{Cl}_2$  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 CH<sub>2</sub>Cl<sub>2</sub> during the usage within the Devonshire dock complex is not influenced by a wind speed just above the liquid surface.

The exposure time of CH<sub>2</sub>Cl<sub>2</sub> was calculated last year to be 2 minutes 20 seconds; the check this year gave the same result.

CH<sub>2</sub>Cl<sub>2</sub> vapour pressure @ 20°C is 348.9 mm of Hg .

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

CH<sub>2</sub>Cl<sub>2</sub> 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 ) / m<sup>2</sup> 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 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 m<sup>2</sup>

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 CH<sub>2</sub>Cl<sub>2</sub> calculated as

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

Therefore the release of CH<sub>2</sub>Cl<sub>2</sub> to atmosphere at Devonshire dock complex has not exceeded 12.4 g / hour in the period between November 2010 and November 2011.

## 5. Permit Change

After discussion with the permitting officer from Barrow Council it was agreed that the di-isocyanate casting process could not remain under the umbrella of the surface coatings authorisation as by definition in PG 6/23 (11) it couldn't be classed as a surface coating activity. This would mean that potentially BAESMS would require another permit for di-Isocyanate activities unless an exemption could be claimed under triviality.

The exemption for triviality was claimed and to do this BAESMS had to prove that minimal Isocyanates were emitted to atmosphere; this was done through the historical annual monitoring done over a number of years. In fact during this monitoring the levels that were actually emitted to atmosphere could not be detected they were so low, as the di-isocyanates are mixed in a closed system so none are lost to atmosphere. Also BAESMS do not use blowing agents in the process so no ozone depleting substances are released as part of the process.

By proving these requirements BAESMS met the conditions of the exemption and as a result did not require another permit for di-isocyanate activities.

## **6. Control Techniques**

BAESMS adhere to the control techniques specified in the permit to minimise fugitive releases. This has been demonstrated this year during internal audits carried out by the SHE department, external audits carried out by LRQA and the annual inspection from the council. One discrepancy that was noted this year was in the terminology of the permit where it stated that thinners when used on wipes must be dispensed by a piston dispenser. In PG 6/23 (11) it states that they must be dispensed either by piston dispenser or similarly contained device. BAESMS use anti-spill reservoir bottles rather than piston dispensers; a request was put in to modify the permit to reflect this. This modification was incorporated in the latest permit variation in November.

## **7. Air Quality**

All of the emissions stacks on site continue to meet the requirements of the permit.

## **8. Appropriate Management Systems**

BAESMS continue to achieve ISO 14001 certification, this is accredited each year by LRQA. This environmental management system requires the company to continually improve its practises to keep the certification, this is something that BAESMS demonstrate each time they are recommended for re-certification.

## **9. Other Issues**

Some complaints were received during the spring and summer months over noise and odour allegedly coming from the shipyard. Each complaint was investigated separately. The odour complaint was received while SMITE was in a trial period so the investigation centred on that area, however at the time the complaints were made there were no unusual boiler activities and there were no fuel deliveries. There wasn't any smell noticeable on site either leading to the conclusion that the smell didn't originate from BAESMS.

BAESMS received a couple of noise complaints in close proximity, again this was at a time when SMITE trials were being conducted so originally the investigations centred around SMITE. There were no apparent unusual noises coming from SMITE. This led the investigation to look at other areas of site where it was found that an extraction fan was being used for the first time in a long time and was rattling. The extraction was switched to a different fan and the rattling fan was switched off and fixed.