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Our Ref. 4RS-SF-060557-K42330

Your Ref.

6th October 2006

Mr. Matt Smyth,
Smyth Composites,
Panmure Industrial Estate,
Carnoustie,
Angus,
DD7 7NP.

Dear Matt,

Re. Toxicity Testing of 'Phenclad'

Please find enclosed 4-RAIL Services Limited Report reference 4RS-RH0060557-R144651 relating to the quantitative and qualitative analysis of the material as described above.

The toxic fume emission requirements detailed in London Underground Limited Standard Number 2-01001-002 Fire safety performance of materials, Section 5.2.3, deals with the chemical composition that is required for materials with respect to Toxic Fume Emission Requirements. This section states that for unrestricted use of a material, neither it nor its constituents shall have deliberately incorporated by selection, addition or modification any significant amounts of organically bound halogens, nitrogen sulphur or phosphorous.

Trace levels of such chemical groups are acceptable – the criterion for 'trace level' shall be that the summation of the weight for weight percentage of the chemical group divided by the atomic weight for the group shall not exceed 0.015%.

Quantitative analysis of the sample showed that it contained sulphur at a level of 0.91%. Qualitative analysis also showed that the sample also contained phosphorous, the amount of this element present was not quantified. Therefore the value of the summation detailed in the standard will be greater than the 0.015 permissible for 'trace level'.

It is therefore 4-RAIL Services opinion that the material may not be suitable for its intended application with regard to toxic fume emission in the event of a fire, as the sample did not fulfil the requirements for 'trace level', as defined in London Underground Limited Standard Number 2-01001-002 Fire safety performance of materials. However, it should be noted that the test results obtained should always be viewed in conjunction with flammability and smoke emission properties of the materials to determine any potential fire hazard and that final approval of a material can only be made by the regulating departments of the rail service operating company concerned.

I hope that this information is sufficient, but if you require any further information please let me know.

Yours sincerely,

Sara Finch
Materials Consultant

Enc.



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Report No. 4RS-RH-060557-R144651

QUANTITATIVE AND QUALITATIVE ANALYSIS OF ONE SAMPLE (REF: PHENCLAD)

Prepared for: *Matt Smyth*
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Issue Date: *5th October 2006*

Prepared by: *Miss R. Hayes*
Technologist

Signature: *R Hayes*

Certified by: *S. Finch*
Materials Consultant

Signature: *Para Rail*

CONDITIONS OF ISSUE OF REPORTS.

THIS REPORT IS ISSUED IN CONFIDENCE AND SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT WRITTEN APPROVAL FROM 4-RAIL SERVICES.

FURTHER INFORMATION.

REQUESTS FOR ADDITIONAL INFORMATION ON THE SUBJECT OF THIS REPORT OR OTHER QUERIES SHOULD BE ADDRESSED TO THE AUTHOR

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1. Introduction

One sample, as detailed below, was received on 13th September 2006 for elemental analysis.

4-RAIL SERVICES SAMPLE NO.	SAMPLE DESCRIPTION
060557/1	Phenclad <i>Red GRP</i>

The unused portion of the sample will be retained for a period of six months from sample receipt.

2. Test Methods

4R-E207 ISSUE 8

Quantitative analysis of samples for Nitrogen, Carbon and Sulphur using the Carlo Erba EA1108 Elemental Analyser.

4R-E208 ISSUE 7

Qualitative examination of specimens by Scanning Electron Microscopy and Energy Dispersive analysis of emitted X-rays.

3. Results

The results of quantitative and qualitative analyses are given in Tables 1 and 2 respectively.

Figure 1 shows the spectrum obtained by SEM X-ray analysis of the sample.

4. Experimental Considerations

A quality control standard containing thiourea is used during quantitative analysis. The following recoveries were calculated for the three determinants:

- 98.34% Nitrogen
- 101.27% Carbon
- 99.26% Sulphur

The accuracy of the quantitative analyses is also determined by running samples in duplicate.

Calibration of the X-ray lines used for qualitative analysis is carried out monthly.

Table 1 Quantitative Analysis

Date of analysis: 02/10/06

4-RAIL SERVICES SAMPLE No.	SAMPLE DESCRIPTION	N(%)*	C(%)*	S(%)*
060557/1	Phenclad Red GRP	<0.11	49.31	0.91

* Mean results for nitrogen, carbon and sulphur are reported.

Table 2 Qualitative Analysis

Date of analysis: 25/09/06

4-RAIL SERVICES SAMPLE NO.	SAMPLE DESCRIPTION	Elements Detected
060557/1	Phenclad Red GRP	C, O, Na, P, S

Figure 1: X-Ray Spectrum of Sample No. 060557/1 (Ref: Phenclad)

