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Odour Impact Assessment

Client:	BAE Systems (Operations) Ltd
Project:	Thermocouple Calibration Instrumentation Room (2 Shed)
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Audit Trail

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00-10-10 Project Definition

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24-MEC-1222-10

00-10-102 Project Title:

Thermocouple Calibration Instrumentation Room (2 Shed)

00-10-103 The Client & End-User

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00-10-20 Project Documents

00-10-201 Document Summary

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Odour Impact Assessment Report

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Stage 1 – Odour Assessment

00-10-202 Reference Documents

Reference	Description	Issue	Format
24S0052-BAES-002-2-DR-F-001_A	Planning application location plan	-	pdf
24S0052-BAES-002-2-DR-F-002_B	Planning application LEV proposed plan and elevations	-	pdf
-	COSHH Exposure Benchmark Assessment - Instrumentation TC Calibration	-	docx
-	Elmotherm 009-0008 (Varnish MSDS)	-	pdf
ID24-150876BTR2	BAE Systems (Nederman quote)	-	pdf
-	Jupiter ISOTECH	-	pdf
-	KF159b (Thermocouple wire)	-	pdf
-	NF151 (BCS-1181) (Thermocouple wire)	-	pdf
-	Pegasus ISOTECH	-	pdf

00-10-203 Relevant Drawings

Reference	Description	Issue	Format
n/a			

00-10-204 Reference Drawings

Reference	Description	Issue	Format
n/a			

00-10-30 Project Introduction

00-10-301 Purpose of report

This assessment supports the planning application for replacement of the existing LEV 058 at the 2 Shed Instrumentation facility in Samlesbury.

Most odours are mixtures of many chemicals that interact to produce what we detect as a smell. A distinction should be made between: odour-free air, containing no odorous chemicals; and fresh air, usually perceived as being air that contains no chemicals or contaminants that are unpleasant (i.e. air that smells 'clean').

Fresh air may contain odorous chemicals, but these odours will usually be pleasant in character, such as freshly-mown grass or sea spray. Perceptions of an odour - whether it is found to be acceptable, objectionable or offensive - are partly innate and hard-wired, and partly determined through life experiences and hence can be subjective to the individual.

00-10-302 Scope and Objectives

This assessment will conduct a desktop validation of the LEV system against specific local authority criteria. The objectives include verifying that discharged air releases to a safe location without re-entering buildings, confirming appropriate discharge velocity for proper dispersion, validating stack height specifications, ensuring protection against water ingress, and assessing potential odour impacts on residential premises.

00-10-40 Project Background

00-10-401 Description of Process

The LEV system will serve a dry calibration process for thermocouples which have been previously varnished with 0.5 mL of Elmotherm 009-0008 varnish. This calibration activity will be conducted within the 2 Shed Instrumentation facility at Samlesbury Aerodrome. The calibration will take place within new Jupiter (35 to 660°C) and Pegasus (120 to 1200°C) ISOTECH calibrators, with one of each installed in the facility. Both calibrators can operate simultaneously with each calibration lasting 8 to 10 h.

The proposed system will replace the existing LEV 058, featuring a partial enclosure (1m x 1.2m) with a face velocity exceeding 0.5 m/s and total airflow of 2160 m^3/hr. The system will maintain transport velocities exceeding 10 m/s with appropriate inlet/outlet duct diameters (250mm and 224mm respectively.

00-10-402 Relevant information

00-10-402/1 Description of the Location of Receptors and their Relative Sensitivities to Odour Effects

The following table presents the location of sensitive to odour receptors.

Table 10.401 – Location of Receptors and Relative Sensitivity

Location of Receptor	Relative Sensitivity
	(House) High
	(Farm) Low

	(Pub/Restaurant/hotel) Medium
	(Industrial) Low

00-10-402/2 Wind Direction

Figure 10.401 – E, ESE, SE (source Willy Weather NW PR5) – using 5-day forecast

00-10-403 Methodology

This odour assessment utilizes established methodologies to evaluate potential impacts from the thermocouple calibration process:

00-10-403/1 FIDOL Assessment Framework

The FIDOL (Frequency, Intensity, Duration, Offensiveness, Location) framework provides a structured approach to evaluating odour impacts. This methodology considers how often an odour might be detected, its strength, how long it lasts, the unpleasantness of the odour character, and the sensitivity of the location affected. The assessment applies these factors to determine the overall significance of potential odour effects on nearby receptors.

00-10-403/2 Institute of Air Quality Management (IAQM) Impact Descriptors

The assessment employs IAQM's standardized odour effect descriptors to classify the magnitude of potential impacts. This methodology establishes a clear relationship between odour exposure (concentration and frequency) and receptor sensitivity, allowing for consistent categorization of impacts as negligible, slight, moderate, or substantial. These descriptors provide an objective basis for determining the significance of predicted odour effects.

00-10-403/3 H1 Screening Methodology

The Environment Agency's H1 risk assessment approach is utilized to evaluate the potential environmental significance of emissions. This screening tool provides a standardized method for comparing predicted process contributions against relevant environmental standards. The assessment applies this methodology to determine whether emissions from the thermocouple calibration process remain below significance thresholds at nearby sensitive receptors.

00-20-10 Substance Identification and Characteristics

00-20-101 Elomtherm 009-0008 Substance Composition

Elomtherm 009-0008 is an insulation varnish used in industrial applications where thermal and electrical insulation is required. It is designed to provide protective coatings for electrical components and withstand high temperatures without degradation.

The varnish is primarily composed of solvents and resins, with the solvents functioning as carriers to facilitate application and drying. Upon exposure to heat, these solvents evaporate, leaving behind a protective polymeric coating.

The main volatile components in the varnish, which may contribute to emissions upon heating, include:

- **Xylene**, CAS 1330-20-7 (Between 25 and 30% w/w): A common solvent used for thinning and application, known for its volatility and ability to dissolve resins.
- **Reaction mass of ethylbenzene and xylene** (Between 25 and 30% w/w): A combination of aromatic hydrocarbons that enhance the varnish's spreading ability and drying properties.
- **2-pheylphenol**, CAS 90-43-7 (Between 0.25 and 0.5% w/w): An aromatic compound often used as an additive to modify the performance characteristics of the final coating.
- **Cobalt bis(2-ethylhexanoate)**, CAS 136-52-7 (Between 0.1 and 0.25% w/w): A metal-based compound that may act as a catalyst or stabiliser in the curing process of the varnish.

The Elmotherm 009-0008 varnish presents several potential hazardous reaction scenarios that must be considered in the risk assessment:

- The material must be kept away from oxidizing agents, strongly acidic or alkaline materials, and amines, as these could trigger unwanted chemical reactions.
- Vapours released from the varnish may form explosive mixtures with air, particularly in confined spaces where adequate ventilation is not maintained.
- Under thermal decomposition conditions, the material will produce several hazardous byproducts including carbon dioxide (CO_2), carbon monoxide (CO), oxides of nitrogen (NO_x), and dense black smoke.

Table 20.101 – Odour Thresholds and Characteristics for Elmotherm Varnish

Substance	CAS#	Odour Threshold	Odour Description
M-Xylene	108-38-3	0.05ppm	Sweet aromatic
p-xylene	106-42-3	0.08ppm	Sweet aromatic
o-xylene	95-47-6	0.5ppm	Sweet aromatic
Mixed Xylene	1330-20-7	0.05-3.7ppm	Sweet aromatic
Reaction mass inc. Ethylbenzene	Not specific	0.4 – 2.3ppm	Aromatic, gasoline-like
2-phenylphenol	90-43-7	0.1-0.3ppm	Phenolic Odour

Cobalt bis(2-ethylhexanoate)	136-52-7	Not found	Not determined
Other similar Cobalt compounds (as a reference)	Various	0.01 – 2ppm	Little to no odour. Fruity metallic, sharp. Mild petroleum

00-20-102 Potential Decomposition Products from Thermocouple Insulating Materials

The thermocouples used within the calibration process (KF159 Type K and NF151 Type N) incorporate high-temperature fibreglass insulation rated for temperatures up to 700°C. Testing operations will utilise the Pegasus high-temperature calibrator with capabilities up to 1200°C, which exceeds the rated temperature limits of the fibreglass insulation materials.

00-20-102/1 Possible Decomposition Products from Fibreglass Insulation Components

Organic Binders and Coatings: When operating above the rated temperature of 700°C, thermal degradation of organic components is likely to occur, potentially releasing:

- Carbon monoxide (CO) and carbon dioxide (CO_2)
- Various volatile organic compounds (VOCs)
- Formaldehyde (from formaldehyde-based resins)
- Acrolein and other aldehydes
- Phenol (from phenolic resins)
- Styrene (from polyester resins)

Flame Retardants and Additives: At temperatures approaching 1200°C, thermal breakdown of additives may release:

- Hydrogen halides (HCl, HBr) from halogenated flame retardants
- Phosphorus oxides from phosphate-based flame retardants
- Boron compounds from boron-containing additives

Fluoropolymer Coatings (if present): If the thermocouple wires incorporate fluoropolymer coatings such as PTFE/Teflon, temperatures above 350-400°C could generate:

- Hydrogen fluoride (HF)
- Carbonyl fluoride (COF_2)
- Perfluoroisobutylene (PFIB) and other fluorinated compounds

Table 20.102 – Odour Thresholds and Characteristics from Possible Decomposition Products from Fibreglass Insulation Components

Substance	CAS#	Odour Threshold	Notes
Carbon monoxide (CO)	630-08-0	Odourless	No warning properties by smell
Carbon dioxide (CO_2)	124-38-9	Odourless	No warning properties by smell
Formaldehyde	50-00-0	0.05-1.0 ppm	Pungent, irritating odour
Acrolein	107-02-8	0.02-0.4 ppm	Extremely pungent, choking odour
Phenol	108-95-2	0.04-5.0 ppm	Sweet, medicinal, tar-like odour
Styrene	100-42-5	0.05-0.2 ppm	Sweet, sharp, plastic-like odour
Hydrogen chloride (HCl)	7647-01-0	0.3-3.0 ppm	Pungent, irritating odour
Hydrogen bromide (HBr)	10035-10-6	2-5 ppm	Sharp, irritating odour
Phosphorus pentoxide (P_2O_5)	1314-56-3	Not available	Typically no distinct odour
Hydrogen fluoride (HF)	7664-39-3	0.03-3.0 ppm	Sharp, irritating odour
Carbonyl fluoride (COF_2)	353-50-4	Not available	Not available
Perfluoroisobutylene (PFIB)	382-21-8	Not available	Not available
Silicon dioxide (SiO_2)	7631-86-9	Odourless	No warning properties by smell

00-20-102/3 Possible Decomposition Products from Perfluoroalkoxy (PFA) Insulation Components

When PFA (Perfluoroalkoxy alkane) insulation materials are exposed to temperatures exceeding their thermal stability limit (typically above 260-300°C), significant decomposition occurs. Given that the Pegasus calibrator operates at temperatures up to 1200°C, any PFA components exposed to these extreme temperatures would undergo severe thermal degradation.

The thermal decomposition of PFA at elevated temperatures generates several hazardous fluorinated compounds:

- Hydrogen fluoride (HF) - a highly corrosive and toxic gas
- Carbonyl fluoride (COF_2) - readily hydrolyses to form HF and CO_2
- Tetrafluoroethylene (TFE)
- Hexafluoropropylene (HFP)
- Perfluoroisobutylene (PFIB) - extremely toxic, with toxicity comparable to phosgene
- Carbon tetrafluoride (CF_4)
- Perfluorocarbons (PFCs)
- Particulate fluoropolymer fragments

Table 20.103 – Odour Thresholds and Characteristics from Possible Decomposition Products from Perfluoroalkoxy (PFA) Insulation Components

Substance	CAS#	Odour Threshold	Notes
Hydrogen fluoride (HF)	7664-39-3	0.03-3.0 ppm	Sharp, irritating odour; highly corrosive
Carbonyl fluoride (COF_2)	353-50-4	Not well established	Hydrolyses to HF and CO_2 in moist air
Tetrafluoroethylene (TFE)	116-14-3	Not well established	Slightly sweet odour; extremely flammable
Hexafluoropropylene (HFP)	116-15-4	0.5-1.0 ppm	Characteristic sweet odour
Perfluoroisobutylene (PFIB)	382-21-8	Not well established	Extremely toxic; limited odour warning
Carbon dioxide (CO_2)	124-38-9	Odourless	Asphyxiant at high concentrations
Carbon monoxide (CO)	630-08-0	Odourless	Toxic gas; no warning properties
Perfluoroalkyl ethers	Various	Not well established	Various short-chain perfluorinated compounds

00-20-104 Control and Mitigation Measures

00-20-104/1 Primary LEV System Controls

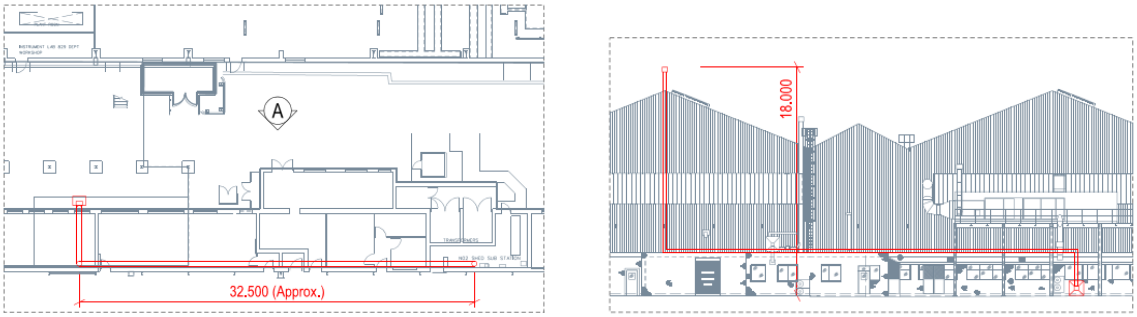
The LEV system aims to capture and remove airborne contaminants generated during the thermocouple calibration process. The system will feature a partial enclosure measuring 1200mm wide × 1000mm height × 600mm depth. This enclosure will maintain a face velocity exceeding 0.5 m/s at the opening, which aligns with HSG258 guidance for capturing vapours and fumes from this type of process. The system delivers a total extraction capacity of 2,160 m³/h. The fan unit will be housed externally within an acoustic enclosure located externally at floor level.

00-20-104/2 Discharge Configuration

The extracted air will discharge via a stack positioned above roof level (Figure 10.102). The discharge point will incorporate a high velocity weatherproof cowl aimed at preventing rain ingress while maintaining discharge velocity.

A sound attenuator will be integrated into the discharge ductwork. A fire damper will be incorporated into the installation to meet building safety requirements and prevent potential fire spread through the ductwork system.

Figure 20.101 – Discharge Configuration



00-20-104/3 System Monitoring and Safety Features

The LEV system will include an airflow indicator to provide visual confirmation of system operation. A dedicated control panel will house the on/off functionality with integrated light switching for the enclosure illumination. The panel will also display run/fault signals from the fan, allowing operators to verify system status.

The fan will incorporate a variable speed drive, permitting adjustment of extraction rates as required by process conditions and enabling energy optimisation during operation.

00-20-104/4 Commissioning and Maintenance

The system will undergo full commissioning in accordance with COSHH regulations and HSG 258 legislative guidance. Upon completion, the system will receive certification documenting its performance characteristics. Operating and maintenance documentation will be provided, detailing inspection and service requirements.

00-30-10 Emission Calculation

The thermocouple calibration process involves several potential emission sources that must be considered when evaluating odour exposure. The Pegasus calibration system utilises four test wells, each measuring 130 mm depth with a diameter of 6 mm, yielding a volume of 3.71 mL per well. Whilst the Jupiter system has 6 wells all 140 mm deep. During the calibration process, which typically lasts up 8 to 10 hours. Each well can have up to 1 thermocouple wire which has been varnished with up to 0.5 mL of Elmotherm 009-00008.

The thermocouple probes themselves contribute additional material that could potentially generate emissions under high-temperature conditions. The fibreglass insulation material present is calculated at a maximum volume of 0.000002783 m³ per well, based on a 3 mm probe with 3 mm insulation thickness. For probes with PFA insulation, the volume is calculated at 0.00000184 m³ per well, assuming a probe diameter of 1.5 mm.

The proposed control system consists of two primary components operating in conjunction; the cooling system will provide an airflow of 0.6 m³/hr directly at the test wells to reduce thermal emissions, while the LEV system operates at 2,160m³/hr to capture and remove any vapours or decomposition products generated during the calibration process.

00-30-101 Olfactory Benchmark Analysis

Based on the materials involved, xylene from the varnish presents the highest potential for odour emission during normal operation, with the lowest odour threshold among the identified compounds. Therefore, odour exposure calculations focus solely on the worst-case substance to represent maximum potential impact.

According to the MSDS, the varnish applied prior to the thermocouple calibration has a density of 0.95 g/mL. Given that the maximum volume of varnish per thermocouple is 0.5 mL, there is a total mass of 0.48 g of varnish. Assuming complete decomposition in hour 1 (out of 8 - 10 hr test period) and both Pegasus and Jupiter units operating at maximum capacity, the maximum amount of substance emitted can be calculated as:

- Xylene (30% w/w): 0.48g of varnish x 0.3 = 0.14 g = 144 mg
- Considering 10 wells: 144 mg x 10 = 1,400 mg
- Therefore:

$$C = \frac{Total\ mass\ of\ Xylene}{Total\ airflow\ x\ Process\ time} = \frac{1{,}400\ mg\ of\ Xylene}{2160\ \frac{m^3}{h}\ x\ 1h} = 0.67\ \frac{mg}{m^3}$$

This is equal to 0.154 ppm of Xylene in air which, compared to the odour threshold of 0.05 ppm, represents approximately 3.1 odour units - a detectable but relatively faint smell for most individuals.

For odour assessment purposes, the established olfactory benchmark for 'faint' odours is a 98th percentile concentration (C98) of 0.5 Odour units/m³ (Figure 30.101). Based on the calculated emissions from the thermocouple calibration process, the worst-case scenario for odours arising from the varnish evaporation is categorised as 'faint' or <5 ou/m³ at the stack outlet. Given that the nearby house is classified a high sensitivity receptor, the odour impact is described as moderate.

00-30-102 Environmental Impact Assessment

Using the basic H1 screening methodology as a rudimentary modelling approach to determine potential effects on public health and the environment, the following calculations were performed:

The mass emission rate of xylene was calculated as: 0.67 mg/m³ × 2,160 m³/hr = 1,447.2 mg/hr = 0.000402 g/s.

For assessment purposes, the xylene odour threshold of 0.05 ppm was converted to 260 µg/m³ for use with the H1 assessment tool. An effective stack height of 0 m was considered. This represents the concentration limit below which odours would not be detectable.

The assessment yielded the following results:

- Short-term time-adjusted process contribution to air (1 hour): 1.6 µg/m³ against the 260µg/m³ threshold
- Long-term time-adjusted process contribution (8 hours): 0.085 µg/m³ against the 260 µg/m³ threshold

Applying the H1 methodology demonstrates that the impact of the discharge is well below the odour threshold concentration and can be classified as not significant. The calculated process contributions represent just 0.60% of the threshold value for short-term exposure and 0.033% for long-term exposure. These values indicate that even under worst-case operating conditions, the emissions from the thermocouple calibration process will not create perceptible odours at ground level in the surrounding environment.

Figure 30.101 – Odour effect descriptors for impacts predicted by modelling – "Most Offensive" odours. High sensitivity receptor = moderate impact (at discharge), reducing to Negligible after H1 screening test

Odour Exposure Level C_{98}, ou_E/m^3	Receptor Sensitivity		
	Low	Medium	High
≥10	Moderate	Substantial	Substantial
5-<10	Moderate	Moderate	Substantial
3-<5	Slight	Moderate	Moderate
1.5-<3	Negligible	Slight	Moderate
0.5-<1.5	Negligible	Negligible	Slight
<0.5	Negligible	Negligible	Negligible

It should be noted that the Table applies equally to cases where there are increases and decreases in odour exposure as a result of this development, in which case the appropriate terms "adverse" or "beneficial "should be added to the descriptors.

00-30-103 Qualitative representation using Source – Pathway – Receptor

The assessment considers a single vertical discharge source at roof level with a stack height extension of 3 meters. The odour threshold at the source is categorised as 'faint' with a concentration of <5 ou/m³.

The primary exposure pathway extends approximately 81 meters against the prevailing wind direction. The closest sensitive receptor is a residential property, classified as a high sensitivity receptor due to its permanent occupation and high amenity expectations.

The impact on receptors was evaluated using the established FIDOL factors (Frequency, Intensity, Duration, Offensiveness, Location)(Figure 30.102):

- **Frequency**: The thermocouple calibration process operates for a maximum of 8 hours per day, with peak emissions occurring for approximately 1 hour during this period. This represents a relatively low frequency of exposure for nearby receptors.
- **Intensity**: Calculations indicate that even at the source, odour concentrations remain below the minimum odour threshold. After atmospheric dispersion over 81 meters, the concentration at the receptor position would be substantially lower, resulting in low intensity.
- **Duration**: The calibration process operates on a daily basis during normal working hours, providing potential for regular exposure, though at extremely low concentrations.
- **Odour unpleasantness**: The primary odorous component (xylene) has a characteristic aromatic odour that is generally considered unpleasant at concentrations above the detection threshold, warranting a high unpleasantness rating for assessment purposes.
- **Location**: The receptor is in a residential setting with high amenity requirements where the expectation for air quality is elevated.

Figure 30.102 – Assessment using FIDOL factors

Frequency	How often an individual is exposed to odour
Intensity	The individual's perception of the strength of the odour
Duration	The overall duration that individuals are exposed to an odour over time.
Odour unpleasantness	Odour unpleasantness describes the character of an odour as it relates to the 'hedonic tone' (which may be pleasant, neutral or unpleasant) at a given odour concentration/ intensity. This can be measured in the laboratory as the hedonic tone, and when measured by the standard method and expressed on a standard nine-point scale it is termed the hedonic score.
Location	The type of land use and nature of human activities in the vicinity of an odour source. Tolerance and expectation of the receptor. The 'Location' factor can be considered to encompass the receptor characteristics, receptor sensitivity, and socio-economic factors.

Based on the FIDOL assessment, the relative odour exposure impact is classified as small to negligible. When considering the high sensitivity of the residential receptor, this translates to an overall impact rating of slightly adverse to negligible.

This conclusion is supported by the quantitative assessment which demonstrated that even under worst-case conditions, the odour concentration at the property boundary would remain well below detection thresholds.

Figure 30.103 – Institute of Air Quality Management – descriptors for magnitude of odour effects

Relative Odour Exposure (Impact)	Receptor Sensitivity: Low	Medium	High
Very Large	Moderate adverse	Substantial adverse	Substantial adverse
Large	Slight adverse	Moderate adverse	Substantial adverse
Medium	Negligible	Slight adverse	Moderate adverse
Small	Negligible	Negligible	Slight adverse
Negligible	Negligible	Negligible	Negligible

Applicable to odours at the "most offensive" end of the relative-unpleasantness spectrum

00-40-10 Conclusions

The thermocouple calibration process has been evaluated the potential for odour impacts from the proposed replacement LEV system. Based on both quantitative analysis and qualitative assessment using established methodologies, it can be confidently determined that the system presents minimal risk of odour nuisance to surrounding receptors.

In the worst-case scenario calculations, the concentration of xylene (the primary odorous component) at the stack discharge would be approximately 0.67 mg/m³ (0.154 ppm), which exceeds the odour threshold of 0.05 ppm. This assumes total volatilisation under maximum operating conditions. This assessment focused on xylene emissions as the principal odorous constituent, with no additional odour assessment conducted for potential thermal decomposition products from the thermocouple materials. Given xylene's low odour threshold, this approach provides a conservative basis for evaluation that would encompass any additional emissions from the calibration process.

When applying the H1 screening methodology to evaluate potential impacts at nearby receptors, the calculated process contributions diminish significantly. Short-term exposure levels of 1.6 µg/m³ represent 0.60% of the odour threshold, while long-term exposure levels of 0.085 µg/m³ constitute 0.033% of the threshold. These values demonstrate that even under maximum operation conditions, the emissions would be imperceptible at receptor locations.

The FIDOL assessment, which considers both source characteristics and receptor sensitivity, further confirms these findings. When evaluating frequency, intensity, duration, offensiveness, and location factors in relation to the nearest residential receptors, the overall impact rating can be classified as "slightly adverse to negligible." This conclusion is particularly significant given that residential properties represent the most sensitive category of receptor.

The proposed partial enclosure LEV system, with its 2,160 m³/hr extraction capacity, will provide appropriate engineering controls to effectively capture and disperse odorous substances that could impact nearby sensitive receptors. This is provided that the stack height has at least 1m of effective height above the roof. This includes not only the primary varnish components but also any potential thermal decomposition products from fibreglass insulation materials during high-temperature calibration operations.

00-40-101 Recommendations

During operation of the Pegasus calibrator at temperatures exceeding 700°C, only the exposed thermocouple junction should be placed within the calibration furnace, with the insulated portions kept outside the high-temperature zone. This practice would prevent unnecessary decomposition of insulating materials and reduce the generation of potential decomposition products.

00-50-10 *Glossary of Terms*

00-50-101 Generic

AHU	Air handing unit.
ALARP	As low as reasonably practical (exposure)
BEMS	Building Energy Management System
BMS	Building Management System
BREEAM	Building Research Establishment Environmental Assessment Method
BS EN	British Standard Euro Norm
BS	British Standard
CDM	Construction Design and Management Regulations 2005
CGMP	Current Good Manufacturing Practice
CHW	Chilled Water
CIBSE	Chartered Institution of Building Services Engineers
CIP	Clean in Place
COSHH	Control of Substances Hazardous to Health
DOP	Dispersed Oil Particulate
EPA	Environmental Protection Agency
FAT	Factory Acceptance Test
H&S	Health and Safety.
HEPA	High Efficiency Particulate Air (Filter).
HVAC	Heating, ventilation and air conditioning.
IAT	Installation Acceptance Test
IBC	Intermediate Bulk Container
IEC	International Electrotechnical Commission
IP	Ingress Protection
LEL/UEL	Lower Explosion Limit / Upper Explosion Limit
LEV	Local Exhaust Ventilation (System) – airborne exposure control system
LTHW	Low-Temperature Hot Water.
MCB	Miniature circuit-breaker
MEWP	Mobile Elevated Work Platform
NTP	Normal Temperature and Pressure (normally 20°C & 1atm)
Nm3/hr	Normalised meter cubed per hour (flow rate expressed at NTP conditions)
O&M	Operation and Maintenance
P&ID	Process and Instrumentation Diagram

PLC	Programmable Logic Control
PPM	Parts per million
RAMS	Risk Assessment & Method Statement
RIBA	Royal Institute of British Architects
RPE	Respiratory Protective Equipment. Protects the wearer from a variety of airborne particulates.
SCADA	Supervisory Control and Data Acquisition
SIP	Sanitise in Place
SME	Subject Matter Expert
SOP	Standard Operating Procedure and may refer to a referenced document controlled by the Client or describe a method of performing an action.
STP	Standard temperature and pressure (normally 273.15°K and 0.987atm)
URS	Any User Requirement Specification, complete with all Appendices, drawings and any other information listed as being part of it.
VOC	Volatile Organic Compound
WEL	The workplace exposure limit (set by the HSE within Table 1 of the EH40 Guidelines)

00-50-102 Project Specific

IAQM	Institute of Air Quality Management
FIDOL	Frequency, Intensity, Duration, Offensiveness, Location
ou/m³	Used as a measurement unit for odour concentration.