



# Asbestos Monitoring Plan Former ROF Bishopton

September 2010

**BAE SYSTEMS**

Testing  
Advising  
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# 1. Introduction

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Exova Group Ltd (Exova) has been commissioned by BAE Systems Properties Ltd (BAE Systems) to formulate an Asbestos Monitoring Plan in support of the remediation of the former ROF Site at Station Road, Bishopton, Renfrewshire (Site).

This document sets out the proposed monitoring strategy for asbestos related remediation works at the Site. This document responds to the Planning Condition Nr. 23(f) of Renfrewshire Council Planning Consent ref. 09/0527/PP for the Remediation of Bulk Earthworks and is presented to formally discharge this condition.

The Planning Condition Nr. 23 is replicated as follows:

*Prior to any demolition, clearance, enabling, building or other works commencing on site, the following documents, as listed with supporting documents submitted by BAE, shall be submitted for the written approval of the Planning Authority. The proposed content of each plan shall be approved in writing with the Planning Authority in consultation with SEPA. Thereafter all works shall be undertaken in accordance with the approved documents.*

## *23(f) – Asbestos Monitoring Plan*

### 1.1. Summary of Key Requirements

The Site has been the subject of phased Site Assessment, with a desk study and two major intrusive investigations performed to date (Stage 1, 2006 and Stage 2, 2009), the scope of which was agreed in advance with the Regulatory Authorities. These assessments have resulted in a comprehensive interpretative report incorporating Quantitative Risk Assessments and a Conceptual Site Model.

The Site has also been subject to both Management and Demolition Asbestos Surveys (as defined in the HSE publication HSG 264 Asbestos: The Survey Guide) of all standing buildings and structures, performed by Exova in 2010.

In accordance with current United Kingdom (UK) best practice and guidance, this document presents the asbestos monitoring objectives and criteria and proposes mitigation to prevent the accidental release of asbestos fibres.

As part of the remediation strategy for the site a non-hazardous landfill will be constructed and managed under Renfrewshire Council Planning Consent Ref 09/0456/PP and a PPC authorisation from the Scottish Environment Protection Agency (SEPA). This landfill will contain a stable non-reactive cell for the deposition of asbestos and asbestos containing materials (ACMs) arising solely from the remediation of the Site.

The following asbestos related activities are covered in this report:

1. Removal of ACMs from buildings and structures;
2. Temporary storage of asbestos containing materials pending deposition to site landfill;
3. Removal of ACMs from soils (screening process);
4. Transportation and deposition to site landfill of ACMs arising from buildings and structures;
5. Excavation, transportation and disposal to site landfill of asbestos contaminated soils;
6. Deposition of ACMs within the dedicated site landfill.

## 1.2. Setting

The Site is located to the south-west of Bishopton Village in Renfrewshire, Scotland, approximately 15km west of Glasgow city centre and is centred on National Grid Reference (NGR) NS 433 691.

The Site is roughly rectangular in shape and occupies an area of approximately 1005 hectares (ha). Within the land area and generally enclosed within an outer security fence is the former Royal Ordnance Factory of some 766 ha in area which can be currently accessed via Station Road, Bishopton. Of this 766 ha BAE Systems currently operates a testing facility which occupies some 170 ha and is separated from the remainder of the site by an inner security fence. See Appendix 2 for a Site Location Plan and Site General Arrangement Plan.

The General Arrangement Plan at Appendix 2 shows indicatively the proposed locations of landfill, various contractors' compounds servicing different aspects of the site remediation and Phase 1 of the future development.

There are approximately 1200 nr standing buildings and/or structures on the site, the majority of which will be demolished as part of the remediation and regeneration of the site. Other remediation works include asbestos removal, earthworks, landfill construction, contaminated land removal (see Section 1,1).

## 1.3. About Exova

Exova is a global organization specialising in the provision of accredited testing services, with over 3,500 staff across the world operating from 124 laboratories.

International regulation introduced for the management of asbestos in the workplace has led Exova's investment in its laboratories and facilities to provide a comprehensive range of Asbestos Management services.

Exova offers building surveys to identify type, location and condition of asbestos containing materials and air monitoring to ensure workplace safety. Exova holds ISO 17025 accreditation for atmospheric sampling, fibre counting and the identification of asbestos in bulk materials; as well as ISO 17020 accreditation for asbestos surveying. Accreditation has been issued by the United Kingdom Accreditation Service (UKAS). Copies of current UKAS schedules are given in Appendix 1.

Exova laboratories are equipped with state-of-the-art technology and offer complete analysis and characterization of asbestos and dust by microscopy for the identification of material constituents. Exova is able to isolate, identify and quantify all types of asbestos (Chrysotile, Amosite, Crocidolite, Tremolite, Actinolite and Anthophyllite) in virtually all types of materials such as cements, vermiculite, insulating materials as well as floor and ceiling tiles.

Exova's UK services also include:

- Asbestos sampling
- Risk Assessment
- Atmospheric fibre monitoring
- Four Stage Clearance Testing (Certificate of Re-occupation)
- Project Management
- Training

#### 1.4. Scope of this Document

This document addresses the monitoring requirements proposed for a number of likely remediation activities. They are:

- Section 3 deals with the removal of asbestos containing materials from buildings and structures
- Section 4 deals with working with asbestos contaminated soils;
- Section 5 deals with the transportation of asbestos containing materials;
- Section 6 deals with monitoring of the landfill site, and
- Section 7 deals with monitoring of site welfare facilities.

## 2. Regulatory Framework

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This section sets out the regulatory framework for working with asbestos and asbestos containing materials, including both licensed and non-licensed works as well as working with asbestos contaminated soils.

### 2.1. Licensed Asbestos Works

Although the Control of Asbestos Regulations 2006 (CAR) applies to all work with asbestos, the law requires that work with the most hazardous forms of asbestos (with respect to their likelihood of fibre release) can only be carried out by companies who have obtained a license for such work from the Health and Safety Executive.

Licensing Regulations prohibit work with certain types of asbestos containing materials including asbestos lagging, insulation and asbestos insulating board unless the Contractor holds an appropriate HSE license (such materials have been identified within buildings on the Site during Demolition Asbestos surveys performed by Exova).

Licensed removal or remediation almost always requires the work to be carried out with a contained environment or enclosure, normally under negative pressure. On completion of the works, the enclosure is subject to a Four Stage Clearance procedure (See Paragraph 3.3) before it is considered fit for re-occupation (or demolition, in this case).

Guidance on performing licensed asbestos works is given in the HSE publication HSG 247 "Asbestos: The licensed Contractor's guide".

### 2.2. Non-licensed Asbestos Works, Asbestos Cement etc

There are certain types of ACMs, which are deemed to be less hazardous due to their reduced likelihood of fibre release, to which the requirement to use a licensed Contractor does not apply. These ACMs include asbestos cement, articles of rubber, plastic, bitumen, gaskets etc. The Site contains substantial amounts of asbestos cement products throughout, particularly in the form of roof sheeting, pipework, guttering etc.

Methods and procedures for working with non-licensed ACMs are described in the HSE publication HSG 210 "Asbestos Essentials, A task manual for building, maintenance and allied trades on non-licensed asbestos work".

Non-licensed work does not normally require the construction of a contained enclosure but may involve covering of nearby surfaces or screening of surrounding areas to prevent contamination. Four Stage Clearance is not normally required; however the area should be subject to a thorough visual examination on completion of the works.

### 2.3. Working with Asbestos Contaminated Soil

The regulatory framework surrounding asbestos in soil in the United Kingdom is “vague” and guidance is often outdated and of limited use for risk assessment purposes.

As stated previously, the CAR 2006 applies to all work with asbestos including working with asbestos contaminated soils; however such work is not referred to in either Asbestos: The Contractor’s Guide (for licensed work) or Asbestos Essentials (for non-licensed work).

Most asbestos guidance published by the HSE relates to occupational exposure and Health & Safety legislation and is therefore not directly applicable to asbestos in soils. The most recent UK contaminated land guidance dealing specifically with asbestos is the ICRL Guidance Note 64/85 “Asbestos on Contaminated Sites 1990”. Unfortunately this guidance is of limited use, as it is particularly poor on risk assessment and much of the legislation referred to is outdated.

As stated, ICRL Guidance Note 64/85 gives very little detail in assessing risk but does state that factors to be considered should include: amount and form of asbestos, location of site (relative to housing, schools etc), present use of the land, ease of public access and the proposed future land use. The document further states:

*The Environmental Health Department of the relevant local authority should be consulted on the need for, and form of, any immediate action required in order to minimise risks to public health.*

The guidance suggests that if discrete pieces of ACMs are present, the area should be treated as “contaminated”. If no discrete ACMs are present; test the soil for asbestos fibres with a limit of detection (LOD) of <0.001% wt.

The value of 0.001% wt as a “clearance level” is derived from research by Addison *et al*, at the Institute of Occupational Medicine in 1988. This was further developed in the HSE publication “HSE Contract Research Report No 83/96 Development and Validation of an Analytical Method to Determine the Amount of Asbestos in Soils and Loose Aggregates”.

It should be noted that these publications are not risk based and that asbestos cannot be assessed using CLEA or any other standard exposure assessment tool. These tools assume the concentration (%wt) of contaminant in soil is related to risk, this is not true for asbestos. Risk is associated with the likelihood of asbestos fibres becoming airborne from the soil and this depends on a great number of factors including the nature of the asbestos (bound or unbound), nature of the soil (cohesive or granular), moisture content of soil, weather conditions, extent of disturbance etc.

New guidance on asbestos in contaminated land is currently being developed in the United Kingdom, based on the risk assessment approaches developed in the Netherlands and the USA. The Environment Agency and Health and Safety Laboratory are collaborating to:

*“develop cost-effective methods for the analysis of asbestos in soils which support the development of relevant measurable assessment criteria which can be used for site-specific risk assessment”.*

It is possible that this new guidance will be published over the lifetime of the remediation works and that the treatment and monitoring of asbestos in soil may alter throughout the lifetime of the project. Any and all such changes shall be agreed with Renfrewshire Council, prior to implementation.

It should be noted that due to the ongoing research work on risk assessment of asbestos in contaminated land, BAE Systems reserve the right to suggest alternative proposals to Renfrewshire Council with respect to both soil monitoring and “clearance”, when/if such other guidance becomes available.

## 2.4. Special Waste in Scotland

The Special Waste Regulations 1996 transposed the requirements of the Hazardous Waste Directive. However, they did not fully transpose all of the Directive's requirements nor did they take in to account possible amendments to and expansions of the European Waste Catalogue and the list of hazardous wastes. The Special Waste Amendment (Scotland) regulations 2004 addressed these issues.

Regulations 2, 2A and 2B of the Special Waste Amendment (Scotland) Regulations 2004 provide a full definition of special waste. Simply, "special waste" is any waste which is hazardous waste as defined by Article 1(4) of the Hazardous Waste Directive.

The European Waste Catalogue defines asbestos containing materials and asbestos containing wastes as "Mirror Entries" which indicate that some wastes have the potential to be hazardous or not, depending on the concentration of the "dangerous substance" present within the waste (in this case asbestos).

All asbestos types are listed as Category 1 carcinogens defined as "Substances known to be carcinogenic to man. There is sufficient evidence to establish a causal association between human exposure to a substance and the development of cancer".

The assessment of any waste as "hazardous" under the Hazardous Property Assessment H7 Carcinogenic has a Limiting Concentration of greater than or equal to 0.1% weight "dangerous substance" ie asbestos in the waste overall.

Thus we can see that in general, ACMs e.g. asbestos cement, asbestos insulating boards, roofing felts etc will obviously be classed as hazardous (Special Waste in Scotland). The situation is much less clear for mixtures of waste containing asbestos and ACM fragments e.g. soil containing asbestos and ACM residues. In these situations, the waste must be subject to laboratory testing to determine both the presence and concentration of any asbestos.

The 0.1% wt figure refers specifically to the dangerous substance ie the asbestos and not the concentration of ACMs (e.g. asbestos cement contains typically 15% asbestos, thus for a soil to be Special Waste it would need to contain 0.1% wt asbestos ie approximately 0.7% wt asbestos cement).

## 2.5. Current Regulations, Guidance Notes & Codes of Practice

The following regulations shall apply to working with asbestos and asbestos containing materials during the remediation of the Site. It should be noted that this list is not exhaustive. All Contractors must be aware of and operate under all current appropriate legislation and within the requirements of the relevant Codes of Practice.

1. The Control of Asbestos Regulations 2006 SI 2006/2739
2. Work with materials containing asbestos. Control of Asbestos Regulations 2006. Approved Code of Practice and guidance L143
3. Health and safety at Work etc Act 1974
4. Management of health and safety at work. Management of Health and Safety at Work Regulations 1999. Approved Code of Practice and guidance L21.
5. Managing health and safety in construction. Construction (design and Management) Regulations 2007. Approved Code of Practice L144
6. Asbestos: The licensed Contractor's guide HSG247
7. Asbestos: The analyst's guide to sampling, analysis and clearance procedures HSG248
8. Asbestos essentials: A task manual for building, maintenance and allied trades on non-licensed work HSG210
9. The Special Waste Amendment (Scotland) Regulations 2004 SI 2004/112
10. Asbestos(Licensing) Regulations 1983 SI 1983/1649
11. The Asbestos (Licensing) (Amendment) Regulations 1998 SI 1998/3233

# 3. Removal of Asbestos Containing Materials

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This section describes the monitoring regime to be adopted during removal of asbestos and asbestos containing materials from buildings and structures, including procedures to ensure compliance with relevant regulations and clearance of buildings and protection of workers, site employees and the general public. Monitoring will be performed by an independent accredited contractor dissociated with the removal works.

## 3.1. Licensed and Non-Licensed Works

As described in Section 2, work with asbestos and asbestos containing materials (ACMs) is deemed to require the use of a licensed Contractor when working with the more hazardous products e.g. insulation or non-licensed work for less hazardous products such as asbestos cements, vinyl floor tiles etc.

Clearly the monitoring requirements for licensed and non-licensed works shall vary significantly depending on legal requirements, sample location, surrounding environment etc.

In general working with licensed materials shall be carried out within an enclosed environment under controlled conditions. In these circumstances an independent UKAS accredited laboratory (independent analyst) shall perform periodic leak monitoring of all enclosures during removal works to ensure the integrity of the enclosures and thereby prevent accidental release of asbestos fibres in to the air and the surrounding environment. A more rigorous monitoring regime shall be operated where the buildings/enclosures are "adjacent" to either occupied buildings on-site or external buildings out with the Site boundary (see Paragraph 3.6). The decision to carry out increased, or continual, leak monitoring of enclosures/buildings shall be made on a building-by-buildings basis.

On completion of the removal works the independent analyst shall be responsible for performing Four Stage Clearance Monitoring within every enclosure (see Paragraph 3.3) prior to its final clearance and demolition. The stages to this procedure are as follows:

**Stage 1:** Preliminary check of site condition and job completeness;

**Stage 2:** A thorough visual inspection inside the enclosure area;

**Stage 3:** Air monitoring;

**Stage 4:** Final assessment post-enclosure/work area dismantling.

It should be noted that the regulations permits three situations where working with asbestos insulation, asbestos insulating board etc does not require a license to work. These are during air monitoring/asbestos sampling, when working on your own premises using your own employees or where the work is deemed to be of "short duration".

Short duration work is defined as where the total number of hours worked is no longer than one hour in seven consecutive days for any one person and the total time spent by all the workers is no more than two hours, also in seven consecutive days.

When performing non-licensed work e.g. the removal of asbestos cement sheets, gutters etc, clearance air testing is not normally required. On completion of the works, the Contractor shall perform a thorough visual examination of the area to ensure that it has been cleaned properly and that there is no asbestos debris remaining. The Contractor shall issue a Certificate of Visual Examination to that effect for every area/building where non-licensed works have been carried out.

Notwithstanding the general statement above that air testing is not normally required for non-licensed work; the independent analyst shall perform random air monitoring around non-licensed removal works to ensure Contractors are not releasing asbestos fibres in to the surrounding environment. As with licensed works, the requirement for monitoring during works shall be made on a building-by-building basis and may be increased where work is being carried adjacent to occupied premises, either within or out with the Site.

Whether a building is subject to licensed, non-licensed asbestos works, or both BAE Systems shall be responsible for collating a "Clearance Document" for each building prior to demolition. No building, where asbestos has been identified during the Demolition Surveys may be subject to demolition without the issue of such a document.

In general, all leak monitoring air tests shall be analysed on site within an hour of sampling by the independent analyst. If fibre levels are identified in excess of the Clearance Value (0.01 fibres/ml), all work shall be stopped and working procedures reviewed and any remedial actions required put in place before work is allowed to recommence.

### **3.2. Internal and External Works**

Following on from Paragraph 3.1 above, there will be a general increased requirement for both periodic leak monitoring of licensed works and air clearance monitoring of non-licensed works where work is being performed within buildings or structures. This is due to the possibility of enhanced asbestos fibre levels from enclosure leakage or residual materials in a confined environment. Some areas/enclosures, where licensed removal works are being performed may be subject to "continual" leak monitoring throughout the works.

It is good industry practice to perform clearance air testing of non-licensed works, where this work is "significant" and has been performed internally. The area/building will not be deemed clear of asbestos unless both the visual examination and any air tests are satisfactory ie <0.01 fibres/ml.

There will be no requirement to perform both leak testing of enclosures and clearance air monitoring of non-licensed works, where these works are being carried out externally e.g. the removal of external guttering or down pipes.

The requirement for monitoring and the extent of that monitoring shall be made on an area-by-area basis, subject to current regulatory requirements.

### **3.3. Four Stage Clearance Monitoring**

It is a requirement under CAR 2006 that following licensed asbestos removal; the enclosure/area/building must be assessed to determine whether it is thoroughly clean and is fit for demolition.

The clearance certification process is a vital component of asbestos removal work and the issue of a Certificate of Re-occupation by an independent and impartial organisation provides crucial reassurance to BAE Systems of the performance of the Contractor and that work is meeting the standards required by the regulations.

The re-occupation procedure is a four stage process involving considerable interaction and cooperation between the Contractor and the independent analyst. The process involves both a thorough visual examination of the enclosure and atmospheric fibre monitoring. The full process is detailed in the HSE publication HSG 264 "Asbestos: The analyst's guide to sampling, analysis and clearance procedures".

The independent analyst shall perform Certificate of Re-occupation (Four Stage Clearance) testing on each and every enclosure where licensed asbestos removal has been performed. The independent analyst shall work with the Contractor to minimise the requirement for repeat working e.g. monitoring of decontamination unit. The area/enclosure shall not be deemed as satisfactorily cleaned/decontaminated until the independent analyst has issued the Contractor with a Certificate of re-occupation.

### **3.4. Contractor Monitoring**

As part of their general role in representing the client with respect to the asbestos works, the independent analyst shall be responsible for performing a number of Contractor monitoring procedures during the duration of the contract. These monitoring procedures shall include, but not be restricted to, the leak testing, clearance air testing and Certificate of Re-occupation testing as mentioned previously.

In addition to the above, the independent analyst shall be responsible for observing and approving smoke testing of each enclosure to ensure integrity prior to the commencement of any licensed asbestos removal works and performing regular Contractor employee exposure monitoring (as required by CAR 2006) throughout the duration of the project. The independent analyst shall agree with the Contractor an exposure monitoring strategy which ensures a representative range of jobs, personnel and work methods are examined.

### **3.5. Temporary Storage of ACMs**

Where there is a requirement for the Contractor to store asbestos and ACM waste materials prior to removal to the on site landfill, these materials must be double bagged or wrapped and held in an appropriate lockable container.

The independent analyst shall perform random visual inspections of such containers to ensure that the container is appropriate, locked and that there is no visible debris on or around the container. If the inspection raises any concerns or issues, these shall be brought to the attention of the Contractor and appropriate remedial measures agreed and implemented without delay.

The independent analyst shall hold records of all inspections, which shall be made available to BAE Systems.

### **3.6. Site Perimeter Air Monitoring**

As mentioned in Paragraph 3.1 there may be a requirement to perform Site Perimeter Air Monitoring where licensed asbestos removal works are taking place "adjacent" to the Site boundary. This is of particular importance if there are buildings, roads etc externally at the boundary where members of the public could be exposed to asbestos fibres leaving the Site.

The requirement for Site Perimeter Air Monitoring shall be made on a building-by-building basis. Where the independent analyst deems perimeter monitoring to be appropriate, a minimum of three air tests shall be taken along the Site boundary, at least twice a day (morning and afternoon) throughout the duration of the works in that area. The actual number of samples taken may exceed three "per round" and will depend on a number of factors such as weather conditions, prevailing wind direction, extent and nature of asbestos works, proximity of the general public etc.

The air tests shall be analysed on site within an hour of sampling by the independent analyst. If fibre levels are identified in excess of the Clearance Value (0.01 fibres/ml), all work shall be stopped and working procedures reviewed and any remedial actions required put in place before work is allowed to recommence.

## 4. Working with Asbestos Contaminated Soils

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This section describes the monitoring regime employed during the excavation, screening and storage of asbestos contaminated soils. Monitoring will be performed by an independent accredited contractor disassociated with the excavation works.

### 4.1. Excavation Works

As risk associated with asbestos in soils is primarily concerned with the likelihood of asbestos fibres becoming airborne, excavation and movement of soils containing asbestos can create conditions where such release can occur. The likelihood of airborne fibre release occurring and thereby the extent of risk shall depend on a number of factors previously mentioned in Paragraph 2.3.

During excavation of asbestos contaminated soils, the independent analyst shall perform both personal and static perimeter air monitoring for fibres. These shall be performed at least twice daily (morning and afternoon) during works. In addition there may be a requirement for air monitoring within the Contractor compound, if this is located "near" to the works.

The independent analyst shall consider factors such as prevailing weather conditions (wind, rain etc), amount and form of asbestos present and proximity of site workers and the general public when determining the actual number, frequency and locations of sampling points.

As previously, the samples shall be analysed on site and if any perimeter values are found to be in excess of 0.01 fibres/ml, work shall be stopped, the cause identified and appropriate remedial measures put in place before recommencing the works.

The results of the personal monitoring of Contractor personnel shall be used to ensure that appropriate RPE and PPE are being used.

### 4.2. Monitoring of Contaminated Stockpiles

Where excavated soils are deemed as "contaminated" (at this time meaning asbestos concentration >0.001% wt) and have been stockpiled on site, prior to removal to the landfill, the stockpiles shall be subject to static perimeter atmospheric fibre monitoring to ensure there is no significant fibre release to the surrounding environment.

This monitoring shall be carried out on a daily basis until the stockpiles have been removed. As in Paragraph 4.1, the independent analyst shall determine the extent of monitoring dependant on various factors including, size of stockpile(s), nature and amount of asbestos present, prevailing weather conditions etc.

If any fibre levels are identified in excess of 0.01 fibres/ml, the Contractor will be informed immediately and appropriate remedial measures agreed and implemented.

### 4.3. Sorting and Screening

It is likely that, where possible, soils may be screened on site with obvious asbestos materials being removed by hand picking. This will be performed to reduce the amount of soil requiring to be taken to the on site landfill. Where this work is being performed a similar air monitoring procedure as detailed in Paragraph 4.1 shall be followed.

It should be noted that hand picking will only be appropriate where asbestos is present as discrete pieces of ACMs and not where it is spread throughout the soil as loose fibres.

The decision as to which areas are suitable for hand picking shall be made on an area-by-area basis and the independent analyst shall provide input to that decision making process.

### 4.4. Testing of Screened Soils

Once soils have been screening and all "obvious" asbestos and ACMs removed, there will be a requirement for testing the screened material to ensure that it "clean" and suitable for re-use on site.

The independent analyst shall be responsible for the testing of screened soils for the presence of asbestos residues. The first part of the testing shall involve a through visual inspection and/or walk over of the area.

When there is no visual evidence of residual asbestos and/or ACMs the independent analyst shall test representative samples of the soil for the presence of asbestos in accordance with the method given in the HSE Contract Research Report 83/96, discussed earlier. The numbers of samples shall depend on the extent of works and shall be agreed between BAE Systems, the Contractor and the independent analyst.

Where levels of asbestos residues  $>0.001\%$  wt, further picking shall be performed (where possible) or the soil removed to the landfill as contaminated. If additional picking is performed, this will result in a further sampling and testing exercise.

### 4.5. Perimeter Monitoring

As discussed previously the independent analyst shall perform routine perimeter monitoring of excavation works, on soil screening and contaminated stockpiles.

The frequency of sampling and number of sample locations shall be reviewed where such works (or asbestos stripping works) are performed at the Site external boundary. Consideration will be given to the extent and nature of the works and the proximity of the general public when reviewing the monitoring requirements.

# 5. Transportation of Asbestos Containing Materials

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This section describes the monitoring strategy during the transportation of asbestos contaminated materials, whether ACMs from removal works, soil screening or contaminated soils. Materials will be transported internally only to the Site Landfill. Monitoring will be performed by an independent accredited contractor dissociated with the works.

## 5.1. Inspections of Vehicles

It is intended that all asbestos waste generated on the Site shall be transported internally to the on site landfill for disposal. This waste shall come from a number of sources including removal of ACMs from buildings and structures, recovered asbestos materials from soils and contaminated soils where removal has not been possible.

The materials shall be transported within the site using lined and covered vehicles, in accordance with procedures agreed between BAE Systems and the Contractor.

The Contractor shall perform random, but frequent, inspections of the vehicles prior to their movement from the source of the asbestos waste. Such inspections shall include, but not be limited to, inspection of the vehicle prior to loading to ensure adequate and appropriate lining is in place, observation of loading procedures to ensure prevention of spillage of asbestos materials and examination prior to movement to ensure happing is secure, wheels are free of asbestos debris etc.

In addition to the inspection process, the independent analyst shall also perform regular personal air monitoring on drivers to ensure they are not exposed to asbestos fibres released during the loading and transportation process.

## 5.2. Visual Inspections of Transit Routes

In addition to the random vehicle inspections described in Paragraph 5.1, the Contractor shall also perform regular visual examinations the internal transit routes. If any visual asbestos debris is identified, the Contractor will be required to remove this without delay.

The independent analyst shall perform random, but frequent, static air monitoring along the transit route(s). If any of the air samples reveal atmospheric fibre levels in excess of 0.01 fibres/ml, a meeting shall be held between the Contractor(s), BAE Systems and the independent analyst to review procedures and agree and implement any remedial measures thought necessary.

The frequency of both the vehicle and transit route monitoring shall depend on the nature and level of activity being carried out by the Contractor(s).

## 6. Monitoring of Landfill Site

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This section describes the monitoring regime employed during the excavation, screening and storage of asbestos contaminated soils. Monitoring will be performed by an independent accredited contractor dissociated with the landfill works.

### 6.1. Inspection of Vehicles Exiting Landfill Site

A similar vehicle inspection regime, as detailed in Paragraph 5.1 shall be applied to those vehicle exiting the landfill site after deposition of waste materials.

The Contractor shall perform random, but frequent, inspections of exiting vehicles to ensure such vehicles have been adequate cleaned and are free from asbestos residues which could contaminate other areas of the site.

As with the monitoring requirements of Paragraphs 5.1 & 5.2, frequency of inspections shall depend on Contractor activity levels.

### 6.2. Monitoring Landfill Site Personnel and Plant

The independent analyst shall perform regular personal monitoring of landfill site personnel during all asbestos deposition works. The purpose of the monitoring is to check the exposure of these personnel and ensure they are provided with adequate and appropriate RPE and PPE.

The frequency of personnel monitoring will depend on the frequency of asbestos deposition but is likely to be daily, during periods of greatest activity.

### 6.3. Perimeter Monitoring

The independent analyst shall perform static atmospheric fibre monitoring around the landfill perimeter during all periods of asbestos deposition. This may be performed up to twice a day (morning and afternoon), depending on Contractor activity levels.

If any atmospheric samples are identified in excess of 0.01 fibres/ml, deposition works shall be stopped, procedures reviewed, appropriate remedial measures agreed and implemented prior to recommencement of works.

# 7. Additional Monitoring Requirements

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This section describes some additional monitoring requirements to be performed by the independent analyst, which are not covered (or not covered fully) in the previous sections.

## 7.1. Monitoring of Asbestos Contractor Hygiene Facilities

Although inspection and air monitoring of the Contractor's decontamination/hygiene facility is included in Stage 4 of the Four Stage Clearance (Certificate of Re-occupation) procedure, it is likely that this will not take place after the completion of works in each and every enclosure due to the requirement for ongoing work. In addition there is no requirement for hygiene facility inspections during non-licensed works.

The independent analyst shall be responsible for performing random, but frequent, visual inspections of and air monitoring in the Contractor's hygiene facilities. These inspections must be scheduled so as not to disrupt the day-to-day working and ongoing programme of the Contractor.

## 7.2. Monitoring of Main Site Welfare Facilities

The independent analyst shall perform regular visual inspections and air monitoring within the "clean" end of the site personnel access to the main site welfare compound (ie the decontamination route from site to compound). This must be carried out at least weekly during the works.

The independent analyst may decide to increase the frequency of the monitoring dependent on asbestos activity levels and/or results of previous inspections.

## 7.3. Monitoring of Analyst's Facilities

The independent analyst must perform daily air monitoring within their own work area on site throughout the duration of the project. All results must be <0.01 fibres/ml. If results are found in excess of this value a thorough investigation shall be performed to identify the source of the fibres, appropriate remedial measures agreed and implemented without delay.

All air monitoring results and findings of any investigations performed must be made available to BAE Systems.

# Appendix 1 – Supporting Documentation

This section contains copies of Exova's current UKAS schedules for asbestos surveying (ISO 17020), asbestos identification in bulk materials, including soil and asbestos air monitoring and fibre counting (ISO 17025).

**Schedule of Accreditation**  
issued by  
**United Kingdom Accreditation Service**  
21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

 <p>0568 Accredited to ISO/IEC 17025:2005</p>	<b>Exova (UK) Ltd</b>	
	Issue No: 033    Issue date: 25 March 2010	
	Glasgow Analytical Laboratory 4 Bleasdale Court Clydebank Business Park Clydebank G81 2LE	Contact: Mrs A Johnson Tel: +44 (0)141-941 2022 Fax: +44 (0)141-952 7099 E-Mail: <a href="mailto:angela.johnson@exova.com">angela.johnson@exova.com</a> Website: <a href="http://www.exova.com">www.exova.com</a>
Testing performed by the Organisation at the locations specified below		

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details	Activity	Location code
<p><b>Address</b> Glasgow Analytical Laboratory 4 Bleasdale Court Clydebank Business Park Clydebank G81 2LE</p> <p><b>Local contact</b> Ms Julie McEleny Tel: +44 (0)141-941 2022 Fax: +44 (0)141-952 7099 Email: <a href="mailto:julie.mceleny@exova.com">julie.mceleny@exova.com</a> Website: <a href="http://www.exova.com">www.exova.com</a></p>	Health and Hygiene	A
<p><b>Address</b> The Heath Technical &amp; Business Park Runcom Cheshire WA7 4QF</p> <p><b>Local Contact</b> Mr David Cook 4 Bleasdale Court Clydebank Business Park Clydebank G81 2LE Tel: +44 (0)141-941 2022 Fax: +44 (0)141-952 7099 Email: <a href="mailto:david.cook@exova.com">david.cook@exova.com</a> Website: <a href="http://www.exova.com">www.exova.com</a></p>	Health and Hygiene	B

Site activities performed away from the locations listed above:


Location details	Activity	Location code
Premises including domestic, commercial and industrial	Health and Hygiene	C

 <p>0568 Accredited to ISO/IEC 17025:2005</p>	<p><b>Schedule of Accreditation</b> issued by <b>United Kingdom Accreditation Service</b> 21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK</p>
	<p><b>Exova (UK) Ltd</b> <b>Issue No:</b> 033 <b>Issue date:</b> 25 March 2010</p>
<p>Testing performed by the Organisation at the locations specified</p>	

DETAIL OF ACCREDITATION

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
ASBESTOS	<u>Health and Hygiene</u>	Health and Safety Executive Asbestos: The analysts' guide for sampling, analysis and clearance procedures (HSG 248)	
Asbestos Fibres in Air	Fibre counting	Documented In-House Method AL/ASB/02 based on HSE Guidance HSG248: February 2005 – WHO using Membrane Filter Method using Phase Contrast Microscopy (PCM)	A, C
	4 Stage Clearance Process	Documented In-House Method AL/ASB/05 based on HSE Guidance HSG 248: February 2005	C
	Sampling of air for fibre counting	Documented In-House Method AL/ASB/03 based on HSE Guidance HSG 248: February 2005	A, C
Asbestos in Bulk Materials including materials and products suspected of containing asbestos	Identification of: Amosite Chrysotile Crocidolite Fibrous Actinolite Fibrous Anthophyllite Fibrous Tremolite	Documented In-House Procedure AL/ASB/01 based on HSE Guidance HSG 248: February 2005 using stereo-microscopy, polarised light microscopy and dispersion staining	A, B
Asbestos in Soils and Sediments	Identification of: Amosite Chrysotile Crocidolite Fibrous Actinolite Fibrous Anthophyllite Fibrous Tremolite	Documented In-House Procedure AL/ASB/01 based on HSE Guidance HSG 248: February 2005 using stereo-microscopy, polarised light microscopy and dispersion staining	A
	<u>Chemical Tests</u>		
SOILS, POLLUTANTS (INCLUDING SOLID WASTE), SEDIMENTS, SLUDGES OR SIMILAR	Preparation of soils (air drying), moisture content and grading	Documented In-house Method AN 01, air-drying, to give % moisture content and sieving to determine % passing/retained to a specified level as required, eg, 2 mm, 425 um	A

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 issued by  
**United Kingdom Accreditation Service**  
 21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

 <b>UKAS</b> INSPECTION <b>0337</b> <b>Type C</b> <b>Inspection Body</b>  <small>Accredited to          ISO/IEC 17020:2004</small>	<b>Exova (UK) Ltd</b>	
	<b>Issue No: 005    Issue date: 03 May 2010</b>	
	Glasgow Analytical Laboratory 4 Bleasdale Court Clydebank Business Park Clydebank G81 2LE	Contact: Mrs Angela Johnson Tel: +44 (0)141-941 2022 Fax: +44 (0)141-952 7099 E-Mail: <a href="mailto:angela.johnson@exova.com">angela.johnson@exova.com</a> Website: <a href="http://www.exova.com">www.exova.com</a>
Inspection performed at/from the above address only		

DETAIL OF ACCREDITATION

Field of Inspection	Type and Range of Inspection	Methods and Procedures
Surveying for asbestos in premises	Management survey: (domestic, commercial & industrial premises)  Refurbishment and demolition survey: (domestic, commercial & industrial premises)	Health and Safety Executive Asbestos: The survey guide (HSG 264, 2010)  Documented in-house procedure  Documented in-house procedure
END		

# Appendix 2 – Site Plans

