

***CHEMEX ENVIRONMENTAL
INTERNATIONAL LTD***

**CAPABILITY
STATEMENT**

Version: 7.5
Reviewed: Nov 2008
Next review: Nov 2009
Page 1 of 1

TABLE OF CONTENTS

INTRODUCTION	1
SCOPE OF EXPERIENCE	1
CONTACT DETAILS.....	2
INSTRUMENTATION.....	3
CONTROLLED TEMPERATURE ENVIRONMENTS	4
GENERAL EQUIPMENT.....	4
LABORATORY ACCREDITATION.....	5
EXTERNAL QA PROGRAMS	6
CLIENT AUDIT.....	6
REGISTRATION/MEMBERSHIP	6
QUALITY RESPONSIBILITIES	6
METHOD SUMMARIES - ENVIRONMENTAL ANALYSIS.....	7
METHOD SUMMARIES - ECOTOXICOLOGY	8
APPENDICES	
1. ENVIRONMENTAL ANALYSIS METHODS	12
2. ECOTOXICOLOGY METHODS.....	18
3. CERTIFICATES	20

INTRODUCTION

Chemex Environmental International Ltd, (formerly Chemex International Plc) was formed in 1987. The laboratory was initially designed to meet the specifications of the United States Environmental Protection Agency (US EPA) Contract Laboratory Program (CLP). The **ENVIRONMENTAL ANALYSIS** laboratory is equipped to analyse environmental samples to UK, European and US methods. The **ECOTOXICOLOGY** laboratory conducts a number of internationally recognised methods to investigate the environmental fate and effects of bulk production chemicals, effluents and waste waters on the environment.

SCOPE OF EXPERIENCE

Chemex has received samples from almost all European countries including Eastern Europe and the former East Germany. Samples arrive regularly from countries including Spain, France, Italy, Germany and Ireland, providing considerable experience at overcoming shipment problems arising from customs etc. In addition Chemex has received samples from the Far East, Middle East, African countries, West Indies and South America.

Angola • Azerbaijan • Belize • Brazil • Canary Islands • Chad • China • Cyprus • Czech Republic • Denmark • Eire • Finland • France • Germany • Greece • Hungary • India • Indonesia • Israel • Italy • Ivory Coast • Jamaica • Kenya • Netherlands • Norway • Oman • Paraguay • Poland • Portugal • Romania • Russia • Singapore • Slovakia • South Africa • Spain • Sweden • Switzerland • Turkey • UK • Ukraine • Zambia

Amongst others, Chemex is continuously involved in site investigations, regulatory studies for new and existing product registrations, clean-up tasks, groundwater monitoring and effluent characterisation, laboratory auditing on behalf of the client.

Chemex has many successful years experience of bringing large numbers of environmental samples from overseas, maintaining sample temperature and meeting the US EPA recommended holding times.

Chemex works for most industrial sectors including:

- Property Management
- Oil & Petroleum
- Chemicals & Agrochemicals
- Electronics
- Pharmaceuticals
- Waste Management
- Tobacco
- Brewing

- Environmental Consultancies
- Engineering Consultancies

- UK Ministry of Defence
- UK Department for Environmental, Food and Rural Affairs, (formerly MAFF)
- US Department of Defence

CONTACT DETAILS

The Chemex offices and laboratories are located close to Cambridge, with easy access via major transport routes, road, rail and air.

For correspondence or further information the address is:

Chemex Environmental International Ltd
Unit J
Broad Lane Industrial Estate
Cottenham
Cambridge
UK
CB24 8SW

Laboratory Services Contacts -

Ms Karen Cilvert	Client Liaison Officer
Mrs Cheryl Fitzpatrick	Client Liaison Officer

Telephone: 01954 252519

Facsimile: 01954 251764

email: analysis@chemex.co.uk

VAT Registration No: GB 785 4655 80

Chemex Registration No: 4226642

INSTRUMENTATION

GC/Mass Spectrometry

Six Hewlett Packard GC/MS systems. Four 5973 MSDs with 6890 GCs configured for analysis of volatile organic compounds using purge and trap technology. One 5973MSD and 6890 GC and one 5972 MSD with 6890 GC and large volume injector for analysis of semivolatile organic compounds both equipped with autosamplers.

Data is downloaded from the mass spectrometer data systems into a PC-based database. The database allows automated generation of reports and quality control summaries.

Gas Chromatography

Four Varian 3400 Series Gas Chromatography instruments, equipped with the following detectors : FID, ECD, FPD, NPD. Two gas chromatographs fitted with FID detectors. One Carlo Erba 8000 series GC fitted with FID and PID detectors. All instruments have autosamplers. Peak integration is carried-out using dedicated networked computers. The data is then transferred to PC-based spreadsheets for automated data processing and generation of reports.

High Performance Liquid Chromatography

One Perkin Elmer Series 200 Isocratic LC pump, equipped with a Perkin Elmer 785A UV/VIS Detector, a Perkin Elmer LC-25 Refractive Index detector and a Perkin Elmer Series 200 autosampler. Peak integration is carried out using dedicated computers.

Other Organic Analysis

One Dohrmann Phoenix 8000 Total Organic Carbon Analyser equipped for both soil and water analysis and with 120 place autosampler module. PC based data handling and instrument control.

Inorganic Analysis

One Agilent 7500c ICP-MS system (with collision cell system), equipped with autosampler and PC based Chemstation software for data handling. Capable of analysing down to one part per trillion (ppt). Scanning of up to 70 elements in unknown samples.

One PSA Atomic Fluorescence Spectrometer for mercury analysis equipped with autosampler and PC for control and data handling system.

Two flow injection analysers (FIA) equipped with autosampler and PC for control and data handling.

One Dionex AS50 HPLC/ Ion chromatography system for wide variety of inorganic ions and other analyses. Equipped with autosampler and PC control / data handling.

Physico-Chemical Analyses

Setaflash "Series 7" closed cup Flash-Point tester

Buchi B-540 Melting/Boiling point apparatus

Kruss K8 Surface Tension apparatus

CONTROLLED TEMPERATURE ENVIRONMENTS

Pesticides and Semivolatiles suite, Volatile Organic Analysis suite, Metals suite and Traditional parameters suite– Maintained at 20 ±2°C.

2 Fish Testing Laboratories – Maintained at 14 ±2°C and 22±2°C. Supplied with both marine and freshwater systems and a 16 hour light, 8 hour dark photoperiod.

Aquatic invertebrate laboratory – Maintained at 20 ±2°C with a 16 hour light, 8 hour dark photoperiod.

Preparation laboratory - Maintained at 20 ±2°C.

GENERAL EQUIPMENT

In addition to the above analytical instrumentation the laboratory has the following items of major equipment:

- (a) Two cold rooms for sample storage with capacity of 650cu ft.
- (b) Two high temperature kilns for cleaning glassware and sample bottles.
- (c) Fifteen fridge/freezers for local storage of in progress samples, sample extracts and standards.
- (d) Gallenkamp cooled incubator for BOD determinations.
- (e) Four reverse osmosis water purifiers.
- (f) Gas generators for nitrogen and air.
- (g) Full networking of all laboratory and report generation PCs.
- (h) Multiple CD-Writer capability for back-up and archival of all data.
- (i) 34ft of fume cupboard in the organic extraction laboratory plus fume cupboards in other prep labs.
- (j) Microwave digestion unit in the metals laboratory.
- (k) Two liquid argon tanks supplying gas to AAS and ICP instruments.
- (l) One Gel Permeation Chromatography (GPC) systems.
- (m) Four liquid Nitrogen dewars for sub-ambient control of GC ovens.
- (n) Spectrophotometer for use with a wide range of determinands.
- (o) Proxy server system for email and electronic deliverable management.
- (p) Three cooled, illuminated incubator shakers for algal studies.
- (q) Two Gerhardt vapodest distillation systems.
- (r) Twenty position Gerhardt digestion block for refluxing digestion of soil samples.
- (s) Dionex ASE200 accelerated solvent extraction system.
- (t) Turbovap system for automated sample extract concentration.
- (u) Two glasswashing machines for general glassware cleaning.
- (v) Full range of air sampling techniques.

LABORATORY ACCREDITATION

UKAS ISO/IEC 17025

Chemex holds accreditation granted by the United Kingdom Accreditation Service (UKAS) under the Quality Standard ISO/IEC 17025. Formerly the laboratory was accredited to UKAS standard M10, and compliant with International Organisation for Standardisation (ISO) Guide 25 'General Requirements for the Technical Competence of Testing Laboratories', and European EN45001 and British Standard BS 7501, 1989, 'General Criteria for the Operation of Testing Laboratories' and BS 9000. However the new Quality Standard ISO/IEC 17025 encompasses all of these standards and requirements. The majority of Chemex methods are accredited as detailed in the accreditation schedule, see appendix 1. Chemex is testing laboratory number 1110.

GLP

Chemex is certified as operating in compliance with the international codes of Good Laboratory Practice (GLP) based on Section II of Annex 1 to the European Parliament and Council Directive 2004/10/EC and Annex 1 to the European Parliament and Council Directive 2004/9/EC (Official Journal No.L 50) and embodied with:

- *The UK Good Laboratory Practice Regulations 1999 (The United Kingdom GLP Regulations 1999, Statutory Instrument 3106) as amended by:*

- *The UK Good Laboratory Practice (Codification Amendments Etc.) Regulations 2004 (Statutory Instrument No 994).*

These principles are in accordance with the OECD Principles of Good Laboratory Practice, revised 1997 (ENV/MC/CHEM(98)17).

New Jersey-DEP

The United States New Jersey Department of Environmental Protection, Office of Quality Assurance (NJ DEP, OQA) operates an accreditation program for those laboratories participating in the performance evaluation program. Chemex has been successfully audited by the State of New Jersey OQA and in 1994 found to be in compliance with the EPA regulations for environmental contract laboratories. This certification covers USEPA methods 8260 (volatiles, purge and trap with GC/MS (capillary)), 8270 (semivolatile, pesticides, extraction with GC/MS), supported by methods 3510, 3545, 3550, 5030, 5035 and 3640.

MCERTS

The environmental Agency Monitoring Certification Scheme (MCERTS): *Performance Standard for Laboratories Undertaking Chemical Testing of Soil* was established for those laboratories that carry out the chemical testing of soil in accordance with European and international standards. The laboratory implemented the requirements of this scheme in April 2005. This accreditation is specific to individual analytical methods and is detailed in the UKAS accreditation schedule for Chemex (with the UKAS testing laboratory number 1110), see appendix 1. It is the intention of Chemex that as far as practicable, MCERTS accreditation will be sought for the majority of analytes listed on MCERTS performance standard, Annex A.

US EPA-CLP

Due to the impracticality of initial registration and continued compliance assessment to the US EPA-Contract Laboratory Program, accreditation will not be sought. A significant proportion of the methods employed by Chemex are derived from those defined for the US EPA-CLP program.

EXTERNAL QA PROGRAMS

Aquacheck

The laboratory participates in the analytical quality control check scheme Aquacheck operated by LGC. Our participation incorporates many of the Chemex methods for water, effluent.

CONTEST

The laboratory participates in the contaminated land proficiency testing scheme operated by the UK Laboratory of the Government Chemist (LGC). Currently Chemex participates in group A (Metals) and C (organics- PAH, TPH, PCB, VOC, BTEX, phenols, TOC) methods for soil.

ERA/ NJ-Dep-OQA

The United States, state of New Jersey, Department of Environment conducts a proficiency testing scheme for a wide range of determinands in waters and soils for laboratories using US EPA Methods. Data from these studies is used to evaluate the performance of the appropriate laboratories. Chemex participates in PT scheme operated by ERA for US EPA methods 8260- VOCs, and 8270- SVOCs and PCB Aroclors.

CLIENT AUDIT

Clients are encouraged and are welcome to visit the laboratory facility for either general discussion and assessment of our capabilities or, where required, to perform a full laboratory audit. The Business Development staff should be contacted to arrange a suitable date.

REGISTRATION/MEMBERSHIP

Chemex is a member of the:

British Standards Institute.

British Measurement and Testing Association.

European Oilfield Speciality Chemicals Association (associate member).

Standing Committee of Analysts (SCA).

QUALITY RESPONSIBILITIES

The independent Quality Assurance Unit, reporting directly to the Board of Directors, is responsible for monitoring adherence to, and effectiveness of, the quality procedures and ensuring that the quality objectives of the laboratory are being realised.

The QA Unit is responsible for checking all data reported for its compliance to quality control criteria and traceability to samples received.

The Head of Laboratory is ultimately responsible for defining appropriate quality control protocols and their mode of application throughout the laboratory and supporting departments.

The QA Manager monitors the company's adherence to the stated quality objectives by regular discussion with senior management personnel and will ensure that quality issues receive proper consideration at quality review meetings.

This commitment to quality is the responsibility of all Chemex staff from the most junior to the Board of Directors.

METHOD SUMMARIES - Environmental Analysis

Volatile Organic Compounds (VOAs) are analysed using Purge and Trap Gas Chromatography/Quadrupole Mass Spectrometry (GC/MS) instrumentation. There are 38 compounds on the VOA 624 list and 74 on the VOA 8260 Chemex Target Compound List.

Volatile Organic Compounds - Drinking Water List As above, these compounds are analysed using GC/MS instrumentation. There are 58 compounds on the Chemex Target Compound List.

BTEX- Method 1: BTEX (benzene, toluene, ethylbenzene and xylenes) are analysed using GC/MS equipment.
Method 2: Samples are analysed by headspace analysis using high resolution Gas Chromatography with Photo Ionisation Detection (GC/PID).

Semi-Volatile Organic Compounds (Acid, Base Neutrals - ABNs) are analysed using Gas Chromatography/Quadrupole Mass Spectrometry (GC/MS) instrumentation. There are 64 compounds on the ABN 625 list and 129 on ABN 8270 Chemex Target Compound List.

Polycyclic Aromatic Hydrocarbons (PAHs) are analysed as a sub-set of ABN's using Gas Chromatography/Quadrupole Mass Spectrometry (GC/MS) instrumentation. There are 16 PAH's on the Chemex Target Compound List.

Total Petroleum Hydrocarbons (TPHs) are analysed by Gas Chromatography with a Flame Ionisation Detector (GC/FID). Extracts are cleaned-up prior to analysis with silica gel. Other hydrocarbon methods of analysis include: Gasoline Range Organics, Diesel Range Organics, Total Aromatic and Aliphatic Hydrocarbons (fractionated).

Polychlorinated Biphenyls (PCBs) are analysed by Gas Chromatography/Electron Capture Detector (GC/ECD). Extracts are cleaned-up prior to analysis using concentrated sulphuric acid and alumina adsorption chromatography. Results can be presented as Congener or Aroclor mix.

Organonitrogen Pesticides are analysed by Gas Chromatography with a Nitrogen Phosphorus Detector (GC/NPD).

Organophosphorus Pesticides are analysed by Gas Chromatography with a Flame Photometric Detector (GC/FPD).

Organohalogen Pesticides are analysed using Gas Chromatography with an Electron Capture Detector (GC/ECD). Interfering co-extracted material is removed from extracts prior to analysis using alumina adsorption chromatography.

Metals - The Metals packages utilise combinations of Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and Atomic Fluorescence Spectrometry (AFS) with Cold Vapour Sample Atomisation (CVAFS).

Ion Chromatography: - Inorganic and organic anion analysis for common anions such as chloride, nitrate, etc. Also work on organic species, especially indicators of environmental attenuation.

Water Quality Parameters - Various water quality parameters, such as pH, BOD, COD, alkalinity, conductivity etc., are analysed using spectrophotometer, titration methods, gravimetric methods and specific meters.

Flow Injection Analysis - Automated analysis of phenols (4-aminoantipyrine), total and free cyanide, ammonia, sulphide and thiocyanate incorporating in line sample preparation using distillation and solid phase extraction.

HPLC – Applied to various analyses including pharmaceutical compounds, esoteric organic contaminants and sulphur.

Waste Acceptance Criteria (WAC)- The soil samples are leached at liquid to solid ratios of L/S=2 and L/S=8 according to BS EN 12457-3. The results are expressed in mg/Kg for the leaching of L/S=10.

METHOD SUMMARIES - Ecotoxicology (Not exhaustive)

Alga, growth inhibition test (OECD 201, JMAFF, EEC C3, ISO/DIS 10253 and DTAPS methods)

Freshwater species: *Pseudokirchneriella subcapitata* or *Chlorella vulgaris* and *Scenedesmus subspicatus*

Marine species: *Skeletonema costatum* and *Phaeodactylum tricornutum*

The growth inhibition test is performed semi-axenically (i.e. minimising contamination by other organisms) in glass flasks under controlled conditions. Growth of the alga is determined by cell counting or spectrophotometry at 24 hour intervals for periods of exposure up to 96 hours. The data are used to determine the EC₅₀ values by both growth rate and biomass inhibition. The highest no effect concentration (NOEC) is determined by the Bonferonni T Test based on the area under the growth curve.

Lemna sp. growth inhibition test (OECD 221 and Taraldsen and Norberg-King 1990)

Cultures of the floating aquatic plant *Lemna minor* are exposed to a range of test material concentrations under defined conditions. The inhibition of growth, relative to a control culture, is determined in a static system over 7 days. The data are used to determine the median effective concentration, that is the concentration that inhibits the growth of *Lemna* by 50% after 7 days. This is referred to as the 7 day EC₅₀. Growth is based upon the increase in frond number.

Daphnia immobilisation test (OECD 202, JMAFF, EEC C2, DTAPS, static or semi-static test system)

Daphnia magna, less than 24 hours old, are placed into test vessels containing a series of concentrations of test substance or effluent in water. *Daphnia* are observed after 24 and 48 hours and the number immobilised in each vessel recorded. Results are expressed as EC₅₀ values (concentrations causing 50% of the *Daphnia* to be immobilised) for 24 and 48 hours exposure. Classification is based on the 48 hour EC₅₀ figure. The maximum no effect concentration (NOEC) and minimum concentration resulting in significant (P ≥ 0.05) immobility (LOEC) are reported.

Daphnia reproduction test (OECD 211)

The primary objective of the test is to assess the effect of chemicals on the reproduction and output of *Daphnia magna*. The results of the acute immobilisation study are used to select the concentrations of the test substance. The duration of the study is 21 days and the number of offspring produced together with adult and juvenile survival is reported. A semi-static system is recommended and the frequency of test media renewal depends on the stability of the substance. The reproductive output is compared to that of the controls to determine the lowest observed effect concentration (LOEC) and the no effect concentration (NOEC) in addition of the EC₅₀.

Marine copepod (*Acartia tonsa* or *Tisbe battagliai*) acute toxicity test (ISO/PARCOM and DTAPS methods):

Acartia tonsa of a known age are placed into test vessels containing a series of concentrations of the test material in water for 48 hours. The animals are observed after 24 and 48 hours and the number of mortalities in each vessel are recorded. EC₅₀ values, NOECs and LOECs are estimated.

Oyster Embryo Larval Test (DTAPS method)

Separate egg and sperm suspensions are obtained from conditioned oysters and assessed microscopically for motility and maturity and the best selected for bioassays. Fertilisation is achieved and the cells allowed to undergo early stages of cleavage until they reach the 16 to 32 cell stage. The embryo suspension with most uniform cleavage is selected for testing and exposed to a series of concentrations of the test material or effluent. After 24 hours, the control and test vessels are checked for live, normally developed D-shaped larvae. Oyster embryos in control solutions should have developed to straight hinge or D-shaped larvae with a bivalve shell. The median effective concentration (EC₅₀) is the concentration that causes a 50% reduction in successful embryo development to the D-larval stage in terms of total surviving larvae compared to control development over 24 hours.

Fish, acute toxicity test (OECD 203, JMAFF, EEC C1, PARCOM)

Rainbow trout (*Oncorhynchus mykiss*), Carp (*Cyprinus carpio*) or zebra fish (*Brachydanio rerio*) are the preferred species in freshwater. Turbot (*Scophthalmus maximus*) or sheepshead minnows (*Cyprinodon variegatus*) are preferred saltwater species. Fish are introduced into glass aquaria containing water to which the test substance has been added at known concentrations. Fish are observed for mortality and sub-lethal symptoms at specified periods of time. The results of the test are expressed in the form of LC₅₀ values (that is the concentration causing 50% mortality among the test population). The duration of exposure is normally 96 hours. . The maximum concentration at which no mortality occurs (NOEC) and the minimum concentration at which 100% mortality occurs are also reported together with observations of toxic symptoms. The slope of the dose/response curve is also provided where possible. This provides useful extra information for use in environmental risk assessment or hazard classification of the test substance.

Fish, early life stage toxicity (FELST) (OECD 210)

The early life stages of fish are exposed to the chemical usually under flow-through conditions. The study starts by placing fertilised eggs in the test chamber and continues until all the fish are free swimming and feeding exogenously. Lethal and sub-lethal effects such as growth are assessed and compared with controls. The larval and early fry stages are usually the most sensitive stages to the effects of xenobiotics.

Brown Shrimp (*Crangon crangon*) LC50 (MAFF)

Brown Shrimp are introduced into glass aquaria containing the test substance or effluent at known concentrations. Shrimp are observed for mortality and sub-lethal symptoms at specified periods of time. The results of the test are expressed in the form of LC₅₀ values (that is the concentration causing 50% mortality among the test population). The duration of exposure is normally 96 hours. The maximum concentration at which no mortality occurs (NOEC) and the minimum concentration at which 100% mortality occurs are also reported together with observations of toxic symptoms. The slope of the dose/response curve is also provided where possible. This provides useful extra information for use in environmental risk assessment or hazard classification of the test substance.

Bioconcentration: Flow-through Fish Test (OECD 305)

The objective of this study is to determine the steady-state bioconcentration factor (BCF_{ss}). Fish are exposed under flow-through conditions to water of known quality to which the test substance has been added at known concentrations for a period normally not exceeding 28 days (uptake phase). After the uptake phase the remaining fish are transferred to clean tanks under flow-through conditions for a further period of time normally not exceeding 14 days (depuration phase). Samples of fish and water are analysed for the test material at predetermined time points in both test phases.

Chironomus riparius 10 day sediment toxicity test (ASTM E1706-95)

This study is designed to investigate the acute effects of sediment-bound contaminants on the larvae of the freshwater invertebrate *Chironomus riparius*, a non-biting midge, over a 10-day exposure period. Second instar larvae are exposed to sediment either artificially amended in the laboratory with the chemical(s) of concern or collected from the field. Mortality and sub-lethal effects are recorded after 10 days. Toxicity of sediments artificially amended with a substance is determined by measuring the concentration that kills or affects 50% of the animals (LC₅₀ or EC₅₀). Toxicity of sediments collected from the field is determined by measuring the % mortality or effect of the animals exposed to that sediment compared with exposure to a control or reference sediment.

Corophium sp. 10 day sediment toxicity test (PARCOM)

In the test, adult *Corophium* are exposed to spiked natural sediments for 10 days. During this period, burrowing behaviour may be assessed by counting the number of amphipods on the sediment surface or actively swimming. At the end of the experiment, the amphipods are sieved from the sediment and the number of surviving animals recorded. Survival is then analysed statistically, comparing the controls with the treatments. The objective is to determine the initial concentration, which, in 10 days, kills 50% of the exposed animals (10_d LC₅₀).

Earthworm, acute toxicity (OECD 207)

Concentrations of test substance are added to a defined artificial loam soil in which adult earthworms are maintained for 14 days. After 7 and 14 days the effects of the test substance on the earthworms survival and body weight are examined. The results are used to calculate LC₅₀ values and no observed effect concentrations for body weight. Parallel tests are carried out with chloracetamide in order to check the validity of the test system.

Activated sludge respiration inhibition test (OECD 209)

This test examines the effect of test substances on the activity of activated sludge microorganisms taken from a sewage works receiving largely domestic sewage. The test can be used to estimate possible effects on a sewage works and the results can be used to set a suitable concentration range for further biodegradation studies. The test substance is added at different concentrations to activated sludge and incubated at 21 ± 2°C under fully aerated conditions for 3 hours. The respiration rate is measured over a 10-minute period using D.O. probes and closed BOD bottles.

Soil Microbial Biomass (Fumigation / extraction)

The measurement of soil microbial biomass is one of the most reliable procedures commonly used for a better comprehension of the nutrient cycle in soil. Among the methods available, the Chloroform Fumigation Extraction method (Vance et al, 1987) is more commonly used due to its simplicity and applicability for wide group of soils.

The microbial biomass carbon is determined as the difference between the fumigated and non-fumigated organic carbon contents multiplied by a proportionality factor. This factor comes from the work of Wu et al (1990) and Vance et al (1987) who determined a linear relationship between biomass carbon and extractable carbon due to fumigation.

Microtox (EC₅₀)

The test is a rapid and reliable and data can be obtained within hours of samples being taken for assessment. The test investigates the toxicity of a sample to the Microtox™ reagent, the photoluminescent bacteria, *Vibrio fischeri*. Toxicity is expressed as the median effective concentration [EC₅₀ value] which is the concentration of the test substance that reduces the light output of the exposed bacteria by 50% after a 5, 15 or 30 minute exposure period at 15°C. Toxicity can also be expressed as Toxicity Units (number of Toxicity Units (TU) ≡ 100/EC₅₀). Readings of light output are measured using the Microtox™ analyser. Gamma [the ratio of the light lost by the light emitting reagent after exposure to a sample, to the light remaining after that exposure] values are calculated from the light measurements of the test concentrations compared with those for controls. The EC₅₀ values are obtained using the Microtox™ Omni computer software programme.

BIODEGRADATION STUDIES VARIOUS :

Modified OECD Screening test (DOC die-away method OECD 301A, OECD 301E, EEC C4-b)

The loss of dissolved organic carbon (DOC) is followed by analysis every few days during the 28 day study period and is compared with the total organic carbon for the known weight of test substance. A sodium acetate reference is used and greater than 60% loss is expected.

Modified Sturm test (OECD 301B, EEC C4-c)

This method is suitable for non-volatile substances that may be poorly soluble in water.

The amount of carbon dioxide (CO₂) produced as a percentage of theoretical yield (based on total organic carbon analysis) is used as a basis for assessing whether the material biodegrades. CO₂ is measured by way of a sodium hydroxide trap. The study is run for a minimum of 28 days and may be continued if the yield of CO₂ is showing signs of increase towards the end of the 28 day period. A positive control of sodium acetate is run alongside and a degradation of greater than 60% over 28 days should be seen. A blank control containing just the inoculum and nutrient mixture is used to check background levels of activity.

Closed Bottle test (OECD 301D, EEC C4-e)

This method is appropriate for volatile materials and although good water solubility is desired, poorly soluble materials can be tested. As implied by the title, this is conducted in a closed system and oxygen consumption measured by electrochemical probes or through chemical analysis. The principle is similar to the Modified MITI test and suitable controls are used.

Manometric respirometry Test (OECD 301F by OXITOP method)

A measured volume of inoculated mineral medium, containing a known concentration of the test substance (100 mg/l giving at least 50-100mg ThOD/l) as the source of organic carbon, is stirred in a closed flask at a constant temperature for up to 28 days. During the course of the test oxygen is consumed and carbon dioxide evolved. The carbon dioxide is absorbed in sodium hydroxide and the drop in pressure in the test vessels therefore determines the oxygen consumption. The caps of the test vessels contain a pressure transducer and microprocessor to measure and calculate BOD. The amount of oxygen taken up by the microbial population during biodegradation of the test substance is expressed as a percentage of ThOD or, less satisfactorily, COD.

Modified Zahn-Wellens test (OECD 302B)

This method is not suitable for volatile materials. Test material is added to a large volume of activated sludge and nutrient mixture and the decline in dissolved oxygen concentration measured frequently. The duration of the study is generally 28 days but may be extended if a significant lag period is noted at the start. A result of > 70% degradation means that the substance is 'ultimately' biodegradable but < 70% and > 20%, it is 'inherently' biodegradable.

Inherent Biodegradability – Concawe (OECD 302D)

This method is based on ISO 14593: 'Carbon dioxide (CO₂) Headspace Biodegradation Test' and provides a test for assessing the inherent, aerobic biodegradability of organic substances. It is particularly useful for testing insoluble and/or volatile materials. The test is performed in sealed bottles with a headspace of air that provides a reservoir of oxygen (O₂) for aerobic biodegradation. CO₂ evolution from the ultimate aerobic biodegradation of the test substance is determined by measuring the inorganic carbon (IC) produced in the test bottles over that produced in blanks that contain inoculated medium only. The ultimate aerobic biodegradation is the breakdown of an organic chemical by micro-organisms in the presence of O₂ resulting in the production of CO₂, water and mineral salts (ie mineralisation) and microbial cellular constituents (biomass). The extent of biodegradation is expressed as a percentage of the theoretical maximum IC production (ThIC), based on the quantity of test substance (as total organic carbon). A pre-exposure period of 14 days is included and the test is typically run for an additional 56 days. Values ≥20% demonstrate that the test substance is Inherently biodegradable whilst values ≥60% demonstrates Inherent and Ultimate biodegradability.

Biodegradability in seawater – closed bottle method (OECD 306)

This method is appropriate for volatile materials and although good water solubility is desired, poorly soluble materials can be tested. The test vessels are closed filled bottles containing the test substance dissolved in the natural seawater. The bottles are incubated in the dark at 20°C and the degradation is followed by analysis of the dissolved oxygen over a 28 day period.

Ready Biodegradability – CO₂ in sealed vessels (Headspace Test) (OECD 310)

This method is based on ISO 14593: ‘Carbon dioxide (CO₂) Headspace Biodegradation Test’ and provides a test for assessing the ultimate, aerobic biodegradability of organic substances. It provides similar information to the methods described in OECD 301. The test is performed in sealed bottles with a headspace of air that provides a reservoir of oxygen (O₂) for aerobic biodegradation. CO₂ evolution from the ultimate aerobic biodegradation of the test substance is determined by measuring the inorganic carbon (IC) produced in the test bottles over that produced in blanks that contain inoculated medium only. The ultimate aerobic biodegradation is the breakdown of an organic chemical by micro-organisms in the presence of O₂ resulting in the production of CO₂, water and mineral salts (ie mineralisation) and microbial cellular constituents (biomass). The extent of biodegradation is then expressed as a percentage of the theoretical maximum IC production (ThIC), based on the quantity of test substance (as total organic carbon) added initially. The test is typically run for 28 days. Values ≥60% ThIC in a 10 day window demonstrates ready biodegradability.

Biodegradability of Insoluble Substances, BODIS, in seawater (PARCOM)

This method was developed for the assessment of degradation of poorly soluble materials. The test vessels are closed glass bottles with a known volume of natural seawater (2/3) and air (1/3). They are shaken continuously to ensure steady state oxygen partitioning between liquid and gas phases. The degradation is followed by weekly measurements of the biochemical oxygen demand (BOD) in the aqueous phase for a 28 day period. The BOD is calculated from the cumulative oxygen uptake.

Anaerobic Biodegradation (ISO CD 11734 and ECETOC report No.28)

This method is intended to provide a simple and reliable screening test for the ultimate biodegradability of chemicals under anaerobic conditions. The method is applicable to soluble and poorly soluble organic chemicals. A known volume of anaerobic sludge (corresponding to 10% of the sludge concentration in a real digester) suspended in an oxygen free medium is placed in a suitable vessel with a headspace into which any gases produced may be evolved. Prior to sealing a small amount of test compound is added. The vessels are incubated at constant temperature (35 ± 1°C) and pH for a period of 8 weeks. The headspace pressure, resulting from the production of gas, is measured. From the measured values of net gas production the extent of biodegradation is calculated. The kinetics of the degradation are followed by intermediate measurements at suitable intervals during the course of the test.

Abiotic degradation - Hydrolysis as a function of pH (OECD 111)

Hydrolysis is an important reaction controlling degradation. The reaction is particularly relevant for substances with low biodegradability and can influence the persistence of a substance in the environment. The method is only applicable to water soluble substances. The test material is dissolved in water at low concentration with pH and temperature controlled. The decrease in the concentration with time is followed by a suitable analytical technique. The test is performed at three pH values (normally, 4.0, 7.0 and 9.0). The initially testing is performed at 50°C with two further analyses performed at a temperature below this (typically 40°C). The rate constants for each condition are derived from plots of the log of concentration against time.

Estimation of the Adsorption Coefficient (K_{oc}) on soil and on Sewage Sludge using High Performance Liquid Chromatography (HPLC) (OECD 121)

An important parameter in the sorption behaviour of substances is the adsorption coefficient. This is defined as the ratio between the concentration of the substance in the soil/sludge and the concentration of the substance in the aqueous phase at adsorption equilibrium. The adsorption coefficient normalised to the organic content of the soil K_{oc} is a useful indicator of the binding capacity of a chemical on organic matter of soil and sewage sludge and allows comparisons to be made between different chemicals. The experimental method uses HPLC for the estimation of the adsorption coefficient K_{oc} in soil and sewage sludge. While passing through the column in the mobile phase the test substance interacts with the stationary phase. As a result of partitioning between mobile and stationary phases the test substance is retarded. The dual-composition of the stationary phase having polar and non-polar sites allows for the interaction of polar and non-polar groups of a molecule in a similar way as is the case for organic matter in soil or sewage sludge matrices. This enables the relationship between the retention time on the column and the adsorption coefficient on organic matter to be established.

APPENDIX 1

ENVIRONMENTAL ANALYSIS METHODS

Analyte	Matrix	Instrument	Reference Method	Detection Limits	Accredit. Status*
Acidity	Water	Titration	SCA 1981	2mg/l	-
Acid Herbicide	Water	GC/MS	USEPA 8151, 615	10ng/l	-
	Soil	GC/MS		170ng/Kg	-
Alcohols	Water	GC/FID	USEPA 3810, 8015 and SCL 818	0.5-2.0 mg/L	-
	Soil	GC/FID		0.5-2.0 mg/Kg	-
Alkalinity	Water	Titration	SCA 1981	3mg/L	UKAS
	Soil			30mg/Kg	-
Ammonia	Water	Flow Injection Analysis	HMSO 1981	0.01µg/L	-
	Soil			0.5µg/Kg	-
Biological Oxygen Demand	Water	Oxygen meter	SCA 1988	2mg O ₂ /L	-
Bromide	Water	Ion Chromatography	USEPA SW846-9056	0.025mg/L	UKAS
	Soil			0.25mg/Kg	-
BTEX Hydrocarbons	Water	GC/PID	USEPA 3810, 8015 and SCL818	5µg/L	UKAS
	Soil			5µg/Kg	UKAS
BTEX Hydrocarbons and TBME	Water	GC/MS	USEPA 624	0.8-1.5µg/L	UKAS
	Soil			0.8-2µg/Kg	UKAS, MCERTS N.JERSEY
Chemical Oxygen Demand	Water	Spectrophotometer	USEPA 410.4	10mg O ₂ /L	UKAS
Chloride	Water	Spectrophotometer	USEPA 325.2	0.5mg/L	-
	Soil		BS 1377	2mg/Kg	-
	Water	Ion Chromatography	USEPA SW846-9056	0.10mg/L	UKAS
	Soil			1.0mg/Kg	-
Diesel Range Organics (DRO)	Water	GC/FID	USEPA 8015	10µg/L	-
	Soil			0.4mg/Kg	-

Analyte	Matrix	Instrument	Reference Method	Detection Limits	Accredit. Status*
Dissolved Oxygen	Water	Oxygen meter	SCA 1979 Method A	0.5mg/L	-
Electrical Conductivity	Water	Conductivity Meter	SCA 1978	5.0µS/cm	UKAS
EPH/VPH	Water	GC/FID, GC/PID	USEPA 3810, 8015, MADEP Methods for determination of EPH & VPH	0.01-0.1mg/L	-
	Soil			0.01-0.5mg/Kg	-
Free Cyanide	Water	Flow Injection Analysis	SCA 1988 Method C	10µg/L	-
	Soil			0.2mg/Kg	-
Ferrous Iron	Water	Spectrophotometer	SMEWW315B	0.03mg/L	UKAS
	Soil			0.5mg/Kg	-
Flashpoint	Product	Flashpoint tester	USEPA 1020A	20°C	-
	Soil				-
Fluoride	Water	Spectrophotometer	USEPA 340.1	0.1mg/L	-
	Soil			1.0mg/Kg	-
	Water	Ion Chromatography	USEPA SW846-9056	0.05mg/L	UKAS
	Soil			0.50mg/Kg	-
Formaldehyde	Water	HPLC	USEPA 8315A	3.3µg/L	-
	Soil			100µg/Kg	-
	Water	Spectrophotometer	HACH Method 8110	5µg/L	-
	Soil			100µg/Kg	-
Glycols	Water	GC/FID	USEPA 8015	5mg/L	-
	Soil			5mg/Kg	-
Gasoline Range Organics (GRO)	Water	GC/FID	USEPA 8015, 3810 SCL 818	0.1mg/L	-
	Soil			0.1mg/Kg	-
Hardness	Water	Titration	HMSO 1981	5mg/L	-
Headspace	Water	GC/FID	USEPA 8015, 3810 and SCL 818	0.005-2mg/L	-
	Soil			0.005-4mg/Kg	-
Hexavalent Chromium	Water	Spectrophotometer	SCA 1980	0.02mg/L	UKAS
	Soil			0.2mg/Kg	-
Ionic Balance	Water	Various	Various	-	-

Capability Statement

Version 7.5
Reviewed: Nov 2008
Next review: Nov 2009
Page 13 of 22

Analyte	Matrix	Instrument	Reference Method	Detection Limit/Range	Accredit. Status*
DIN Leaching	Soil/Sed	Various	DIN 83418 Part 4	-	-
NRA Leaching	Soil/Sed	Various	NRA Rec. Test	-	-
TCLP Leaching	Soil/Sed	Various	USEPA 1311	-	-
Leaching using Zero Headspace Extractor (ZHE)	Soil/Sed	GC/MS	USEPA 1311 DIN 83418 Part 4 NRA Rec. Test	-	-
Metals : ICP-MS	Water	ICP-MS	USEPA SW-846 Method 6020	0.25-200µg/L	UKAS
	Soil			0.25-200mg/Kg	UKAS MCERTS
Metals : CV-AFS	Water	CV-AFS Hg	SW-846 1613B	0.06µg/L	UKAS
	Soil			0.12mg/Kg	UKAS MCERTS
Nitrate	Water	Spectrophotometer	USEPA 353.3	0.05mg/L	-
	Soil			0.5mg/Kg	-
	Water	Ion Chromatography	USEPA SW846- 9056	0.02mg/L	UKAS
	Soil			0.20mg/Kg	-
Nitrite	Water	Spectrophotometer	USEPA 354.1	0.02mg/L	-
	Soil			0.2mg/Kg	-
	Water	Ion Chromatography	USEPA SW846- 9056	0.02mg/L	UKAS
	Soil			0.20mg/Kg	-
Organic Acids	Water	Ion Chromatography	USEPA SW846- 9056	0.2mg/L	-
	Soil			2.0mg/Kg	-
Organic Matter	Soil	Spectrophotometer	HACH DR/2000, BS 1377(3) 1990	0.06%	-
Organohalogen Pesticides	Water	GC/ECD	USEPA 608	0.005-0.5 µg/L	UKAS
	Soil			0.1-10µg/Kg	UKAS
Organonitrogen Pesticides	Water	GC/NPD	SCA 1985	0.02-0.2µg/L	-
	Soil			0.3-5µg/Kg	-
Organophosphorus Pesticides	Water	GC/NPD	USEPA 1618	0.1-0.2µg/L	-
	Soil			1.7-3.4µg/Kg	-

Analyte	Matrix	Instrument	Reference Method	Detection Limits	Accredit. Status*
Organo-Tin	Water	GC/MS/SIM	In-house	10µg/L	-
	Soil			330µg/Kg	-
Orthophosphate	Water	Spectrophotometer	SCA 1980	0.02mg/L	UKAS
	Soil			0.2mg/Kg	-
pH	Water	pH meter	SCA 1978 USEPA 9045	0.5-13	UKAS
	Soil			0.5-13	-
Phenol (4-AAP)	Water	Flow Injection Analysis	HMSO: Ref.Method 1981	5µg/L	-
	Soil			0.2mg/Kg	-
Polycyclic Aromatic Hydrocarbons	Water	GC/MS	USEPA 610, 625, 3630, 8270	0.5µg/L	UKAS
	Soil			10µg/Kg 75µg/Kg	UKAS MCERTS
Polychlorinated Biphenyls -Aroclor	Water	GC/ECD	USEPA Method 608, SW-846 8082	20ng/L	UKAS
	Soil			0.5µg/Kg	UKAS MCERTS
	Swab			0.5µg/Kg	UKAS
	Transf. Fluid			10mg/Kg	-
	Motor Oil			0.06mg/Kg	-
-Congener	Water	GC/ECD	USEPA Method 608, SW-846 8082	1.0ng/L	UKAS
	Soil			10ng/Kg	UKAS
	Swab			10ng/Kg	UKAS
	Oil			0.5µg/L	-
Reactivity	Water	Various	USEPA SW- 846, Chapter 7		-
	Soil				-
Red List	Water	GC/MS, GC/ECD, GC/NPD	In-house	Various	-
	Soil	ICP-MS, , CV-AFS			-
Redox Potential	Water	Probe and Meter	SMEWW 2580		No

Analyte	Matrix	Instrument	Reference Method	Detection Limits	Accredit. Status*
Semivolatile Organics 625/8270	Water	GC/MS	SW 846 8270	0.5-10µg/L	UKAS N.JERSEY
	Soil			75-600µg/Kg	UKAS MCERTS N.JERSEY
Silica	Water	Spectrophotometer	SMEWW 4500 D/E	0.05mg/L	UKAS
	Soil			1.0mg/Kg	-
Speciated Phenols by GC/MS	Water	GC/MS	USEPA 8041, 604	0.1-1.0µg/L	-
	Soil			5-80µg/Kg	-
	XAD Tube			1-10µg/tube	-
Sulphate	Water	Spectrophotometer	USEPA 375.4 BS 1377	5mg/L	-
	Soil			10mg/Kg	-
	Water	Ion Chromatography	USEPA SW-846 9056	0.05mg/L	UKAS
	Soil			0.5mg/Kg	-
Sulphide	Water	Flow Injection Analysis	1983 HMSO Method B	0.10mg/L	-
	Soil			1.0mg/Kg	-
	Water	Iodometric (Tentative)	MEWAM 1983 HMSO, B	0.10mg/L	-
Sulphur (Elemental)	Water	HPLC	In-house	1.0mg/L	-
	Soil			5mg/Kg	-
Sulphite	Water	Iodometric (Titration)	SMEWW 4500, B 1992	2.0mg/L	-
Thiocyanate	Water	Flow Injection Analysis	HMSO: Ref. Method E 1992	0.02mg/L	-
	Soil			10mg/Kg	-
Nonionic Detergents	Water	Flow Injection Analysis	In-house	1mg/L	-
TIC – VOCs and SVOCs additional screening for unknown	Water	GC/MS			-
	Soil				-
Toluene Extractable Material	Water	Gravimetric	In-house	0.5mg/L	-
	Soil			10mg/Kg	-

Analyte	Matrix	Instrument	Reference Method	Detection Limits	Accredit. Status*
Total Cyanide	Water	Flow Injection Analysis	SCA 1988	10µg/L	
	Soil			0.2mg/Kg	
Total Dissolved Solids	Water	Gravimetric	SCA 1980	20mg/L	-
Total Organic Carbon	Water	NDIR	USEPA 9060	0.2mg/L	-
	Soil			0.1%	-
Total Petroleum Hydrocarbons	Water	GC/FID	USEPA 8015C	20µg/L	UKAS
	Soil			0.7mg/Kg	UKAS MCERTS
Total Phosphorus	Water	Spectrophotometer	SCA 1980	0.1mg/L	-
	Soil			5mg/Kg	-
Total Suspended Solids	Water	Gravimetric	SCA 1980	2mg/L	UKAS
Turbidity	Water	Spectrophotometer	HACH DR/2000	2FTU	-
Volatile Organics 624/ 8260 lists	Water	GC/MS	USEPA 8260	0.8-20µg/L	UKAS N.JERSEY
	Soil L			0.5-20µg/Kg	UKAS MCERTS N.JERSEY
	Soil M			65-2500µg/Kg	UKAS N.JERSEY
Volatile Organics in Drinking Water	Water	GC/MS	USEPA 524.2	80-500ng/L	UKAS

Key: * According to UKAS accreditation schedule version 022, issued 27 May 2008
 UKAS- United Kingdom Accreditation Service
 N.JERSEY- US State of New Jersey DEP OQA certification
 MCERTS- UK Environmental Agency Monitoring Certification Scheme

APPENDIX 2

ECOTOXICOLOGY METHODS

Biodegradability and Bioaccumulation (Freshwater & Marine)

Study title	Reference Method
Bioaccumulation	
Octanol/Water Partition Coefficient – Shake Flask method	OECD 107
Octanol/Water Partition Coefficient – HPLC method	OECD 117
Biodegradation	
DOC Die-Away test	OECD 301A
Modified Sturm test	OECD 301B
Closed Bottle test	OECD 301D
OECD Screening test	OECD 301E
Manometric Oxitop test	OECD 301F
Inherent Biodegradability – Zahn-Wellens EMPA test	OECD 302B
Inherent Biodegradability - Concave closed bottle test	OECD 302D
Biodegradability in Seawater- Closed Bottle method	OECD 306
Biodegradability in freshwater- Head space test	OECD 310
Biodegradability of Insoluble Substances (BODIS) in Seawater	PARCOM
Anaerobic Biodegradation	ISO/DIS 11734

Marine Ecotoxicology

Study title	Reference Method
Aquatic toxicity tests	
72 hour EC ₅₀ Alga (<i>Skeletonema costatum</i>)	ISO 10253
48 hour EC ₅₀ Marine Copepod (<i>Acartia tonsa/ Tisbe battagliai</i>) – Static	PARCOM, DTAPS
96 hour LC ₅₀ Fish (<i>Scophthalmus maximus</i>) – Semi-static	PARCOM
10 day Sediment test (<i>Corophium volutator</i>) LC ₅₀ – Static	PARCOM
Oyster Embryo Larval test EC50 – Static	MAFF 1991, DTAPS
96 hour LC ₅₀ Brown Shrimp (<i>Crangon crangon</i>) – Semi-static	MAFF
Microtox EC ₅₀ (Microtox Omni software)	Azur Environmental,

Freshwater/Terrestrial Ecotoxicology

Study title	Reference Method
Adsorption / Desorption screening test	OECD 106
Algal growth inhibition	OECD 201, DTAPS
Acute toxicity to fish (<i>Oncorhynchus mykiss</i>) – semi-static	OECD 203, JMAFF
Acute toxicity for crustaceans (<i>Daphnia magna</i>) – static, 24 and 48 hour	OECD 202, DTAPS, JMAFF
Acute toxicity to earthworms	OECD 207
Activated sludge respiration inhibition	OECD 209
Chronic toxicity to fish (<i>Oncorhynchus mykiss</i>) – semi-static	OECD 210
<i>Daphnia magna</i> growth and reproduction – (21 day)	OECD 211
Bioconcentration flow through fish test	OECD 305
Effects on sediment dwelling organisms (<i>Chironomus riparius</i>)	Draft OECD
Effects on aquatic plants (<i>Lemna minor</i>)	OECD 221, (Taraldsen & Norberg-King)
Chronic toxicity to earthworms	ISO Draft
BOD – 5 day	EEC C5 / C6
BOD	EEC C8
COD	EEC C9
Soil microbial biomass	Fumigation/extraction

Capability Statement

Version 7.5
Reviewed: Nov 2008
Next review: Nov 2009
Page 18 of 22

Physico – Chemical Test Methods

Study title	Guideline
Melting Point / Freezing Temperature	EEC A1
Boiling Point	EEC A2
Relative Density	EEC A3
Vapour Pressure *	EEC A4
Appearance (physical state, colour and odour)	-
Surface Tension	EEC A5
Solubility in Water (pH 7)	EEC A6
Solubility in Water (pH 5, 7 and 9)	EEC A6
Solubility in Organic Solvents (6 solvents)	-
Partition Coefficient (HPLC method)	EEC A8, OECD 117
Partition Coefficient (Shake Flask method)	EEC A8, OECD 107
Flammability (solids)	EEC A10
Flammability (solids and liquids)	EEC A13
Auto-flammability (self-ignition temperature – solids) *	EEC A16
Flash point (liquids and low melting point solids)	EEC A9
Oxidising Properties (solids)	EEC A17
Acidity / Alkalinity, pH	CIPAC MT 31/75
Storage stability	CIPAC Methods
Spontaneity	CIPAC MT 160
Wet Sieving	CIPAC MT 59.3/167
Wettability	CIPAC MT 53.5
Persistent Foaming	CIPAC MT 47
Pourability	CIPAC MT 148
Dilute Emulsion Stability	CIPAC MT 20
Tap Density	CIPAC MT33/169
Active ingredient content	CIPAC Methods
Suspensibility and suspension stability	CIPAC MT 15,161
Adsorption Coefficient using HPLC	OECD 121
Solution extraction of Polymers in water	OECD 120
Direct Photolysis Rate in Water by Sunlight	EPA OPPTS835.2210
5 Batch Analysis	Various - discuss

* Method currently sub-contracted

Appendix 3
CERTIFICATES



**THE DEPARTMENT OF HEALTH OF THE GOVERNMENT
OF THE UNITED KINGDOM**

GOOD LABORATORY PRACTICE

**STATEMENT OF COMPLIANCE
IN ACCORDANCE WITH DIRECTIVE 2004/9/EC**

TEST FACILITY

**Chemex Environmental International Ltd
Unit J
Broad Lane Industrial Estate
Cottenham
Cambridge
CB4 8SW**

TEST TYPE

**Analytical Chemistry
Environmental fate
Phys/chem tests
Environmental Toxicity**

DATE OF INSPECTION

11 April 2007

A general inspection for compliance with the Principles of Good Laboratory Practice was carried out at the above test facility as part of the UK GLP Compliance Programme.

At the time of inspection no deviations were found of sufficient magnitude to affect the validity of non-clinical studies performed at these facilities.



10/7/07

Dr. Andrew J. Gray
Head, UK GLP Monitoring Authority



United Kingdom Accreditation Service

ACCREDITATION CERTIFICATE



TESTING LABORATORY
No. 1110

Chemex Environmental International Limited

is accredited in accordance with the recognised International Standard ISO/IEC 17025:2005
General Requirements for the competence of testing and calibration laboratories.

This accreditation demonstrates technical competence for a defined scope as detailed in and at the locations specified in the schedule to this certificate, and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué dated 18 June 2005).

The schedule to this certificate is an essential accreditation document and from time to time may be revised and reissued by the United Kingdom Accreditation Service. The most recent issue of the schedule of accreditation, which bears the same accreditation number as this certificate, is available from the UKAS website www.ukas.org.

This accreditation is subject to continuing conformity with United Kingdom Accreditation Service requirements. The absence of a schedule on the UKAS website indicates that the accreditation is no longer in force.

R. Bell

Accreditation Manager, United Kingdom Accreditation Service

Initial Accreditation date
21 March 1994

This certificate issued on
12 May 2006

The Department of Trade and Industry (DTI) has entered into a memorandum of understanding with the United Kingdom Accreditation Service (UKAS) through which UKAS is recognised as the national body responsible for assessing and accrediting the competence of organisations in the fields of calibration, testing, inspection and certification of systems, products and persons

*State of New Jersey
Department of Environmental Protection*

Certifies That

Chemex Environmental International Limited

Laboratory Certification ID # ENGL686

having duly met the requirements of the

**Regulations Governing The Certification Of
Laboratories And Environmental Measurements N.J.A.C. 7:18 et. seq.**

is hereby approved as a

State Certified Environmental Laboratory
*to perform the analyses as indicated on the Annual Certified Parameter List
which must accompany this certificate to be valid*

Expiration Date June 30, 2009



Joseph F. Aiello
Joseph F. Aiello, Chief
Office of Quality Assurance

THIS CERTIFICATE IS TO BE CONSPICUOUSLY DISPLAYED AT THE LABORATORY WITH THE ANNUAL CERTIFIED PARAMETER LIST IN A LOCATION ON THE PREMISES VISIBLE TO THE PUBLIC