No	Overview of Amendment & Text affected	Effective Date	Authorisation
1	First Issue	31/01/13	M. Holmes
2	Second Issue – logo, references and further detail/clarification.	18/09/15	T. Bamber
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1.0	**SCOPE OF WORKS** This operating procedure states the methodology and documentation required to undertake sampling and monitoring of vapour, liquid and solids.
2.0	**GENERAL INSTRUCTIONS** This Standard Operating Procedure (SOP) identifies best practice for the sampling, Analysis and Monitoring of Vapours, Liquids and Solids. However due to the inherent nature of site investigation and other operations undertaken by CELTIC site conditions and restrictions will dictate the exact methodology to be used on a site specific basis. In the event that a step can not be completed all work is to stop, the equipment and/or system made safe and Client Project Manager or delegated representative informed. Any irregularity or discrepancy discovered whilst carrying out the instructions of this method statement is to be brought to the attention of the Client Project Manager or delegated representative. All HOLD POINTS and KEY POINTS contained within this operating procedure are to be strictly observed.

	All plant and equipment needs to have valid inspection, testing and conformity certification prior to works commencing. Details of the above will be recorded by the site engineer / manager. All personnel must be competent in the tasks they are undertaking.
3.0	**PERSONNEL REQUIREMENTS** CELTIC personnel
4.0	**RELATED DOCUMENTATION** Site Specific Health and Safety Plan Report (to include risk, COSHH, PPE and Manual Handling Assessments). CELTIC Quality Manual (on EnGlobe Intranet) CELTIC Standard Operating Procedures (SOP's)(on EnGlobe Intranet) Equipment Calibration/Service/Inspection Certificates SAR-EC-03 Site Equipment Calibration Record Form
5.0	**SPECIAL TOOLS, MATERIALS AND EQUIPMENT** Laboratory supplied Containers Laboratory supplied cool boxes, ice packs and packaging materials Field analysis equipment (e.g., Photo Ionisation Detector (PID), Water Test Kit, Dissolved oxygen meter etc.) Low flow controller Peristaltic Pump/Wasp Pump or similar Bailers Spade Trowel Cleaning Materials
6.0	**PRE-COMMENCEMENT** All operatives undertaking this work are to read and understand this procedure and related documentation.
7.0	**CONTINGENCY PLANS** <u>In the event of an accident/incident</u>: STOP WORK immediately and inform first aider (if necessary), CELTIC Health and Safety Manager and Project Manager. Undertake necessary action depending on severity, emergency aid, reporting, recording requirements etc. as detailed within the Emergency Response Procedure (SAR-IMS-11 Emergency Preparedness and Response Procedure) and Incident Reporting Procedure (SAR-IMS-04 Incidents, Non Conformance, Corrective and Preventive Action) available on the EnGlobe intranet. In the event of a wound carry out emergency aid and initial wound monitoring.

	Remove all contaminated clothing to reduce risk of skin absorption. If the wound is exposed to contaminated materials it should be washed with copious amounts of water. If the injury is serious and there is no risk of further injury by moving the casualty, then they must be taken to the nearest accident and emergency department as detailed in the Site Specific Health and Safety Plan. If the casualty cannot be moved or the injury is life threatening an ambulance must be called (Tel: 999 site mobile). A copy of the COSHH (Control of Substances Hazardous to Health) assessment for the site is to be passed to medical personnel if the casualty has been contaminated. **All incidents are to be added to the incident report form on the Englobe intranet as soon as possible after the accident/incident by the CELTIC Site Engineer** (EnGlobe Corp. > English > Quality, Health-Safety and Environment (QHSE) > United Kingdom > Incident Report 2013: 'Respond to this Survey').
8.0	**PREPARATION** CELTIC Project Manager and Client Project Manager/delegated representative will review the Site Specific Health and Safety Plan Report, including risk, COSHH, PPE (Personal Protective Equipment) and Manual Handling Assessments. **KEY POINT** For all sampling operations manual handling is to be assessed to assure weights of containers are suitable for the operative. CELTIC Site staff will have available all information relating to buried services, structures etc. as identified during the Services Identification Survey. CELTIC Site Engineer to confirm methodology is appropriate and valid. CELTIC Site Engineer to ensure that appropriate action is undertaken in relation to the Health and Safety Plan e.g. correct PPE being used, area is as safe as reasonably practicable. CELTIC Site Engineer to ensure that all instruments are calibrated in accordance with manufacturers instructions prior to being used. The area is to be cordoned off with appropriate barriers/fencing/signage where there is a potential for contact with unauthorised personnel.
9.0	**METHODOLOGY**
A	**VOC Monitoring of Ambient Air** During the sampling works CELTIC are to undertake ambient air (AA) monitoring for volatile organic carbon (VOCs) using a PID, where required by the COSHH Assessment. The PID Trigger and Action concentrations will be set in accordance with the COSHH Assessments for the site, taking account of all likely potentially harmful

	substances and their expected concentrations. The results of the monitoring are to be recorded on SAR-PC-32 - Environmental Permit Monitoring Proforma and retained within the site file for inspection. **KEY POINT** If average ambient concentration over a 15 minute period consistently exceeds the set ACTION concentration all work is to stop IMMEDIATELY; the area is to be evacuated. A review of PPE and working procedures will then have to be taken with the Celtic site manager and in line with any contingency plans for the site.
B	**VOC Monitoring of Solid Samples** Selected soil samples taken during sampling operations are to be screened in the field for the presence of VOCs using a PID. The soil samples will be placed in a suitable container (e.g. sampling jar, plastic bag etc.). After 10 minutes the VOC concentration in the container will be measured using the PID. All monitoring results are to be recorded within the site file. The containers will then be resealed, stored (under appropriate conditions for the required analysis) and sent to the laboratory for analysis or disposed of in accordance with site and Waste Management Duty of Care Regulations.
C	**Solid Sampling** Solid samples are to be retrieved (either by hand or using a cleaned sampling tool) directly from surface soils, drill returns during borehole drilling or sampling tubes during window sampling or from materials retrieved by excavator during the excavation of trial pits. During drilling field samples are to be recovered (typically at 0.1m – 0.25m –0.5m then at 1m intervals, from depths where significant lithological changes are noted and where visual assessment indicates significant contamination). The field samples selected for storage or laboratory analysis are to be placed in laboratory supplied containers appropriate for the analysis proposed. The samples are to be labelled with sample ID, date, location, site name, project No. and depth. The samples are to be packaged within the containers supplied prior to shipment to the laboratory. **KEY POINT** No one is to enter into the excavations without appropriate approval and possession of a valid permit; SAR-PC-22-General Permit to Work/SAR-PC-26 – Excavation Permit is to be completed and recorded in the site file by the Site Manager, with a copy to be forwarded to the SHE Representative. Field blanks are to be supplied by the laboratory and returned with the samples.
D	**Groundwater Sampling and Level Gauging** **KEY POINT** Groundwater sampling is normally undertaken after a time period has elapsed since well installation to allow conditions to equilibrate.

	In well measurements are to be made using an interface probe, allowing detection and measurement of light non-aqueous phase liquids (LNAPL) and groundwater. Depths to LNAPL and groundwater interfaces are to be measured relative to top of well casing and ground level. If no NAPL is suspected a dip meter may be used to gauge the level of groundwater within the monitoring well. **HOLD POINT** If LNAPL is present then it should be sampled by slowly lowering a bailer into the product column. Water samples will also be collected. Samplers are to ensure that no NAPL is present within the groundwater samples. **KEY POINT** Decontaminate the interface or dip meter after each use, by rinsing with clean water. Prior to sampling, a maximum of three well volumes of groundwater to be purged using dedicated equipment. Purged waters will be fed directly into storage containers prior to disposal. In accordance with CELTIC personnel assessment, the appropriate purging equipment will be chosen. Available purging equipment to include Waterra tubing, peristaltic pumps and bailers. The purged waters are to be disposed in accordance to site regulations and Waste Management (Duty of Care) Regulations. **HOLD POINT** If purged waters are obviously contaminated contact the CELTIC Project Manager for advice on disposal. Following recharge of the well, sample(s) are to be retrieved using dedicated equipment or peristaltic pump. Purging will cease once the in-situ parameters have stabilised (i.e. when three successive readings are within +/- 0.1 pH, +/-3% conductivity, +/-10mv redox and +/- 10% DO measured by multi-parameter probe or when a maximum of three well volumes have been removed as CELTICs standard practice. The flow of water should be reduced to a steady trickle (around 0.5-1l/min to reduce drawdown), with bottles held at an oblique angle with water running down the inside wall of the container. Samples for VOC analysis should be filled so that no air remains in the container (tip vial upside-down to check for air bubbles). **KEY POINT** The time allowed for groundwater recharge into the well is to be decided by CELTIC site personnel based on groundwater conditions. In-situ testing of pH, dissolved oxygen, conductivity, redox, temperature etc. can be taken using portable probes in accordance with the appropriate instruction manuals. The water samples selected for storage or laboratory analysis are to be placed in laboratory supplied containers appropriate for the sample and proposed analysis. The samples should be labelled with sample ID, date, location and project No. The

	samples are to be stored on site prior to shipment to the laboratory in the laboratory suppliers transportation boxes. Field blanks to be supplied by the laboratory and returned with the samples. Visual characteristics, which include the presence or absence of any free product or sheens to be noted and all samples handled appropriately. If free product is retrievable, separate samples are to be taken. Relevant details are to be recorded within the site file.
E	**Surface Water Sampling** Sampling of drains, culverts, streams and of other surface waters are to be completed by lowering suitable clean sampling containers into the watercourse at defined locations and where appropriate transfer the retrieved samples into laboratory supplied bottles. Surface water sampling from water bodies should be risk assessed, undertaken in pairs and appropriate rescue equipment provided/carried as appropriate. **KEY POINT** Do not enter confined spaces (drains, manholes, culverts, etc.). Ensure area near water is stable and readily accessible before sampling.
F	**Chain of Custody** Laboratory supplied chain of custody forms are to be completed by CELTIC personnel according to laboratory instructions. The completed forms are to be submitted with the samples to the laboratory with a copy retained within the site file. Any surplus sampling containers are to be returned to the laboratory with the samples, and not returned to the office for storage.